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Student Perceptions of How Partnership Influences Development of Graduate Attributes, Identity, and Belonging

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Abstract

Universities have a responsibility to prepare their graduates for life within the workplace and community; students and future employers expect that graduates have developed a certain skillset. One way to develop these skills is through students as partners initiatives, which are projects and programmes that position the expertise of the student as equally important to the expertise of the staff/faculty partner. Engaging in students as partners initiatives has been shown to carry numerous benefits for students beyond facilitating employability and has been adopted across many higher education institutions. This study examined the effects of students' involvement in students as partners initiatives on their perceptions of their development; students' perceptions were collected on seven graduate attributes - communication, academic writing, teamwork, critical thinking, content knowledge, quantitative skills, and qualitative skills – and on students' sense of identity and sense of belonging. Students across four Science, Technology, Engineering, and Mathematics (STEM) Schools at the University of Edinburgh, as well as students who have completed specific partnership initiatives, were reached out to through questionnaires, focus groups, and interviews. Students reported that partnership allowed them to explore and build confidence in skills they would otherwise not focus on at that point in their education. Students also perceived partnership to be central in helping them build their sense of belonging within their discipline or School and in helping them identify their academic community. Similarly, students who engaged in partnership reported a more diversified identity beyond their student identity. Students also shared their perceptions on how the COVID19 pandemic has affected their studies and the mitigating effects that partnership often had in helping them deal with these changes. Finally, the study explored instances where students participated in what they perceived to be partnership, but which typically would not be labelled as partnership within the academic literature. Importantly, students reported gaining some of the same outcomes from these perceived partnerships as the literature commonly reports for students as partners initiatives, suggesting that experiences do not need to meet the criteria of full partnership to offer positive outcomes. This study further identified two elements present in many perceived partnerships, which could be encouraged throughout the formal, credit-bearing undergraduate curriculum to improve outcomes of more students.

Lay Summary

As students progress through their undergraduate university studies, they develop skills and abilities beyond content and disciplinary knowledge. These skills, such as teamwork, and communication, can help students find jobs and become active members of their communities upon graduating. In addition, students have the chance to define who they are throughout their studies and become part of diverse communities.

Many universities structure their programmes in ways to ensure all their graduates can develop the desired skills, abilities, and identities by the time they graduate, often seeking to develop these skills through significant experiences during the student's education. One such experience can be becoming engaged in collaborating with university staff, in initiatives called students as partners (SaP) - experiences where a student's expertise is considered just as important as the staff members they work with. These partnerships can take many forms, from class interactions to long-term projects. Working in partnership has been shown to be a good way for students to improve their skills, build relationships with their peers and university staff, and explore their interests. Partnership can also be a way to build resilience and learn skills that may be otherwise less often prioritised during their degree.

This study explored the connections and interactions between how students learn different graduate skills, develop their identity, and find their sense of belonging throughout their studies; and how involvement in partnership can affect this development. In the study, students were asked for their perceptions and opinions on the topic using focus groups, interviews, and questionnaires. Students completing their studies across four Science, Technology, Engineering, and Mathematics (STEM) Schools at the University of Edinburgh were invited to give their perceptions on their studies and experiences of partnership. Students taking part in courses and initiatives specifically involving partnership were also invited to provide their perceptions. Throughout the duration of this study, the world experienced the pandemic of COVID19, which forced majority of teaching and learning out of in-person spaces into hybrid or fully online learning. Consequently, students also offered their perceptions and experiences of this unique situation. The three student groups involved in the study were affected similarly to many of the other students studying at the University of Edinburgh.

Students taking part in specific partnerships had to complete their projects online or not work on them during the pandemic. All students had to adapt to the new situation and new mode of learning, influencing their perceptions of their experiences, their identity, and their sense of belonging.

Undergraduate students across all year groups shared their perceptions in the study. Different skills and attributes became important to students as they progressed through their degree. Students considered graduate attributes such as content knowledge as most important in earlier years, with higher year students considering skills such as communication as the most important and most developed. Students did not see many changes to their identity, but they reported narrowing down the community group that they felt they belonged to as they progressed, from the general sense of belonging to the University to belonging to their School in particular, to sometimes belonging in their degree or academic field group only.

This changed when students participated in partnership. Through partnership, students reported learning more diverse skills and defining themselves as more than just a student. Interestingly, learning experiences with two specific elements of partnerships were usually identified as partnership by the students: experiences with increased student agency development and experiences with a strong relational component. Experiences with increased student agency development, such as Student-Led, Individually-Created Courses or project-based assessments, provided students the flexibility and freedom to explore different avenues of learning and consequently learn a variety of skills, which allowed the students to better adapt to new contexts such as the pandemic. These projects also increased the students' sense of belonging to the University and sped up the rate at which students' sense of belonging strengthened to their School or discipline. Next, experiences with elements of partnership was that in which students perceived that they were experiencing partnership due to building genuine relationships with their staff counterparts within mainstream teaching, such as engaging in live lectures or tutorials. This gave students greater opportunity to develop skills such as communication, resulting in better outcomes for students in relational skills and a heightened sense of belonging. If the partnership experience happened within a professional field, such as through work experience, then students reported feeling an increased sense of belonging to that discipline as well.

This study has shown that partnership could be an important tool for universities to help students develop different skills and increase their resilience to unpredictable situations. It could also help the students feel part of the university and could help them gain skills for employment. Crucially, this

study has shown that students can experience benefits of partnership (such as engagement, interaction, and positive relationships with staff) by taking part in initiatives and experiences that have some of the characteristics of partnership, but not necessarily all of them, making it more feasible for staff and students alike to do so.

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List of Abbreviations and Acronyms Used

COVID19	Corona Virus Disease 2019
Dr.	Doctor
Eds.	Edition
Feb	February
Gp1	Group 1
Gp2	Group 2
HE	Higher Education
HIPs	High Impact Practices
IAD	Institute for Academic Development
Nov	November
NSS	National Student Survey
No.	Number
Oct	October
QAA	Quality Assurance Agency
Q&A	Questions and Answers
SaP	Students as Partners
SLICCs	Student Led, Individually Created Courses
SPA	Student Partnership Agreement
STEM	Science, Technology, Engineering, & Mathematics
STEM S1	STEM semester 1 student data group
STEM S2	STEM semester 2 student data group
UN	United Nations
Vol.	Volume
WWOOF	World-Wide Opportunities on Organic Farms

Declaration

Unless otherwise stated, the candidate confirms that the research undertaken, and the text submitted is her own work, and was not submitted for any other degree or professional qualification. The candidate further confirms that all work conducted by others that was mentioned in this thesis is referenced and credited as appropriate.

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Chapter 1 Introduction

This Chapter serves as a brief introduction to the motivations and focus of this study, as well as introducing each chapter in turn to give the reader an overview of the work.

1.1 Motivation

Becoming well-educated and highly skilled in a chosen field is at the forefront of students' motivation to pursue higher education at undergraduate and postgraduate level. Likewise, students gaining employability skills before their transition into the workforce is essential for a well-functioning society, and to the success of a university as a whole (Newman & Jahdi, 2009). Consequently, facilitating the teaching of skills that ensure students are suitably prepared to join the workforce has been at the forefront of higher education (Lipan et al., 2020), with what skills are considered necessary being subject to the employment market. This can make the completion and achievement of a degree a necessary point in an individual's journey to secure employment, making the degree an essential outcome for the individual and making them in effect clients of the university, rather than members of the university community. As a result, universities have needed to institutionalise marketing policies developed since the 1970s (Furedi, 2011) in an attempt to remain competitive against other higher education institutions (Keating, 2005; Natale & Doran, 2012; Wedlin, 2008). This often results in the higher education sector seeing the student as consumers rather than colleagues and co-creators of knowledge.

This push towards consumerisation may however not be in best interest of students, who rather than feeling empowered by the university's focus on employability may instead feel themselves to be a product of the university and not an individual member of it. Consequently, students may be less likely to engage with their studies (Dicker et al., 2019), resulting in them failing to develop a

sense of belonging to the university's community and reduced chance to build strong relationships with their peers and university staff.

Student partnership, where students can engage with their staff counterparts on a more equal level, is a growing field within student engagement and often aims to combat and contest this transactionary, consumerist version of universities (Mulya, 2019). Within this space, students move from the role of a consumer of education to a partner or co-creator of their education (Healey et al., 2014) with an active voice (Huxham et al., 2017), directly challenging the idea of the student as a consumer of university education. Partnership offers the opportunity to build relationships between students and staff/faculty and can create greater connections to the university itself (Gravett et al., 2019). Partnership also aids in creating a sense of community (Bickford & Wright, 2006). This engagement and building of relationships within the university could then in turn serve to improve students' engagement with their studies and their achievement of employability skills.

Creating and trialling diverse ways to achieve graduate attributes is important within the rapidly changing global context. While not an initial motivation for this study, the global COVID19 pandemic exemplified some of reasons why students as partners (SaP) should be considered as a more mainstream learning strategy. Throughout the duration of this study, all teaching and learning occurred in hybrid or fully online spaces due to the restrictions brought about by the COVID19 pandemic. While the switch in learning mode brought about positives for many students, such as being able to express themselves more readily within these new spaces or allowing students to stay at home, the situation brought with it multiple negatives as well. Beyond the adverse mental health effects to students and staff brought on by the isolation and uncertainty of the situation, students also had to adapt to a different approach to learning and interacting with little or no prior preparation. While these changes to the mode of education were extreme, similarly fast changes in context and education delivery may occur again (for instance due to climate change triggering another pandemic or adverse weather events), exemplifying the need to learn from the experiences of hybrid and online learning to inform the design of learning for future generations and find robust ways to engage students in the future. Student partnership could be one possible way to collaborate in negotiating future ways of learning and teaching, to foster strong student engagement, and to support students' development of graduate attributes.

1.2 Focus of Study

Throughout the study, the effects of partnership and elements of pedagogic partnership on students' educational outcomes were examined. The study's main focus was evaluating the effects of these partnerships on multiple aspects of students' learning and identity. The research questions addressed by this thesis are:

1. How do students' perceptions of their graduate attribute development change and differ throughout their degree?
2. What are the immediate and persistent effects of students as partners (SaP) initiatives on students' perception of their confidence, improvement, and development of their graduate attributes?
3. How do students' identity and perception of belonging in the academic and professional community change with involvement in students as partners initiatives?

Beyond these questions, the study also aimed to examine the intersections of each of the themes of graduate attributes, students as partners, identity, and belonging, as well as exploring the different themes that emerged from the data. Furthermore, the study takes into consideration the effects of the COVID19 pandemic on students' engagement, mental health, and perceptions of their future.

To answer these questions, the study uses a mixed methods approach, employing the use of questionnaires, focus groups, and interviews; asking students about their studies in general and their experiences of partnership. The data generated was interpreted through the theoretical perspective of interpretivism, with some influences from critical inquiry, and considered using a social constructionist epistemology.

1.3 Thesis Structure

This chapter aims to orient the reader to the study and outlines the structure of the thesis. Chapter 2 Background provides a thorough and nuanced look at the background literature of the concepts that frame this thesis - student partnership, graduate attributes, identity, belonging, and perceptions –

and outlines the context of the study. Chapter 3 then introduces the methodology and methods used throughout this study.

The following two chapters present the results of the study: chapter 4 discusses the data collected during the questionnaire phase of the data collection and chapter 5 then goes on to outline the themes that emerged through the focus groups and discusses the connections to the questionnaire data.

The following chapter, chapter 6 discusses the results and critiques the findings by positioning them in the wider literature as well as exploring the implications and limitations of the work. The final chapter, chapter 7, aims to consolidate the entirety of the thesis by highlighting the central themes and considers potential future avenues for related research. It also includes overall conclusions from the thesis.

Finally, References and Appendices follow.

Chapter 2 Background Literature

This chapter serves as a thorough review of the literature surrounding this study. As this study aims to combine multiple, often separate fields, the chapter introduces each concept in turn before synthesising all concepts together.

In the first section, the concepts of student partnership, belonging, and identity are addressed from the perspectives of pedagogical research, psychology, and sociology. These concepts are first approached separately in turn, with connections between them being drawn in later parts of the chapter. The second section introduces the concepts of graduate attributes, both as markers of achievement used by many institutions, and in their pedagogical use. As this section provides a holistic overview of graduate attributes rather than an in-depth analysis of the graduate attributes selected for this study, a second graduate attribute section is included in the methods chapter to ensure all necessary detail is provided (please refer to section 3.5 on page 62). The third main section focusses on the concept of perceptions, their use in research, and their basis in psychology and sociology. Rather than explicitly arguing for their use, the section explores the advantages and disadvantages of using perceptions as data. The chapter then delves into the contexts in which this study took place, explaining the study context at the University of Edinburgh, as well as the context of the Student-Led, Individually-Created Courses (SLICCs) and the Student Partnership Agreement (SPA). Finally, it expands on COVID19 pandemic that occurred throughout the entirety of the data collection and analysis phases of this study.

2.1 Partnership, Belonging, and Identity

This section provides details of the different aspects of student partnership, identity, and belonging as understood and used in this study. The section is structured to introduce each of the concepts in turn, first fully describing the definitions chosen for this study and then positioning these definitions

within the wider literature. Next, the research surrounding each of the concepts is analysed, including multiple common theoretical framings, before describing the framing used within this study.

2.1.1 Student Engagement and Students as Partners

Students as partners is an ideology under which every participant in a particular initiative has the opportunity to contribute equally though not necessarily in the same way to that initiative (Cook-Sather et al., 2014). Within students as partners initiatives, every participant's expertise is seen as valid and valued, even if that expertise varies substantially, with great variation of what can be done and what is even considered partnership (Mercer-Mapstone et al., 2017). In practice, partnership can mean many things, for example realising the wealth of experience students have of being students, involving them in designing new courses, and working with students to set their own assessments. Internationally, there is great interest in the field with specialist journals (International Journal for Students as Partners; Journal of Educational Innovation, Partnership and Change; Teaching and Learning Together in Higher Education, Student Engagement in Higher Education Journal), increased publication of articles in mainstream higher education journals, and many blog posts (see for example Abbot, 2019; Bovill, 2018; or Park & Hudson, 2018).

There are multiple definitions of partnership used in the context of the students as partners literature that need to be explored to adequately understand the concept. Perhaps the most common definition of student-faculty partnership is as *"a collaborative, reciprocal process through which all participants have the opportunity to contribute equally, although not necessarily in the same ways, to curricular or pedagogical conceptualization, decision making, implementation, investigation, or analysis"* (Cook-Sather et al., 2014a, p6-7). This definition is intentionally broad as there are large differences between initiatives that can be considered partnership; the main identifier of students as partners initiatives is that they are projects and programmes that position the expertise of the student as equally important to the expertise of the staff/faculty partner (Cook-Sather et al., 2014 pp. 27; Huxham, 2007). For example, students' knowledge and experience of being a student is considered equally important to the academic's subject knowledge and teaching experience when co-designing curriculum. In other words, students and staff are bringing equal expertise to the collaboration; this equality does not mean that the expertise is the same, but rather that it is being valued in the same way. In short, partnership explicitly values the different expertise brought by each partner.

Worldwide, universities have become increasingly marketized; institutions are using business practices and models to ensure they are competitive against other higher education institutions (Natale & Doran, 2012; Wedlin, 2008). The extent of this marketization varies by country, for example being somewhat less pronounced in Scottish universities than in English institutions, in large part due to different student funding structures and quality assurance systems (Keating, 2005). Rather than treating students as customers of the university, students as partners offers the possibility of a more inclusive relationship between students and staff/faculty and to the university itself (Gravett et al., 2019), and creates community (Bickford & Wright, 2006). This is because through partnership, students are seen as having an active voice in their education and university journey, and rather than being customers, students are encouraged to consider themselves as colleagues alongside academic staff (Huxham et al., 2017).

It is also important to understand partnership within the broader category of student engagement (Bryson, 2014; Kahu, 2013). As with partnership, there are many definitions of student engagement. This is a notoriously difficult concept to define, with multiple meanings stemming from diverse historical contexts (Dunne & Owen, 2013; Jensen & Bennett, 2016; Kuh & Hu, 2001). The term has broadly come to denote the level of students' interest or involvement in their learning as well as their connection or interaction with all aspects of the university experience (Axelson & Flick, 2010). Further, many common definitions stress that engagement is two sided; it is not just what involvement students have in their learning, but also the role that institutions play to induce students to engage (Kuh, 2001; V. Trowler, 2010). Within these definitions, partnership can be considered a type of engagement.

The level of student engagement at a particular university has long been argued to be a factor tied to the overall quality of education at that university (Coates, 2005; P. Trowler & Trowler, 2010), and as a result, multiple countries have strived to measure engagement in national surveys. For example, the National Survey of Student Engagement is used in North America (Kuh, 2002; Kuh & Umbach, 2004; The Trustees of Indiana University, 2019). In the United Kingdom, the National Student Survey (NSS) is the largest national survey, but it focusses on student satisfaction rather than engagement, as well as only surveying final year students (Buckley, 2012; J. T. E. Richardson et al., 2007; J. Williams et al., 2008). This led to the creation of the UK Engagement Survey in addition to the NSS, which has been used at up to 42 institutions since 2015, with 18 institutions participating in 2020 (Neves, 2018, 2020). The UK Engagement Survey is largely derived from its US counterpart and isn't as widely adopted as the NSS in the UK (Howson & Buckley, 2017).

Finally, whilst the terms *student engagement* and *students as partners* appear to be emerging as dominant terms, especially in the North American context, it is important to note that these terms are often contested and critiqued (Cook-Sather, 2006). Not everyone identifies with the terminology of partnership or agrees on specific terms; consequently, partnership initiatives and practices can be denoted by a multitude of terms. This is well captured by Dunne (2016, pp.3), who provides an illustrative list of widely used synonymous terms:

“Students as Partners, Student Partnerships, Student-Staff Partnerships, Students as Researchers, Students as Co-Researchers, Students as Learners and Teachers, Students as Change Agents, Students as Change Makers, Student Fellows, Student Colleagues, Students as Producers/Co-Producers, Students as Co-creators, Students as Co-constructors of knowledge, Students as Champions, Engagement in learning, in active learning, in reflection, in enquiry; Engagement with the institution, Engagement as practice, Epistemic Engagement, Civic Engagement, Community Engagement, Work-based Engagement.”

2.1.2 Research on Students as Partners

There are many forms of students as partners (also referred to within this thesis as partnership or SaP), with various amount of research associated with it. As such, any discussion of the research literature around partnership should first be framed within the relevant type and form of partnership. This section endeavours to explore the categories commonly present within literature and thus broadly map the field.

As more universities implement institutional partnership project schemes, the research around formal student partnerships has expanded. Historically, student partnership initiatives tended to be small, and highly specific (Mercer-Mapstone et al., 2017). The scale and diversity of partnership initiatives has been growing steadily as partnership approaches and participants diversify (Mercer-Mapstone & Bovill, 2020). However, it is almost impossible to generalise from currently available case studies (which, to be fair, rarely tends to be their aim) and extrapolate to other contexts (Healey & Healey, 2018).

There have been multiple attempts to categorise and subdivide partnership approaches using different common attributes of partnerships. Partnership is often categorised by the output of the initiative. For instance, Healey et al. (2014) proposed a popular model dividing partnership initiatives

into four categories – learning, teaching, and assessment; curriculum design and pedagogic consultancy; subject-based research and inquiry; and scholarship of teaching and learning. Alternatively, partnership could also be divided based on the role a student plays within the partnership, such as whether they are for example a representative, co-researcher, consultant or pedagogical co-designer (Bovill et al., 2016) or how engaged they are in an initiative (Dunne & Zandstra, 2011). These models also take into consideration that partnership tends to be fluid, with students often switching between roles. There are also typologies that employ a multitude of these categorisations to enable a more nuanced understanding (Bovill, 2019).

Ultimately, partnership tends to be specific to each initiative and hard to generalise, so no one categorisation system has yet emerged as definitive. This lack of classification may be considered desirable as it enables a more open notion of what can be considered partnership, as well as allowing academics and students more freedom to initiate projects and initiatives without requiring institutional buy-in. Conversely, the lack of categorisation can also be problematic as it may reduce the ability of those working in this field to share innovations clearly and may reduce opportunity for discussion about specific issues within the field. Nevertheless, the lack of overall categorisation has led some researchers to attempt to characterise and map the field by examining published literature. One of the more comprehensive summaries was a systematic literature review focussed on literature within the 2011-2016 year range, and associated papers (Matthews, Cook-Sather, et al., 2019; Matthews, Mercer-Mapstone, et al., 2019; Mercer-Mapstone et al., 2017). The initial publication from this series gave a wide overview of the students as partners research, focusing mainly on how partnerships are represented in academic literature. This included showing that just over half of published accounts of partnership from that period were small scale or not specified in size (altogether 51%), students partnered mostly with academic staff and other students, and partnerships occurred most often in the space of curriculum design and pedagogic consultancy. This research also produced a comprehensive overview about the outcomes and inhibitors of engaging in partnership (Matthews, Mercer-Mapstone, et al., 2018). The researchers further enquired into the dataset collected by Mercer-Mapstone et al. (2017) and identified several overarching outcomes that appear to matter during both positive and negative partnership experiences. The main outcome was to changes in interpersonal relationships between partnership participants, showing that relationships are at the forefront of partnerships; a position that has been corroborated by other work (Bovill, 2020a; Felten, 2019; Felten & Lambert, 2020; Hermesen et al., 2017). However, the data used in the systematic review and associated papers also suffers from multiple limitations. Firstly, the review only included papers that self-described as students as partners, and therefore missed a

significant proportion of the literature that did not use that specific language, but instead used terms such as co-creation, co-design, students as change agents. The principal limitation of the Mercer-Mapstone et al. (2017) systematic review is that it should be considered as an overview of the published work around 'students as partners' projects within the specific dates surveyed, rather than presenting the true state of the partnership or the broader student engagement field. This is because most research around partnership focuses on the small-scale, well defined partnership projects; however, some classroom-based partnership work is missed as it tends to be published in more generic higher education learning and teaching journals, some of the work may not be labelled as partnership, or it remains unpublished and shared internally (perhaps because some teachers see classroom partnership approaches as a natural way of teaching). There may also be some problems with the mapping of the literature, where the original model by Healey et al. (2014) has many overlaps between the categories, for example, some would consider learning, teaching, and assessment to be part of curriculum design, others would consider quality enhancement to be part of curriculum design, learning and teaching.

The attempts to map the partnership field through published research and through conceptual nuances have uncovered important gaps in the research literature. While authors tend to report a range of outcomes and effects these partnerships had on the students upon completion, the studies tend not to follow-up about these effects at a later date due to the small scale and short-term nature of most partnership initiatives (Matthews, Mercer-Mapstone, et al., 2019). Whilst many of these studies demonstrate that partnership enhances the outcomes of students in the short term, it may not be appropriate to extrapolate and assume that these benefits are retained some months or years after the partnership experience finishes. The long-term effects of partnership initiatives may be hard to measure, and students can move on from partnerships and indeed out of the tertiary education setting quite quickly. One possible solution to this is to use graduate attributes as a possible 'measure' of partnership outcomes. All students are poised to develop graduate attributes to some extent (whether they are explicitly aware of it or not), but the effect of partnership initiatives on students' graduate attribute development is as yet under-researched, perhaps because graduate attributes develop gradually over time and their development may not be fully evident throughout the partnership or immediately after its conclusion (but could become evident upon reflection after an initiative has concluded). For instance, Pauli-Jones et al. (2016) showed a correlation between SaP pedagogy and perceived attainment of graduate attributes; similarly, Owusu-Agyeman & Fourie-Malherbe (2019) has suggested students as partners practices can stimulate the attribute of civic engagement. While links between graduate attributes and

partnership are yet to be fully elucidated (Chng, 2019), graduate attributes may become useful predictors for evaluating effects of partnership.

There have been a number of longitudinal studies that concern issues related to partnership without specifically looking at the higher (tertiary) education student-staff partnership initiatives themselves (see for example Bernold et al., 2007; Boston et al., 2017; J. N. Hughes, 2011; Keen & Hall, 2009). Studies that mention student-staff partnership initiatives explicitly tend to not be longitudinal studies. Often, researchers will review the entire body of work in partnerships in one specific institution. Zdravković et al. (2018) searched through a decade's worth of student engagement initiatives in their faculty's archives to identify the best initiatives for fostering student engagement. Similarly, Becker (2019) provides an account of nine years of partnership, but does so on a personal, self-reflective level without providing any long term outcomes. As mentioned above, partnership initiatives are usually short-term and informal; consequently, the research into partnership tends to be similarly short-term and informal, with longitudinal studies being quite rare. Similarly, most funding tends to be short term, through for example institutional teaching development funding. The same issues that create challenges to the establishment of partnership initiatives also create challenges for research into those initiatives, such as lack of funding, institutional resistance, and quick student turnover (Mercer-Mapstone et al., 2017). Any potential longitudinal studies may be disproportionately affected by these barriers. For example, the high student turnover would mean that long-term studies would have to be conducted on a sufficiently large scale to yield usable data. Similarly, institutions that don't have enough funding for educational research are unlikely to fund short-term partnership research, much less long-term studies; indeed, analysis of physics higher education research in the UK showed that most funding is short-term in nature (Hardy et al., 2014). Additionally, it is harder to identify appropriate robust measures for long-term studies. Studies of specific projects may relate to specific outcomes, but long-term effects of multiple initiatives are more diffuse and harder to measure. Finally, SaP research tends to predominantly employ qualitative methodology due to the nuanced nature of partnership.

2.1.3 Facets of Identity

Another way to look at the changes that students' experience during their time at university, is to evaluate changes to their perceived identities and feeling of belonging in a certain group. An identity is the perception of self, including all the values, behaviours, and attributes of that person (Reitzes & Burke, 1980; Sfard & Prusak, 2005; Shaw, 1999). As identities are fluid and likely to develop

throughout an individual's university study (Deirdre Bennett et al., 2017; Bowen, 2018; Erikson, 1968; Goffman, 1963; Grossberg, 1996; Rubin, 2007), changes in identity may help uncover some of the long term effects of partnership.

An individual's identities can be defined as a set of intrinsic personality characteristics that make up their perception of self (Burke, 1980). There are a number of theories about the formation and development of identity; many sociologists have argued a form of fixed identity where an individual may change identities throughout their life, but they are exchanging one fully formed identity for another until ultimately settling for a single one (Marcia, 1966; Rothstein, 1992); this idea has however been widely contested in favour of more dynamic explanations (Sfard & Prusak, 2005), where individuals have multiple aspects of identity that evolve over time and space (McCune, 2019). Conversely, educational discourse has long adopted a competing version of identity formation as a form of social construction (Goffman, 1963). Social constructionism is a theoretical perspective that suggests that any meaning and knowledge is constructed through social interactions between individuals and the environment (Davis et al., 2017; Kim, 2001; Prawat, 1992), as well as recognising the effects of language, as well as the historical, cultural, and social contexts that may affect this knowledge construction. In this way, it focusses on the social interactions as a source of knowledge above all else and considers research and investigation as a type of social action (Losantos et al., 2016). It points to the constant change in individuals and rejects the concept of the 'objective' truth, instead understanding that the discipline is constructed by people. In contrast, most inquiry within STEM tends to implicitly adhere to positivism, which is a system that recognises only knowledge that is possible to be verified through logical or mathematical proofs, and rejects any experiences not derived in some way through natural phenomena (Navarro Sada & Maldonado, 2007).

When considering identity from a social constructionist perspective, identity is seen as developing from the society and context around an individual, who can have multiple identities that are used in different contexts as appropriate (Erikson, 1968; Grossberg, 1996), that complement and compete with each other (Curwood, 2014; Watson, 2006), potentially eventually resolving to provide a coherent narrative (J. A. Taylor, 2008). It is worth further defining two ways identity could develop under social constructionism (see page 37 for further explanation), which is through the concepts of positional identity and relational identity. An individual's *relational identity* is based in the dynamics of social interactions between themselves and other individuals within the context, such as feeling comfortable to speak to others in the specific environment (Holland et al., 1998). Equally, *positional identity* refers to an individual's perceived social position in their context which is dependent on the

others present in that context and their “greater or lesser access to spaces, activities, genres, and, through those genres, authoritative voices, or any voice at all” (Holland et al., 1998, pp. 128).

To give further context to the connections between identity and partnership, it is necessary to define three types of identities – student (or learner), academic, and professional identity – each with a significant body of literature behind it. Firstly, student identity can be described as the perception of self in the student role (Shaw, 1999). It is important to note that this identity is not limited to the concepts and meanings that normally epitomise the student role (Reitzes & Burke, 1980); student identity is not the same for everyone and will change significantly throughout their life as they mature and leave formal education. In western cultures, it has been shown to form first in early childhood (Hawkins, 2005) and is reformed over and over as the context of a person’s education context changes (Rich & Schachter, 2012; Scanlon et al., 2007). Finally, student identity is sometimes talked about in terms of the different types of students that make up the student body and may be used therefore to refer to those eligible to hold the student identity. For instance, Kasworm (2005, 2010) discusses the student identity of adults over 25 years old within different contexts, whilst Yopyk & Prentice (2005) consider the identity of student athletes. These specific studies (Kasworm, 2005, 2010; Yopyk & Prentice, 2005) appropriately illustrate one of the pitfalls of student identity research, which is inaccurately viewing the student body as more homogeneous than it really is and defined only by their context. Thus, student identity can be incorrectly equated to the experience of simply being a student, without recognising the vast variation in students’ experience, or how central the student identity is to the individual (Bowman & Felix, 2017). It is necessary to recognise that there is a lot of nuance within these terms and that identity ultimately comes down to self-identification and self-perception through the cultural and social lenses adopted by individuals (Sfard & Prusak, 2005; Wertsch, 1991), rather than identification by others based on selected criteria. For example, an individual may be studying full time, but not consider themselves a student – their student identity could be non-existent or overshadowed by other primary roles – as is sometimes the case with mature students whose other identities may prove stronger (Shaw, 1999).

Next, academic identity can be understood as the identity of academics and those working within academia. More than just an identity automatically ascribed to anyone that joins academia, academic identity concerns the narratives and understandings that an individual creates and recreates about themselves as an academic (Sfard & Prusak, 2005). Research into academic identity looks at what narratives academics create about themselves and what social, cultural and historical

processes and tools are available to them (Lasky, 2005). Academic identity is distinct from student identity despite existing within the same context and seems to exist in much more of a communal space. Whilst student identity research focuses much more heavily on individual perceptions, academic identity research positions the academic firmly into their context amongst other academics employed within higher education and examines the forces acting upon the individual, from administrative changes (Winter, 2009) to the demands of their cohort or community (Churchman, 2006). Different disciplines are also recognised to be part of diverse academic territories (Becher & Trowler, 1989) and communities (Kogan, 2000) that can have very little intersection across them. In this way, academic identity is much more readily ascribed to anyone with an academic position, regardless of their own self-perceptions.

Finally, professional identity is the identity one adopts within a professional environment based on experiences, perceptions, values, and attributes (Slay & Smith, 2010). This identity goes beyond what is understood as employability in that it encapsulates achievements that are central to an individual's self-perception within a professional setting, not just the ability to gain employment (Dawn Bennett, 2016). Within the context of this study, there are several interesting facets to this identity. Students will at some point have to transition from their student identity to a professional identity, the form of which is often defined by the institution through the use of graduate attributes (Daniels & Brooker, 2014). Moving from student to professional identity is often an active, conscious process on the student's part and does not occur immediately (Joseph & Heading, 2010; Markus & Wurf, 1987), implying that students may at points experience facets of both a student and professional identity (McCune, 2009; Tomlinson & Jackson, 2019). It is also important to consider the various intersections between academic and professional identity (Nixon, 1996), as well as student and professional identity. Simply put, academia is a profession and academics thus possess some form of professional identity relating to their academic identity (Stronach et al., 2002), and some academics will have a second professional (and academic) identity related to their discipline, for example to medicine or law.

It is important to distinguish the concepts of role and identity when observing identity evolution. Social roles are the parts individuals adopt and play out as members of a specific social group; each role comes with a set of expected behaviours that the individual understands are appropriate for the role (Heiss, 1981). These roles are extrinsic in nature and are set by the social group, rather than the individual. Individuals can be socialised into a specific role through reactive and proactive processes, and eventually adopt aspects of the role as part of their intrinsic identity, thus connecting the two

concepts (Howkins & Ewens, 1999). This can be seen in the intersection of student and professional identity. As students become engaged in their chosen field, they become more aware of their new prospective role and become socialised into it through for example learning ways of thinking and practising in the subject (McCune & Hounsell, 2005). Students then adopt aspects of these roles into their own professional identity through reflecting on these roles.

Every individual has multiple aspects of identity that evolve over time. Different aspects will become more or less important as an individual ages and moves between different groups. In addition to types of identity that are specifically relevant to this work, it is necessary to also consider the extent to which that identity is essential to someone's perception of self (Bowman & Felix, 2017). This construct, known as *identity centrality*, describes how important (or central) a specific membership in a social identity group is to a person (Rosenberg, 1979). For example, some mature students may not see themselves as students first and foremost because they have other more central identities such as family; in other words, their student identity is not as important to their overall self-perceptions as other aspects of themselves. If types of identity are the variables that make up the individual's self-perceptions, then centrality is the quantifier that determines which identities are most important in an individual's life. Identity centrality refers to the tendency of an individual to view themselves in terms of that identity. This view is long-term and does not change significantly between situations. Conversely, *identity salience* refers to how important an individual's identity is from situation to situation, in any particular moment (Sellers et al., 1997). Individuals will tend to behave in a way that is consistent with their central identity; this makes it a possible predictor for desired outcomes. Settles (2004) has shown that women who consider being a scientist as their central identity, achieved higher grades in their STEM majors. Furthermore, this central identity increased their satisfaction with their performance in science (Settles et al., 2009). As such, a central identity that is in agreement with the goals of an individual will improve the individual's outcomes in those goals; appropriately, this means that students that have their student identity as central would commit to their studies more and may be less likely to drop out (Bowman & Felix, 2017).

The multiple identities and group memberships that every individual develops can interact with each other to produce benefits and conflicts for the individual. In these interactions, identity centrality is a crucial lens to understand the implications of the possible conflicts and synergies. Several identity overlaps are possible. At times, positional and relational identities of an individual will overlap due to overlap of circumstances. This can happen simultaneously, such as when a student partner needs to draw on both their student and professional identities at the same time to succeed in their students

as partners project. Alternatively, the identities can also not directly intersect with each other, for example when an established professional is studying towards new qualifications; in this case, the individual's professional and student identities coexist and are unlikely to interact with each other. These intersections of multiple identities are not unusual and tend to be easily reconciled by switching which identity is the most salient in a particular moment (Tomlinson & Jackson, 2019). Identities that are not intersecting can nonetheless play a major part in task performance due to identity centrality, because the identity that is central and salient in a particular moment can affect an individual's task performance. Yopyk & Prentice (2005) showed that student-athletes performed better on a challenging mathematics test when first primed with their student identity compared to those primed with their athlete identity.

As such, interaction of identities is common – whether they are beneficial or not seems to depend in most part based on how central certain identities are to people. When two identities clash with each other, an individual can be experiencing identity interference. This interference goes beyond simple decrease in task performance (as shown above) and is associated with a number of negative psychological and physical outcomes (Keller, 1977). For example, a woman functioning in a male dominated field such as physics may experience gender-scientist identity interference, meaning she may feel that she needs to minimise her gender identity in order to better fit in with her male colleagues. Indeed, high identity interference between the scientist and gender identities has been related to lower well-being and perception of performance (Settles, 2004). Furthermore, a follow up longitudinal study showed that identity interference has a lasting impact on performance and psychological wellbeing (Settles et al., 2009). This could also be due to stereotype threat being in effect, where the influence or risk of confirming the negative stereotypes associated with an individual's racial, cultural, or gender group leads to a high cognitive load and reduced academic performance (Shih et al., 1999; Spencer et al., 1999, 2016; Yopyk & Prentice, 2005).

This intersection and fluidity of identities relates back to the practice of students as partners (Nygaard et al., 2013), especially if viewed through a social constructionism lens, the main theoretical lens employed in this study. Social constructionism places the focus on students' understanding of interpersonal interactions and discussion, suggesting that meaning is constructed through interpersonal interactions (Davis et al., 2017; Kim, 2001; Prawat, 1992). This suggests that each student will construct their own meaning of the same learning experience based on their personal meaning, with learning being an active and continuous process of constructing this meaning. Since identity can be understood through this concept, then the prolonged and personal interaction

with another identity group can influence and impact upon an individual's identity away from their primary membership group. As partnership is often based on genuine contact with each other (Felten, 2019), staff and students become agents co-constructing new identities alongside each other by influencing each other's relational identity. In other words, through partnership, student partners may feel less like students and staff partners may feel less like academics. Interestingly, most partnerships (drawing on student's expertise as a student) may in turn affirm both groups' identities by increasing the feeling of belonging (Matthews, Mercer-Mapstone, et al., 2019). In fact, developing a more secure identity is one of the outcomes sometimes mentioned as a result of partnership (Mercer-Mapstone et al., 2017). However, the connection between partnerships and identity development is still emerging and generally under-researched in partnership literature.

2.1.4 Facets of Belonging

Belonging is often researched alongside identity as their definitions can be intertwined. Belonging takes many forms, with individuals belonging to many different groups. Likewise, belonging is dynamic and can be denoted by the individual themselves as well as others (Yuval-Davis, 2006). Belonging has been structured along three major analytical levels: social locations; identifications and emotional attachments; and ethical and political value systems. First, belonging within social and economic locations denotes an individual's position in groups such as gender, race, class, nation, profession, or age-group. This belonging tends to be more visible to outsiders and has historically been the root of power dynamics and inequalities (Harding, 1991). Second, identifications and emotional attachments denote the narratives that individuals use to perceive themselves (Martin, 1995), and thus overlaps greatly with identity. Within the concept of belonging, this analytical level centres around the transient emotional investments and attachments to groups and others (Fortier, 2000; Probyn, 1996). At this analytical level, and closely overlapping with the previous study of identity, it can be argued that this is where most of the espoused relational outcomes of Partnerships occur. Both student and staff partners form new attachments to each other and to the specifics of their project, and in turn find a new sense of belonging through this change. Third, ethical and political value systems introduce value and judgement to the previous analytical levels of social location and identification/emotional attachment. At this analytical level, the categories and identities individuals can belong to are judged and their boundaries redefined (Geddes & Favell, 1999). This depends on the specific ideologies and attitudes about what categories of identity exist, and where the boundary between categories should be drawn – to an extent, it denotes the

acceptance or rejection of an individual's belonging to a specific identity and category, rather than that individual's own perceptions of their belonging (Yuval-Davis, 2006).

Throughout their life, an individual will be likely to belong to multiple communities and social groups. Belonging to multiple groups has been shown to positively correlate with well-being, aligning with the concept that having multiple avenues of self-expression and multiple memberships grounds an individual more firmly in their social world (see for example Binning, Unzueta, Huo, & Molina, 2009; C. Haslam et al., 2008; Jetten, Haslam, Pugliese, Tonks, & Haslam, 2010; J. M. Jones & Jetten, 2011). However, this relationship between number of memberships and well-being is not simple and depends heavily on the individual's self-concept (i.e. if they feel their identities within these groups are distinctive and compatible or not) as well as the wider social context of the individual (Iyer et al., 2009; S nderlund et al., 2017). Group belonging is often researched in the abstract and in relation to social identity; outside of this, belonging in multiple groups and particularly conflict between the individual's membership groups is generally researched only in the cases of multiple religious belonging (Phan, 2003), belonging of immigrants/refugees (Krzy anowski & Wodak, 2008; Pfaff-Czarnecka, 2013), or in specific cases such as in intercultural work environments (Moody, 2018).

In its own right, belonging is an important part of the student university experience. It has been identified as an indicator for student success (Yorke, 2016) and improving student feelings of belonging can also help reduce student attrition (O'Keeffe, 2013). Perception of belonging is even considered as a necessary precursor to any successful learning taking place (Beck & Malley, 1998). The logical leap to identity is that if multiple individuals share the same identity, they will perceive themselves as belonging to that group (Faircloth, 2009). This viewpoint is dangerously simplistic since an individual can experience membership in a community without necessarily identifying with that community, for example due to ideological differences or past events. For example, an international student that has lived and studied in a foreign country their whole life may struggle with feeling like they belong in their country of origin (Fail et al., 2004). However, research into perceptions of belonging does provide a helpful indicator of student's perceptions of themselves, as perceptions of belonging will give a researcher a clearer idea of the individual's positional identity. Similarly, developing a strong sense of belonging within higher education has been linked to students' participation in activities designed to foster student engagement (L. Thomas, 2012), which may suggest that involvement in student partnership may also facilitate the development of students' sense of belonging (Healey et al., 2014). Taken altogether, research into student identity

and sense of belonging has the potential to yield many meaningful insights and advice towards how educators deliver and develop teaching.

2.2 Graduate Attributes

Graduate attributes are skills and mindsets that graduates are meant to develop as a result of their education (Barrie, 2006). Multiple terms are used in literature to describe these attributes, such as key skills (Drew et al., 2002), generic attributes (Barrie, 2007), key competencies (Mayer & Australian Education Council Committee, 1992), transferable skills (Drummond et al., 1998), or employability skills (Fallows & Steven, 2000). Students' development of these attributes can be used as a measure of students' progress, with the expectation that key skills will be developed as students move towards graduation. Graduate attributes can include a wide variety of skills and mindsets, from very specific, often technical attributes such as understanding labour markets (Bridgstock, 2009) or reading comprehension (Woolmer et al., 2016) to less tangible attributes such as adaptability and confidence (Clanchy & Ballard, 1995; University of Glasgow, 2019).

Graduate attributes is a term used to refer to a range of skills that are stated as aspirational outcomes of higher education. James, Warhurst, Tholen, & Commander (2013) recognises four aspects of these skills: development, supply, demand, and deployment. Skill development concerns how and why a student develops a skill. Skill supply is the skills that are available to the labour market. On the other hand, skill demand centres on those skills that employers specifically seek out. Finally, skill deployment concerns the skills actually used in employment. Together, these four aspects specify a sort of life cycle of any skill from its development to use. According to James et al. (2013), any graduate attribute should be developed with these four aspects of skills in mind. Some drawbacks with this way of describing graduate attributes include that it is a very linear model of skills development, to imply skills are developed, supplied, demanded, and deployed. Also, it could be argued that this model ties skills too directly to employment as an end goal of education and downplays the attributes the institution aspires to develop in its graduates for the general betterment of society, such as 'global citizenship.' The ties to labour and employment are not as evident or straightforward when considering these graduate attributes. This model is also somewhat at odds with the principles of SaP due to its inherent focus on the marketisation of skills and education (Newman & Jahdi, 2009).

The use of graduate attributes has been criticised as they are often considered to be too vague and hard to implement for the university (Green et al., 2009). Similarly, they can omit key competencies (Bridgstock, 2009) and are unlikely to be relevant to all students equally (Holmes, 2013). In addition, even if a student develops all graduate attributes, it does not necessarily mean that they will secure employment, making graduate attributes a poor predictor of future employability (Holmes, 2013). Graduate attributes are set usually by individual universities to suit their stated institutional aims, and as such, they vary across institutions. Whilst institutional graduate attributes change, their purpose does not; the attributes represent an important aspirational statement of what is expected of all graduates in terms of their development.

A shared set of attributes that students should have developed upon graduating from a particular institution are set at nearly all universities, as well as by some professional bodies in specific disciplines. The use of these attributes to define goals for graduates is the same regardless of this scale, but the type of attributes tends to differ, with multiple differences between graduate attributes and learning outcomes. Course-level learning outcomes are statements of everything the student should be able to do by the end of a course and as such are always assessed. These outcomes are limited in scale and highly specific to their context, whilst graduate attributes are unassessed and more generic. At this level, it is common to find specific learning outcomes or intended learning outcomes linked to content knowledge or specific skills, which are in turn mapped to the overall graduate attributes set at a higher level.

In higher education (Undergraduate, Masters, and PhD levels as defined in UNESCO Institute for Statistics, 2012), the programme-level learning outcomes are statements of everything the student should gain from the programme as a whole; these are more aspirational and are assessed through the course-level learning outcomes and assessments, or less commonly through specific programme-level assessment (also called synoptic assessment or integrated programme assessment), which assesses students' understanding of the links between subjects across the programme, thus promoting deep learning and holistic teaching (Barber, 2009; Constantinou, 2020). As such, course-level learning outcomes must directly connect to the programme ones. Programme-level learning outcomes then often directly articulate how students will develop the University-level graduate attributes by completing the programme, as they also denote the qualities a student will develop by the time they complete or pass a specific course. Notably however, not all institutions and disciplines require this connection to be made.

Learning outcomes tend to thus be concrete and directly assessable; in contrast, graduate attributes at the whole of university level are more likely to feature more general attributes such as mindsets, outlooks, and generic skills rather than specific content or discipline-specific skills. In the middle of this scale are sometimes the faculties, schools, and colleges, whose graduate attributes tend to be a mixture of mindsets and more generalised content skills. Science faculties (and science students themselves) in particular sometimes place importance on content knowledge as one of their graduate attributes (Dvorakova & Matthews, 2019). Not every school or college will have their own graduate attributes, which are distinct from those of the wider university; notably, the Colleges and Schools at the University of Edinburgh do not have any separate graduate attributes.

Most universities have formalised their graduate attributes into an official statement or policy, and the University of Edinburgh is no exception (see Table 1). The research reported in this thesis took place within the context of the University of Edinburgh and therefore, it is important to focus on the University of Edinburgh graduate attributes, but also to base any graduate attributes used in this research study on the University of Edinburgh attributes so that they are fully relevant to the students in this study.

Professional bodies that accredit degrees also require degree programmes to meet specific criteria to be accredited. These relate to the standards that a graduate is required to reach, in order to be given membership or entry into a specific profession. These professional competencies are different from the graduate attributes discussed thus far in that they are not directly student facing. Professional bodies, such as The Royal Meteorological Society, instead set graduate competencies and accredit degrees that comply with these requirements. Finally, country-wide quality assurance agencies will often set benchmark statements to ensure all degree programmes are aligned to a similar level. In Scotland, the national programme of Enhancement Themes run by Quality Assurance Agency (QAA) Scotland aims to support ongoing enhancement of learning and teaching issues of national importance, which has included work to investigate the nature of graduate attributes and to inform national debate in this area (Nicol, 2009; QAA Scotland, 2019; Whittaker, 2008). The QAA Scotland also offers a set of benchmark statements that describe the academic standards graduates are expected to achieve following the completion of their degrees. These statements are intended to be used as reference points in designing and implementing academic programmes (Quality Assurance Agency, 2020; Whittaker, 2008).

Table 1. Summary of University of Edinburgh graduate attributes, adapted from University of Edinburgh website (University of Edinburgh, 2016).

University of Edinburgh Graduate Attributes: Mindsets	
Enquiry and lifelong learning	University of Edinburgh graduates seek personal and academic learning that makes a positive difference to themselves and to the world around them. Inspired by their exposure to world-leading research, they are innovative and lifelong learners.
Aspiration and personal development	University of Edinburgh graduates draw on their initiative and experience to expand and fulfil their potential. Making the most of a confident and reflective approach, they take personal responsibility for pursuing their goals and opportunities to grow.
Outlook and engagement	University of Edinburgh graduates draw on the quality, depth, and breadth of their experiences to engage with the communities and world around them. With an informed international perspective, they seek to contribute positively, ethically, and respectfully.
University of Edinburgh Graduate Attributes: Skill Groups	
Research and enquiry	University of Edinburgh graduates use their highly developed skills in research and enquiry to identify and creatively tackle problems, and to seek out opportunities for learning.
Personal and intellectual autonomy	University of Edinburgh graduates use their personal and intellectual autonomy to critically evaluate ideas, evidence, and experiences from an open-minded and reasoned perspective.
Personal effectiveness	University of Edinburgh graduates are effective and proactive individuals , skilled in influencing positively and adapting to new situations with sensitivity and integrity.
Communication	University of Edinburgh graduates use skilled communication to enhance their understanding of a topic or context and to engage effectively with others.

Within the context of identity literature, professional identity goes beyond just the skills and attributes that allow a candidate to be employable but includes attributes such as good citizenship or curiosity for the wider world. Looking through this lens, some of the university graduate attributes can be seen as firmly rooted in the future professional identity that students must develop to secure employment (Daniels & Brooker, 2014). As identity in specific professional groups is sometimes defined by an individual's personal abilities, it is possible to draw a direct link between identity and graduate attributes.

2.2.1 Researching Graduate Attributes

Graduate attributes have been researched extensively, from programme-specific to institution-specific to international level. Consequently, a number of researchers have endeavoured to map the literature (Osmani et al., 2015; Wellman, 2010). Osmani et al. (2015) conducted a literature review of the graduate attributes in the subject areas of business management, accounting, and computer science, showing that graduate attribute papers have been consistently published in the last ten

years across a diverse range of countries, with the highest publication frequency being from Australia, UK, and USA. Interestingly, of the papers they analysed, most used quantitative methods or a mixture of qualitative and quantitative methods to collect data; similarly, most papers used surveys to collect their data. This is in stark contrast to partnership research that tends to be mostly qualitative in nature and may be partly why these two topics rarely merge. Similarly, Wellman (2010) quantified desirable attributes for UK vocationally-focussed marketing curricula and compared them to attributes desired by employers. Finally, in Australia the National Graduate Attributes Project explored how universities achieve their stated graduate attributes (Barrie et al., 2009). Interestingly, few longitudinal studies on graduate attributes have been published to date despite researchers calling for them (Bridgstock, 2009; Harris et al., 2010). It is possible that longitudinal studies do occur but are being conducted internally as the institution's own measurement of progress and simply not published. One of the few available examples of an internal study comes from Curtin University's C2010 Project, which reviewed the longitudinal effects of embedding graduate attributes in their degree programmes over a three year period (Oliver, 2010, 2013); and detailed the challenges of embedding graduate attributes across different degree programmes.

Thanks to the extensive literature surrounding graduate attributes and the fact that most universities publish their graduate attributes on their websites, it was possible to conduct a review of the literature and of other institutions' graduate attributes to inform my choice of the appropriate graduate attributes for this study. The objective was to explore what sort of attributes are most typically referred to within higher education institutions, as well as what graduate attributes are written about the most, with the view that the ideal attributes for this study would include a mixture of both, whilst also referencing the University of Edinburgh's graduate attributes. Table 2 below summarises these findings. Overall, graduate attributes were found to be often slightly overlapping (but were rarely fully corresponding) between institutions and publications, making direct comparisons difficult, especially through a positivist theoretical perspective.

Table 2. An overview of commonly employed graduate attributes.

Graduate Attribute	Illustrative Examples
Ability and willingness to learn	Pool & Sewell (2007)
Ability to work under pressure	Walker et al. (2009)
Adaptability and flexibility	Barrie (2007)
Advanced IT and software skills	Brennan & Wellman (2010)
Analytical skills	Duke (2002)
Assertiveness	Platow (2012)
Being comfortable with uncertainty	Algeo, Thompson, Leigh, & Carroll (2018)
Capitalising on learning opportunities	Bridgstock (2009)

Computer literacy	T. Clarke, Hermens, & Clarke (2009)
Creative appraisal of problems	Albalooshi (2013)
Creative leadership	Rampersad & Patel (2014)
Creativity	Manathunga, Pitt, & Critchley (2009)
Critical thinking/appraisal	Green, Hammer, & Star (2009)
Cultural understanding	Oliver (2013)
Curiosity about field, subject, and world	Biggs & Tang (2011)
Digital literacy	Advance HE (2018)
Discipline specific skills	Normand & Anderson (2017)
Discipline/Core knowledge	Imperial College London (2019)
Enquiring mind and analytical thinking	Oliver & Jorre de St Jorre (2018)
Entrepreneurial skills	Walker et al. (2009)
Financial skills	Kavanagh & Drennan (2008)
Foreign language knowledge	Brennan & Wellman (2010)
Global and local field perspectives	Sixsmith & Litchfield (2010)
Having a global outlook	Jones & Killick (2013)
Independent working and autonomy	Walker et al. (2009)
Indigenous awareness/knowledge	Bodkin-Andrews, Page, & Trudgett (2018); Anning (2010)
Innovation	Radcliffe (2005)
Interpersonal skills	Duke (2002)
Job specific competencies	Finch et al. (2013)
Knowledge of identity, outlook, & engagement	Bridgstock (2009) or Eby, Butts, & Lockwood (2003)
Listening skills	Goby & Lewis (2000)
Managerial and leadership skills	Duke (2002)
Metacognition & Lifelong learning	Bridgstock (2009)
Motivation and Initiative	Walker et al. (2009)
Negotiation skills	Walker et al. (2009)
Oral communication ability/skills	Yap, Ryan, & Yong (2014)
Problem solving	de la Harpe & David (2012)
Professional confidence	Finch, Hamilton, Baldwin, & Zehner (2013)
Professional social capital	Eby, Butts, & Lockwood (2003)
Project management	Petkau (2015)
Qualitative skills	Dvorakova & Matthews (2017)
Quantitative skills	Varsavsky et al. (2014)
Reading comprehension	Eisner (2010)
Research and enquiry	Barrie (2012)
Self esteem	Potgieter (2012)
Self-awareness	University of Edinburgh (2016)
Teamwork & leadership	Moalosi, Oladiran, & Uziak (2012)
Tenacity, Perseverance, and Resilience	Robertson & Cooper (2011)
Transferable skills	Drummond, Nixon, & Wiltshire (1998)
Understanding labour markets	Bridgstock (2009)
Understanding of ethics and governance	Clarkeburn, Downie, Gray, & Matthew (2003)
Work/life balance	Bridgstock (2009)

2.3 Perceptions

Using an individual's perceptions about their capabilities or skills within research, stems from the idea that one's perception of oneself is vitally linked with one's objective abilities and is a widely used methodology (Schunk & Pajares, 2005). As such, this type of data can be used to analyse something that is otherwise not easily measurable. To be able to interpret perception-based data it

can be helpful to draw on psychological research that explores several self-constructs of the perception of self-competence; namely, reciprocal determinism, perceived self-efficacy, and self-competence.

According to Bandura's (1986) social cognitive theory, an individual's behaviour is the result of complex interactions between themselves, others, and the wider environment. Humans have agency, which is the proactive and self-reflective capacity to act and affect one's environment. Within this theory, Bandura describes reciprocal determinism, which is the concept that all these factors (behaviour, environmental influences, personal factors, cognition, perception, etc.) interact together in a reciprocal fashion. In short, how people interpret the results of their behaviour alters their perceptions and in turn affects future behaviour, making the individual at once the producer and product of their environment. Within the confines of this study, this would indicate for example that students who perceive their ability in a particular skill or graduate attribute to be high are more likely to participate in opportunities where they can use that particular skill or attribute. This in turn will give the student more chances to practice and perfect the skill, thus changing their ability levels to reflect their perceived ability levels. In a similar way, it can therefore be said that an individual's perceptions and beliefs of themselves can be a better basis for predicting things like well-being or engagement in tasks, than person's demonstrated abilities and past success. The above example could also be interpreted alternatively as students that believe they possess a particular skill are more likely to engage in activities requiring that skill because they have the confidence that they can succeed in that activity. This confidence to produce specific performance attainments is the self-construct of self-efficacy.

This relates to similar work about growth and fixed mindsets (Yeager & Dweck, 2012). Students who possess a growth mindset as opposed to a fixed mindset consider themselves capable of improving, or growing, which compels them to put in extra effort into a task, which eventually results in improvement. This concept, which suggests that achievement can be improved through cultivating a suitable mindset and underlying neuroplasticity has been demonstrated in children and young adults (Blackwell et al., 2007; O'Rourke et al., 2014). This concept contrasts with the deficit model in teaching where any issues with the student's attainment or progress are attributed to a personal deficit in the student or a deficit in the teacher's teaching methods or effort (Bak, 2001; Harry & Klingner, 2007).

However, it is important to note that behaviour is ultimately complex and thus the causality of self-perception of competence in a skill to performance will not always hold true. Whilst most prefer feeling comfortable and working on what they are good at, some individuals will actively identify and strive to work on their perceived weaknesses, for example a student seeking out opportunities for public speaking in order to improve their confidence and presentation skills. In these cases, a similar feedback loop is still at play, but the skill that the individual is identifying their competency in, differs to what the activity may be. In the example of public speaking, the student may for example be identifying with their self-perception of being adaptable and able to overcome challenges as their driving self-construct, rather than their weakness in public speaking.

Perceptions of self-efficacy can be gained from four primary sources. First, the most influential source of self-efficacy is previous experience and previous accomplishment (mastery experience) where individuals form beliefs based on the outcomes of their previous actions. Second, individuals can gain self-efficacy from vicarious experience when they observe others doing tasks and evaluate their outcomes. This method is especially powerful if the individual is able to draw significant parallels between themselves and the person they are observing. Third, an individual may also develop self-efficacy based on the judgements they receive from others (social persuasions). Fourth, an individual can also judge their self-efficacy based on the somatic and emotional state (such as physical and mental effects of anxiety, stress, mood) that they are experiencing when contemplating taking an action. Thus, behaviour and choices people make are better predicted through an individual's perceptions rather than objective ruling about their abilities (Bandura, 1992).

The concept of self-efficacy can explain the disconnect between how individuals sometimes behave compared to their objective abilities, as positive self-efficacy enhances accomplishment, and negative diminishes it. For example, self-doubt may stop a qualified individual from attempting a task, whilst self-efficacy may let someone unqualified apply themselves to more opportunities. Furthermore, self-efficacy can also help determine the amount of effort, perseverance, and resilience to negative situations (Schunk, 1995). Interestingly, self-efficacy is often considered a social construct in addition to a self-construct as it is sometimes collective for a group of people as a shared belief in a group's capability. For example, a doctor may ascribe the same efficacy and capability they believe themselves to have to the other doctors in their field or the doctors they graduated with; similarly, a person outside of this field will have perceptions about the abilities of doctors in their field and will ascribe them to all the members of the field. In this way, self-efficacy intersects with graduate attributes, which can thus also be defined as the school's collective belief

about what their graduates should be capable of, as well as the general public's perceptions of graduates' skills. In this light, this study can be viewed as the comparison of the collective perceptions to the individual perceptions.

Despite being from two separate fields, self-efficacy and identity are interconnected concepts (Guan & So, 2016). Importantly, both speak about the effects of perceived similarity to other members of a group. In other words, the effects of perceived membership in specific groups and associated identities. Furthermore, self-efficacy posits that the more similarity is perceived, the more an individual's actions are influenced by observing the actions of others within a specific context, and believing their abilities are similar to those they are observing (Bandura, 1977). Since more similarities are perceived with specific in-groups, it can be inferred that the more an individual is connected to a certain group, the more they believe they possess the same abilities and behaviours as the other group members (Tajfel et al., 2004). Therefore, it can be posited that individuals with a stronger perceived identity within a group will perceive a higher self-efficacy of performing behaviours associated with that group (Guan & So, 2016). The two concepts have also been empirically connected (S. A. Haslam et al., 2009; Komarraju & Dial, 2014).

Finally, it is important to address self-concept when discussing the perceived self and perceived competence. Self-concept is the individual's perception of themselves constructed from their responses to experiences and interactions with others and their environment (Shavelson et al., 1976; Shavelson & Bolus, 1982; Shavelson & Marsh, 1986). While both identity and self-concept evolve through social interaction (Millward & Kelly, 2003), self-concept is generally more personal than identity, referring to the sense of who the individual is to themselves rather than their social face, which often denotes identity (Hammell, 2006). This perception is defined through seven critical features and types - organised, multifaceted, hierarchical, stable, developmental, evaluative, differentiable (Shavelson & Marsh, 1986). Of these, hierarchical self-concept, which is defining oneself in different areas of one's life, including academic by defining one high-order general self-concept and several lower-order field specific self-concepts (Chiu, 2013; Marsh & Shavelson, 1985), connects to the previously discussed concepts of identity within a specific academic field. Students can therefore experience a narrow hierarchy of discrete academic self-concepts (for example, mathematical skills) as they progress through their degree, which helps shape their identity within a particular field.

The formation of one's perception of self is a multifaceted and complex process that progresses throughout the individual's entire life and becomes progressively more nuanced. A person's perceptions are often divergent from the objective reality, but that does not decrease the usefulness of collecting this type of data, thanks to the interactions of perceptions of self-competence (reciprocal determinism, perceived self-efficacy, and self-competence) with objective outcomes. Perception-based data's greatest strength and simultaneously their greatest weakness is that the data are subjective. This means that the data must be used carefully for it to be useful to the researcher and the study. For instance, extra care must be taken when collecting this data as perceptions and behaviour can be swayed by small changes to experimental design (Milgram, 1961). Another profound advantage of this data type is that perception data can be used for subjects and topics that are not easily quantifiable otherwise, for example as a way to explore the neighbourhood fear of crime (Hartnagel, 1979) or to explore consumers' perceptions of food quality (Cicia et al., 2002). This data can also be used as a contrast to a quantifiable dataset – such as comparing perceptions of corruption with actual levels of corruption (Olken, 2009) – which can reveal interesting relationships and dissonances between reality and how people interact with that reality.

2.3.1 Using Students' Perceptions of Their Skills and Attributes

Perception-based data is widely used, not just in education research; a large number of fields employ this type of data to answer a multitude of questions, for example exploring attitudes towards the police (Brown & Benedict, 2002), global issues where public opinion dictates level of political engagement (Poortinga et al., 2019), historical consciousness of minority groups (Funkenstein, 1993), or looking at perceptions of how vulnerable or invulnerable one feels (Perloff, 1983). Perception based data has also been used widely as a way to improve primary and secondary education; for example, analysing student mental health (Muggeo & Ginsburg, 2019), comparing 6th grade student's and parents' perceptions (Frome & Eccles, 1998), and investigating middle school students' relationships with their teachers (Prewett et al., 2019).

Asking students for their perceptions of their own skills and attributes can be extremely valuable. Students own perceptions of their skills allow researchers to understand how students view their own development (Hodgson et al., 2014). Measuring students' perceptions has been used widely to understand how students see their abilities and development of their graduate attributes. In Australia, the Science Student Skills Inventory was used to measure the perceptions of science undergraduates at a large, research-intensive university (Hodgson et al., 2014; Matthews &

Hodgson, 2012; Varsavsky et al., 2014). The study asked students to consider each graduate attribute presented in turn and then rate on a Likert scale how important the attribute was to the student, how much they perceived it to be included in their degree, to what extent it was assessed, how much they feel they improved in the attribute, how confident they felt in the attribute and how much they believed they would use the attribute in the next five years. This skills survey, created as a response for the National statement for science threshold learning outcomes in Australia (S. Jones et al., 2012), has produced some interesting results. For instance, the data showed that changes to curriculum following a reform of the teaching of quantitative skills at the university became reflected in students' perceptions and continued years after the initial changes took place (Matthews et al., 2009, 2013, 2015). Similarly, an analysis of perceptions of communication skills showed progressive development of skills across year groups (Mercer-Mapstone & Matthews, 2017). Finally, perception-based data has been used as a way to compare and contrast different types of approaches to teaching, such as blended vs. traditional learning (C. C. Chen & Jones, 2007), computer assisted vs. traditional education (D. Richardson, 1997), personalised education (Waldeck, 2007), or flipped courses (S. Chen et al., 2016). This allows the teaching approaches to be more holistically evaluated for their effectiveness beyond measurements such as grades or attendance.

It has been argued that student perception of the importance and achievement of a learning outcome can be used as a way to predict how well a course or programme is actually developing the student's learning outcomes (Duke & Reese, 1995). This makes student perceptions an important component in evaluating how well a course has taught the required materials (Lamont & Friedman, 1997; Lundstrom & White, 1997). For example, Duke (2002) assessed student perceptions of skill importance and skill level as a way to identify areas of teaching that required more attention.

Using student perception data comes with notable limitations. Students can have skewed perceptions of their own skills or that perception can unduly fluctuate due to recent events. Perception data is inherently emotional and individual and may therefore be affected by what time in the semester the students are surveyed; for example, a student may rate themselves more positively or negatively immediately following end of semester exams, depending on how well they perceive they did. As such, it is important to be aware of any large academic events in the student's lives and avoid them when distributing the questionnaires; furthermore, when using repeated questionnaires, distribute them at a similar time in each semester to minimise variance from large events. Emotion is only one aspect of this; another important reason is simply that perceptions will differ between individuals. The same stimulus can be perceived very differently by two people, and this cannot be controlled for. For example, a result of 60% on an exam can be deeply upsetting for

some students whilst for others it may symbolise a great achievement. How they deal with a perceived failure can also be different and dependent on the individual (Blackwell et al., 2007). In summary, student perceptions cannot ever be considered truly objective as there will always be an emotional and personal component. However, whilst it can be viewed as a limitation, the subjective, qualitative nature of this data may also be one of its principal advantages. Students, like the rest of the populace, will make decisions (about their future careers or study) based on their perceptions. In the long term, for example, if a student perceives they are not confident in a particular skill, they may choose a career that does not depend on this skill. This makes perceptions a valuable type of data to collect.

2.4 Contexts of the Study

This study took place at the University of Edinburgh, and all data was collected within the University during a global pandemic. Below I provide some more context about the University of Edinburgh and the COVID19 pandemic.

2.4.1 Context of University of Edinburgh: Demographics and Student Partnership

Founded in 1582, The University of Edinburgh is one of Scotland's ancient universities. The University is research-intensive and has five main campuses. In the 2019/2020 academic year, the university had 44,510 matriculated students, 11,445 of whom were in the College of Science and Engineering; these numbers were similar and slightly higher to the previous year (see

Table 3) (University of Edinburgh, 2019a, 2020).

Table 3. The breakdown of students by College and degree Level in 2018/2019 (taken from University of Edinburgh, 2019a) and in 2019/2020 (taken from University of Edinburgh, 2020).

2018/2019

Students by Level and College	Undergraduate	Taught Postgraduate	Research Postgraduate	All Levels of Study
Arts, Humanities & Social Science	16,685	6,560	2,165	25,405
Medicine & Vet Medicine	3,160	2,650	1,215	7,025
Science & Engineering	6,925	1,660	2,365	10,950
Total	26,770	10,865	5,745	43,380

2019/2020

Students by Level and College	Undergraduate	Taught Postgraduate	Research Postgraduate	All Levels of Study
Arts, Humanities & Social Science	16,370	7,235	2,210	25,815
Medicine & Vet Medicine	3,250	2,765	1,235	7,250
Science & Engineering	7,165	1,975	2,305	11,445
Total	26,785	11,975	5,750	44,510

Student-staff partnership is likely to have occurred at the University for much longer than it has been recorded. Student-staff partnerships are part of the University's strategic mission, but the University lacks long-term research on the topic. However, in recent years, a series of partnership communities have emerged at the University. For instance, the Edinburgh Network: Growing Approaches to Genuine Engagement (Engage network), established in 2017, runs approximately monthly meetings for students and staff interested in enhancing student engagement (from both the perspective of staff and students) (Institute for Academic Development UoE, 2020a). The Institute for Academic Development (IAD), an Institute at University of Edinburgh which supports teaching learning and researcher development across the whole University, has likewise dedicated a number of web pages to student engagement and has practical guides for both engagement and partnership (Institute for Academic Development UoE, 2020b). Furthermore, the IAD manages a directory of case studies and supports the University's Teaching Matters blog and podcasts which all showcase examples of student engagement practice from across the University (Institute for Academic Development UoE, 2019). The University also has a university-wide partnership initiative - the Student Partnership Agreement (SPA) funded projects - as well as another University-wide initiative which might or might not be considered to be a partnership initiative, but which certainly involves a high degree of student agency (where students need to act independently and pro-actively to affect the outcome of their course), the Student-Led Individually Created Courses (SLICCs). Both of these initiatives are

explored in this study. Student partnership agreements are explicit statements on the ways an institution and Student Unions are working in partnership in Scotland (University of Edinburgh, 2019b), and were proposed by the Scottish Government (Scottish Government, 2011), with guidance on implementation proposed by Student Partnerships in Quality Scotland (Sparqs) (Williamson, 2013). At the University of Edinburgh, this partnership agreement sets expectations for students and staff to work together to improve the student experience and sets the core values of excellence, inquiry, community, inclusion, and responsibility. The partnership agreement is reviewed annually to monitor progress and ensure the set themes are relevant for the following year.

While all these initiatives are open to students from across the university, not many students have specific chances to take part in partnership beyond these established partnership schemes. As not all partnership at the University is reported, exploring the experiences of students not involved in the named partnership schemes in detail could therefore elucidate different partnership experiences not considered initially by this project and showcase the different opportunities available for students. In particular, this study focussed on the experiences of Science, Technology, Engineering and Mathematics (STEM) students with partnership. Students from four Schools within the College of Science and Engineering were involved in the study (School of Biological Sciences, School of Engineering, School of Physics & Astronomy, and School of GeoSciences). These Schools were chosen as they were judged to be broadly representative of the range of disciplines within STEM.

2.4.1.1 SPAs and SLICCs

The University of Edinburgh has several partnership or partnership-like initiatives that are of particular interest to this study and the University's students provide diverse perspectives from different disciplines.

As part of the Student Partnership Agreement, the University funds small partnership projects. The project team must include both students and staff working in partnership, and work towards one of the key themes set by the SPA for that year, such as community, student voices, or social justice (University of Edinburgh, 2019c). The students undertaking these projects have first-hand experience of partnership initiatives and were thus of interest to this study.

The University of Edinburgh's Student-Led, Individually-Created Courses (SLICCs), are credit-bearing courses involving a project that is fully developed by the student themselves (Elder & Geertshuis,

2019). These projects involve activities such as placements, volunteering, expeditions, or research, and allow students to explore learning in various non-traditionally academic experiences, whilst gaining course credit for their work.

The projects, usually undertaken during the summer, follow a standard structure which is explained in detail in Figure 1 on page 54. Thanks to this structure, students assume the role of a pedagogical co-designer in that they design their own course alongside their tutor (Speirs et al., 2017).

Whilst the details of each SLICC is dependent on the type of project, the overall process is the same. First, students plan their experience through a proposal, including submitting the aims of the experience and a timeline. An assigned tutor provides feedback to the student. Once the student addresses the feedback and the proposal is accepted, the student starts their experience. Throughout the project, the student keeps a reflective blog and collects evidence of the experience. The student then submits the Interim Reflective Report at a determined deadline and acts on feedback once again provided by the tutor. Upon completion of the experience, the student submits the Final Reflective Report. Students apply to take a SLICC usually with some idea of what they would like the SLICC to be. For instance, they may have secured a summer internship, or job, or proposed a self-study into a specific topic of interest, such as a particular period in history. The student is then assigned a tutor/supervisor, who may not have expert knowledge within the area the student wants to explore (i.e. a student doing a mathematics project may not necessarily be paired with a staff member working in mathematics); however, the tutor will have knowledge of self-reflective practices, which is what is assessed in SLICCs over expert content knowledge. Because of the unique structure and intent of SLICCs, students are often initially uncertain about what is required for them to succeed in the course. To overcome this, workshops explaining the structure in detail are often run at the beginning of the course, and students have access to their tutor at any point in the course.

At the beginning of the course, the student works with their tutor to define their own learning outcomes and what they expect to achieve throughout the project. The student then works on their project while keeping in regular contact with the tutor through reflective blogs and multiple reports, creating evidence of their learning and of their reflection on their learning. At the end, performance in SLICCs is assessed based on how well the student can demonstrate they met (through quality of evidence) each of the five learning outcomes of the course: analysis (how investigation and learning about the topic was done), application (drawing on and applying a range of skills), skills (developing

skills in one of these: research and enquiry / personal and intellectual autonomy / communication / personal effectiveness), mindsets (working on one of these mindsets: enquiry and lifelong learning / aspiration and personal development / outlook and engagement), and evaluation (evaluating and reflecting on approach, learning, and development) (Elder & Geertshuis, 2019; Speirs et al., 2017; University of Edinburgh, n.d.).

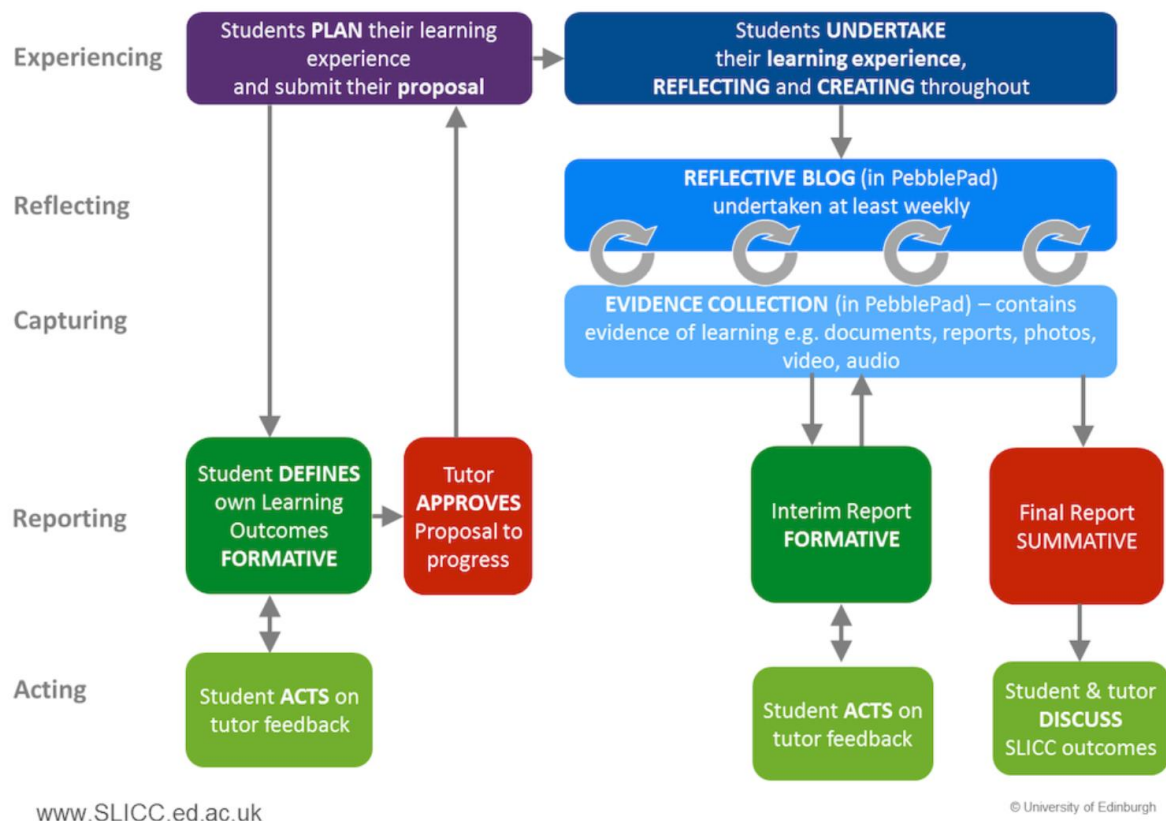


Figure 1. Schematic of the SLICC structure (reproduced from The University of Edinburgh, n.d.).

The course structure provides multiple benefits to students, not just because it gives the students an opportunity to develop unique skills, but crucially provides the students time to reflect on their experiences and skills. The programme's focus on reflection provides students with the chance to explore how they learn, and promotes lifelong learning (Elder & Geertshuis, 2019). The unique style and structure of SLICCs makes them of particular interest to this study; as students who completed SLICCs have been involved in a process requiring them to co-design their learning, they have been primed to adopt a reflective outlook on their work, and they may have different perceptions of their

graduate outcomes compared to students who did not have the chance to think so deeply about their own learning.

2.4.2 COVID19 Context

All data discussed in this thesis was collected online during a lockdown caused by COVID19 pandemic of 2020. Consequently, the participants of this study often referenced the pandemic as a major influence on their experience, heavily affecting results discussed here. As such, the pandemic and its effect on the University and students forms an important part of the study's context.

The COVID19 pandemic was caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first identified in December 2019 in Wuhan, China. The situation was declared a pandemic by the World Health Organisation on 11th March 2020 (World Health Organisation, 2021). The recommended preventive measures centred around reducing chance of infection through social distancing of at least 2 metres, frequent hand washing, and wearing of face masks. Most countries instituted some form of a lockdown that prohibited social gatherings to a certain extent, banned non-essential travel, and either furloughed non-essential workers or made them work remotely. The pandemic (and the responses to it) resulted in global social and economic disruption (International Monetary Fund, 2020). Beyond social and economic issues, the pandemic also affected most people on an individual basis, with poverty rates rising and a large number of people affected by adverse mental health (Czeisler et al., 2020).

The pandemic has also heavily disrupted universities and created a unique environment for students. The first COVID19 cases arrived in the United Kingdom on the 31st January 2020 (Lillie et al., 2020) and the first Scottish case was confirmed on the 1st March 2020 (Scottish Government, 2020b). Scotland first went into lockdown on the 24th of March 2020, with the University of Edinburgh rapidly pivoting to emergency online learning and cancelling all in-person classes shortly after. Classes remained online until the end of the semester (Semester 2 of the 2019/2020 academic year). By the end of May of 2020, the Scottish Government was set to ease lockdown by moving to Phase 1 of the route map out of lockdown and announced preparations for Universities to have a phased return to campus (Scottish Government, 2020a). Phase 2 was instituted on 19 June 2020 and by mid-July 2020, the Government moved to Phase 3, allowing the opening of most other services under applicable restrictions such as mandatory face masks. Scotland continued loosening restrictions throughout August 2020 but started implementing new restrictions in September 2020.

In the first semester of the 2020/2021 academic year, students were allowed to return to halls of residence and the University employed hybrid teaching to teach students, where students interacted with course material both online through a range of digital synchronous and asynchronous teaching and meetings, and in person, such as in labs or tutorials. Students were encouraged to stay in halls of residence whilst doing online learning, and their movement was significantly restricted (Scottish Government, 2020c). New restrictions were instituted in October 2020, including the introduction of the five-level Strategic Framework, which indicated different levels of protection needed in a geographical area based on virus transmission rates (Government, 2020). These levels prevented travel outside local authority area by November 2020, with restrictions further tightening from the end of December 2020 and all of Scotland being placed under level 4 (the highest level) restrictions. The second semester of the 2020/2021 academic year (when this study concluded) was set to begin with hybrid learning and limited in-person classes; however, due to the new lockdown and restrictions announced by the Scottish Government, the University again shifted all teaching and assessment online for the remainder of the semester.

Students and staff were significantly affected by the pandemic. Many suffered adverse mental health effects brought on by isolation and uncertainty of the situation. Conversely, it is also fair to acknowledge some staff and students benefitted from advantages of more flexible ways of working and studying from home – this was particularly the case for students with carer responsibilities. Students and staff had to adapt to different forms of learning and teaching and interaction. The changes from previous University teaching and learning experiences are worthy of exploring and including in any research occurring during this time.

Chapter 3 Methodology and Methods

This chapter provides an account and critique of the overall research design used in this study. Throughout, care is taken to explain the choices made at each stage of the process, and critically reflect on the methods employed in this study. The chapter is structured using Crotty's (1998) hierarchy of research design; namely discussing epistemology, theoretical frameworks, methodology, and methods in turn. Crotty posits that the methodological choices made must align with what the researcher wishes to accomplish through their research, and further that all four elements interact with and influence each other. As such, all four parts of the research design must work together and be justified.

This study went through multiple changes and was adapted significantly with redesigns in the early stages, caused in part due to the COVID19 pandemic. At the beginning of the project, a longitudinal study mapping SaP experiences of STEM students throughout their undergraduate degree was planned. The first questionnaire was designed, piloted with a small group of STEM students, and redesigned following their feedback. It was then implemented with first year STEM students, but received a poor response, due in part because of it coinciding with the first COVID19 national lockdown and subsequent shift to online learning. As a result, the entire study was redesigned from a longitudinal study following a single cohort of undergraduate students to a series of snapshots across all undergraduate year groups. The reach of the study was also expanded to include two further student groups from across the University. Three student groups from the University of Edinburgh were therefore chosen to participate in the new study: (1) students that undertook the Student-Led, Individually-Created Courses (SLICCs), (2) students that completed a Student Partnership Agreement (SPA) funded project, and (3) students from Schools in the College of Science and Engineering (STEM). SLICCs and SPA students were specifically selected as they may have experienced a specific partnership through the SLICCs or SPA; STEM students were not expected to have participated in a specific partnership experience as part of their programme of study. Data was collected through online questionnaires, and through online focus groups and interviews.

The chapter starts with the re-introduction of the research questions guiding this study, followed by the research design structured using Crotty's hierarchy (Crotty, 1998). Interspersed, multiple sections provide further context to the choices made at each step of the study. Finally, the limitations inherent to the methods chosen and context experienced are evaluated and critiqued.

3.1 Research Questions

The project focused on three main research questions:

1. How do students' perceptions of their graduate attribute development change and differ throughout their degree?
2. What are the immediate and persistent effects of students as partners initiatives on students' perception of their confidence, improvement, and development of their graduate attributes?
3. How does students' identity and perception of belonging in the academic and professional community change with involvement in students as partners initiatives?

3.2 Epistemology

Epistemology is the researcher's theory of knowledge and indicates their view on how knowledge itself is created (Crotty, 1998). Epistemological views influence the choice of methodologies and theoretical frameworks drawn upon throughout the study, making them important to explicitly define to better situate the study. While natural sciences will often automatically subscribe to objectivism (a knowledge system positing that all things exist as meaningful entities with an objective truth that can be uncovered), this selection is not as common in social sciences and studies dealing with social data. This study deals almost in entirety with students' perceptions of their reality, which by nature are subjective interpretations of lived experiences rather than an objective recollection of truth. Similarly, the interpretations of the data offered within this thesis cannot be considered a true and objective representation of reality.

Instead, this thesis follows the principles of social constructionism, which is the view that all knowledge and meaning is constructed through interactions between individuals and the outside

world, with all construction of meaning being embedded within social structures and conventions (Crotty, 1998). Losantos, Montoya, Exeni, Santa Cruz, & Loots (2016) summarised the eight main premises of this epistemology as applied in psychology that can be adapted to the educational context of this study (see also Anderson & Goolishian, 1992; Burr, 1995); within these sources, social constructionism:

- (1) is anti-realist in understanding that the entire discipline is socially constructed;
- (2) is anti-essentialist by suggesting that individuals are in a constant state of development;
- (3) is based on the understanding that language constitutes reality and understanding of the world;
- (4) focuses on interaction and social practices rather than trying to define each individual;
- (5) recognises the historical, cultural, and social context of knowledge by incorporating them into the data and analysis;
- (6) understands investigation as a form of social action and invites the researcher themselves to reflect on their language used;
- (7) focuses on processes by generating knowledge from the interactions, thereby constructing knowledge; and
- (8) promotes curiosity within the research process by challenging the researcher to deviate from known theories to make sense of their data.

Within this study, care is taken to consider how students perceive their social surroundings by examining their sense of identity and belonging. The study considers all perceptions as a subjective interpretation of students' experience of their circumstances and extends this subjectivity to the researcher in understanding that the analysis and interpretations offered in later chapters are constructed through the interactions not just with the students and other researchers, but also through the perspectives and personal experiences brought to the study by the author.

3.3 Theoretical Perspectives

Theoretical perspectives seek to explore the assumptions inherent in the study that are then further reflected in methodology (Crotty, 1998). In natural sciences it is common to use positivism (a theoretical perspective recognising only what can be scientifically verified through logical proof), this perspective is insufficient for approaching the topics and data in this study. Within this study, the perspectives of interpretivism and critical inquiry formed the main theoretical frameworks

considered when interpreting the data. As both perspectives were incorporated into different parts of the data analysis, both are explained in detail below.

Critical inquiry, also referred to as the transformative paradigm (Al Riyami, 2015), allows the researcher to intentionally position their research with consideration of the context surrounding the events or objects researched. This perspective is often used in education research to explore and understand how learning and teaching has changed through interactions with other outside factors (such as economy or culture). Importantly, the research approached in this way should have an action agenda to somehow change the lives of the participants (Creswell & Creswell, 2017). Consequently, research into student partnership often sits within this critical space as its intentional or unintentional objective is inherently to change the power hierarchy and change traditional structures (P. Taylor, 2008). While the critical research paradigm sits at the centre of the concepts examined in this thesis, the primary intention of this thesis was to observe and interpret meaning from the interactions with students (and their experiences of challenging the status quo) rather than directly contribute an action agenda. Therefore, it might be considered that the study has been informed by elements of critical theory, rather than it being seen strictly as a study employing critical theory throughout.

Next, interpretivism is the other theoretical perspective which influenced this study. Interpretivism suggests that humans act on their interpretation of their context and any analysis carried out is an interpretation of that interpretation. Researchers seek to gain a deeper understanding of the studied phenomenon in its unique context rather than generalising this context to the whole population (Creswell & Creswell, 2017). In this way, the paradigm points to the inherent complexity between human interactions and seeks to develop a deep understanding of phenomena in their social contexts. Consequently, this perspective is easily utilised in the field through methodologies such as grounded theory or case study (Tuli, 2010). However, one limitation is that interpretivism limits the generalisation that can be made to other contexts (L. Cohen et al., 2000). While this study already acknowledges its low transferability (explored further in Section 3.11 on page 98), some generalisation may be possible within this study to apply the consequences of the conclusions to offer insights that may be relevant to a wider group of students. As such, this thesis uses mostly interpretivism as a theoretical perspective while being influenced by critical inquiry.

3.4 Methodology

Methodological choices must align with the purpose of the research in order to answer the right questions as well as with the chosen methods of data collection (Crotty, 1998). Within this study, both qualitative and quantitative methods of data collection and analysis were ultimately informed by two methodologies, specifically grounded theory and to a lesser extent, heuristic inquiry.

The first methodology employed within this study was grounded theory, which acknowledges ideas emerge directly from the data (Glaser & Strauss, 1967). In this way, it enables the researcher to go beyond the research questions and allows for the creation of new theories and hypotheses (Allan, 2003). While the analysis of the data was done in relation to the selected research questions (especially within the quantitative sections), care was taken to allow concepts to emerge naturally and without bias throughout the coding of the transcripts. In this way, analysis was influenced by the tenets of grounded theory. The methodological process of using grounded theory, along with a worked example of how thematic codes were sorted and synthesised within qualitative data is provided in section 3.9.3 on page 92. Similarly, when analysing quantitative data, no data was favoured or analysed preferentially, and care was taken to examine each component and data group in turn before building concepts and connections across the entire dataset.

The second influence on the methodology used within this study was heuristic inquiry, particularly in relation to interviews and focus groups. Within heuristic inquiry, human experiences are placed above numbers, leading to a deeply subjective and creative connection between the researcher and the phenomenon being studied (Sela-Smith, 2002). Through heuristic inquiry, the researcher themselves examines and expresses their own experience in relation to what is being studied. I believe this connection between subject and researcher should be acknowledged; I have spent over seven years as a student, embedded within different forms of partnership working in several countries and I experienced many of the benefits and disadvantages of partnership first-hand. I have also completed several STEM degrees across different universities and shared many of the experiences the students discussed with me within this study. Finally, I am living within the pandemic with the rest of the world's population and share the realities of the situation. It would feel almost disingenuous to not acknowledge my own experiences as influencing my understandings and choices in researching the journey the students in this study are taking. As such, heuristic inquiry was used during interviews and to an extent within the subsequent analysis (for more information

see section 3.9.3) as a way to check-in with the results of this study to ensure the conclusions reached were appropriate and acknowledging my own experience and its influence on the study.

3.5 What is being measured

The effects of SaP are difficult to measure by itself and directly. Students often are not aware of the meaning of SaP and asking them directly about SaP might lead to spurious data due to misunderstandings of the definition. Therefore, development of graduate attributes during normal study were explored with students first and then development of graduate attributes following SaP initiatives were measured.

Students were also provided with a carefully designed definition of SaP to aid their understanding – *“an experience where your expertise was considered just as important as the staff members you worked with (also known as students as partners)”*. This definition was created to centre the experience over terminology and to not be overly leading in what sort of experiences would be considered.

Similarly, perceptions of identity and belonging were measured to give a broader understanding of students’ experiences (see chapter 2 starting on page 25 for how these relate to SaP). The development of graduate attributes were used as a measure of students’ skills development as they move towards graduation.

3.5.1 Defining the Graduate Attributes within this study

One way to measure the long-term effects of partnership initiatives on students is through measuring the development of students’ graduate attributes. In the simplest terms, graduate attributes are the manifestation of the goals an educational body sets for their students (Barrie, 2006). Thus, graduate attributes vary, with apparent differences between institutions, academic fields, countries, and continents. Whilst the graduate attributes of every place are different in content, their general themes and purpose are similar; the attributes represent an important measure of achievement expected of all graduates. Since graduate attributes are statements of aspiration used for long-term evaluation of achievement, they are only rarely referred to within the field of students as partners. As such, examining the potential connections between student

partnership and graduate attributes presents an innovative approach to measure outcomes of partnerships.

The graduate attributes chosen for this study were selected to both reflect the University of Edinburgh's defined graduate attributes (University of Edinburgh, 2016) and the wider research literature. The intention is that this will enable future comparisons of the results to the literature and the University of Edinburgh's graduate attributes, which in turn will increase the study's usefulness. At first, there was temptation to simply use the University of Edinburgh's own graduate attributes verbatim. After all, students should already have an implicit expectation of working towards these attributes and the teaching they are getting should be tailored towards instilling these attributes (Barrie, 2012). However, the University of Edinburgh's graduate attributes are perhaps not as easily and immediately understandable by students as some other often-used graduate attributes. This is not uncommon: many universities graduate attributes are stated in quite abstract ways because they are aspirational and must be generic enough to cover the entire student population. The graduate attributes ultimately chosen for this study aimed to encapsulate these abstract concepts, such as personal and intellectual autonomy, in the definitions for the study's graduate attributes whilst retaining legibility and conciseness.

Each of the chosen graduate attributes is discussed in their own sections below. Each sub-section explains the relevant scientific literature and the links to the graduate attributes of the University of Edinburgh. The graduate attributes links to identity development are also explored. Finally, the chosen definition of each attribute is discussed. As the students participating in the study were diverse in their background, it was imperative that the graduate attributes of interest were defined in an accessible, non-ambiguous, and readily understandable language. To that end, it was important to strive for definitions of the graduate attributes that limited the amount of ambiguity and that were based on which student group I was addressing.

Below, each of the chosen graduate attributes is explored in terms of their possible effect on a student's identity. Identity is often defined through personal narratives at the perceived extremes of ability; the attributes that an individual believes they excel in, or similarly fail in, can shape their identity. The personal narratives of these skills can indicate the identity and shape the person's belief in themselves. Similarly, a change in an individual's ability level through education can change an individual's identity narrative or affect which identity is central to that person. As such, the effect of skills and identity is cyclical; whilst an individual's identity affects the career path an individual

takes (and by default, what sort of skills they will learn), the skills the individual learns can shift and evolve their identity in turn. As performance in graduate attributes is dependent on the person's evaluation of themselves, the student's perception of their identity in relation to these skills becomes an important way of understanding a student's perception of their skills and attributes.

3.5.1.1 Communication Skills

Communication as a graduate attribute is one of the most universal and commonly reported attributes in higher education (Osmani et al., 2015). This may be because of the overall vagueness of the term; communication often encompasses many different types of communication grouped together, so the umbrella term can be referring to any type, from written, online, oral, or non-verbal communication to name a few (Gray, 2010; University of Edinburgh, 2016; University of Glasgow, 2019; Wilton, 2011). Similarly, communication can be subdivided as not only presenting information in an understandable manner, but also as comprehension of what the other party is communicating, and understanding of interpersonal skills such as empathy (Eisner, 2010).

Society and individuals are linked through communication and the individual's identity (Jung & Hecht, 2004); how an individual chooses to communicate or interact with others, and how the others communicates back in turn forms the backbone of personhood and personal bonds that will in turn greatly define an individual's identity and further shape the individual's communication style. The concepts are so intertwined that the nature of personal identity and an individual's interactions with the outside environment gave rise to the communication theory of identity, which defines identity as experienced at multiple layers and communicated in a variety of ways to the rest of the world (Hecht et al., 2005). More broadly, types of communication have been shown to coincide with individual's identity formation; for example, digital photography (and the manipulation of said photos) being used as a form of communicating with others (Van Dijck, 2008), or online communication allowing an individual to develop distinct new identities (Riva & Galimberti, 1998). Furthermore, developing specific communication skills allows an individual to develop their professional identity (Plack, 2006; Vågan, 2009), which is an important component of this study. As such, by looking at the students' perceptions of their communication skills, several inferences about the students' identity and identity formation can be made.

For the purpose of this study, communication skills are thus defined as '*engaging effectively (understand and be understood) with others through spoken and written means.*' This definition was

judged to be universally understood by all groups of students with no need for changes between student groups.

3.5.1.2 Writing Skills

Writing skills concern the professional (and scientific – when concerning STEM students) writing that is inherent in university studies and employment, and specifically means writing in a way that is targeted and with intention to be understood by specific audiences (Bram, 1995), but also writing for oneself in the form of for example notes. Writing ability develops slowly throughout an individual's education and employment (Kellogg, 2008) and is a skill that takes deliberate and focussed practice to improve upon (Kellogg & Raulerson, 2007).

Due to the overlaps between writing skills and communication skills, writing skills are often included when discussing the communication theory of identity (Hecht et al., 2005; Lee, 1998). However, an individual's academic and scientific writing is a way to represent that individual's academic identity and forms a significant part of an academic's identity work (Kamler & Thomson, 2007). Furthermore, this graduate attribute also directly relates to and develops an offshoot of academic identity: the students authorial identity (Hyland, 2002; Pittam et al., 2009). As such, whilst the literature links between identity and writing skills are not as strong as identity's links with more general oral communication, there are regardless some advantages to examining writing skills separately from communication in terms of the inferences that can be made about the students' identity and identity formation.

For the purposes of this study, two definitions were created: one to suit the survey targeted predominantly at STEM students and one for the survey targeted at students involved in Student-Led Individually Created Courses (SLICCs) or Student Partnership Agreement (SPA) project. For the purposes of this study, writing skills for STEM students are defined as the *'ability to write scientifically and to tailor one's writing to be understood by a wide variety of audiences.'* This definition carries an emphasis on scientific writing and matching writing styles to an audience to separate writing skills from the study's definition of communication skills. As this definition was designed primarily with STEM students in mind, the wording was adapted slightly to tailor it to the SPA project and SLICCs students in this study. For these students, writing skills are defined as the *'ability to write systematically and logically; and to tailor one's writing to be understood by a wide variety of audiences.'*

3.5.1.3 Teamwork Skills

Teamwork occurs when a group of individuals come together to achieve a common goal for the benefit of all (P. R. Cohen & Levesque, 1991). To work effectively in a team, the individuals making up that team need to possess teamwork skills (R. L. Hughes & Jones, 2011). Teamwork is an explicit professional skill that is often required by employers (Shakespeare et al., 2007; Willey & Gardner, 2008) and for industrial work (Manathunga et al., 2009). Teamwork skills are unique from other graduate attributes due to the multifaceted way they can be perceived – as a personal quality, but also a type of communication between individuals (Moalosi et al., 2012). Similarly, teamwork can also be used as a way to teach other graduate attributes through team-based learning, making it both a process and outcome of graduate attribute development (Kuh, 2008; Volkov & Volkov, 2015). This makes the process of teaching teamwork difficult and daunting; consequently, teamwork skills are not always taught with confidence or emphasised in the curriculum (de la Harpe & David, 2012).

Teamwork is explicitly and implicitly embedded in most professional identities; by practicing teamwork and perceiving teamwork to be important, the student is building their professional identity (Daicoff, 2014; Deuze et al., 2007; Shakespeare et al., 2007). Furthermore, teamwork skills can be affected by the extent to which the individual feels they belong in a specific group and shares the values of a particular group (Phaneuf, 2007). Thus, examining students' perceptions of their teamwork skills allows me to observe their professional identity formation and feeling of belonging. Furthermore, teamwork and interactions have been shown to reciprocally affect student learning (E. A. Williams et al., 2006), so looking at teamwork may give an indication of not only belonging but also the student's learning.

As the core principles of teamwork skills are almost universal across all academic fields, only one, universally understood definition was created for all students. Within this study, teamwork skills are defined as *'drawing on one's initiative and experience to engage with others and work towards a common goal.'*

3.5.1.4 Critical Thinking

Critical thinking concerns the *"intellectually disciplined process of actively and skilfully conceptualizing, applying, analysing, synthesizing, and evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action"* (Paul & Elder, 2005). Furthermore, critical thinking has been denoted to involve

adaptability to new situations (Barrie, 2007) and sustained curiosity about the outside world (Dyche & Epstein, 2011). As a consequence of this broad definition, critical thinking can have personal and diverse meaning between individuals, as well as varying between different academic fields (Davies, 2015). For instance, STEM fields place high value on logical and critical evaluation of facts and evidence (Green et al., 2009), whilst fine arts place higher value on personal observation and experience (Lampert, 2006). Regardless of the field, critical thinking is universally accepted as one of the main goals of education (Hitchcock, 2020).

Teaching critical thinking has been shown to lead to increases in identity formation in high school level students through informational style (Kargar et al., 2013), which is where students construct their sense of identity by evaluating information relevant to themselves and about themselves (Soenens et al., 2005); but there is little written on the interaction of critical thinking and identity in university-level students. However, as most of the students surveyed in this study are undertaking STEM degrees where critical thinking is intrinsically prized as part of academic and professional identity, students' own perceptions of the importance of this graduate attribute may be tracked to the student's alignment with their chosen field.

The core tenets and values of critical thinking are remarkably similar across most academic fields despite some inter-field variation, thus the definition used in this study did not require any augmentation for different student groups. For the purposes of this study, critical thinking is defined as the *'ability to critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective, and adapting to new situations with sensitivity and integrity'* for all students.

3.5.1.5 Content Knowledge

Content knowledge is known by multiple synonyms - such as core knowledge, disciplinary knowledge, or academic literacy (Leibowitz, 2011); but this skill denotes the acquisition and using of knowledge specific to one's field of study or employment to solve problems in that field (Barrie, 2007). Other than knowledge of specific parts in a discipline (such as facts or experimental techniques), this also includes the knowledge of the discipline itself, through for example having knowledge of the type of jobs in the field, the labour market, and working conditions (Bridgstock, 2009). As one of the most readily assessed graduate attributes (Dvorakova & Matthews, 2019), it is considered especially important for academic work and thus prized by graduate students (Manathunga et al., 2009).

is graduate attribute also has a notable intersection with identity, similarly to critical thinking – as a high amount of content knowledge may point towards a student embedding themselves in a specific field and identifying with a higher education academic discipline or learning community, or what Malcolm & Zukas (2007) controversially describe as an academic ‘tribe’. Furthermore, content knowledge tends to be the most explicitly taught and examined concept in most courses; so that, surveying students’ perceptions of confidence and their perceptions of how much they improved in their content knowledge gives a salient measure of how engaged a student is with their course and the state of their student and academic identity (Karanauskienė & Kardelis, 2005).

For the purposes of this study, content knowledge for STEM students was defined as *‘knowledge in a chosen scientific field and the ability to appropriately approach scientific problems.’* This definition is however inappropriate for less scientific programmes of study, and so the definition was changed to be more all-encompassing for students in the SLICCs and SPA programmes, who may come from a variety of programmes. For those students, content knowledge is defined as *‘knowledge in a chosen academic field and the ability to appropriately approach projects and problems with expertise.’*

3.5.1.6 Numerical Skills

Numerical skills, also known as quantitative skills encompass skills required for sound mathematical and statistical reasoning (Varsavsky et al., 2014). The attribute is distinct from content knowledge as it does not simply concern the ability and know-how to solve mathematical problems; rather, it encompasses the confidence to apply statistical and mathematical reasoning on numerical data (Matthews et al., 2013) and the ability to understand social reality through a numerical lens (Slootmaeckers et al., 2014).

Numerical skills can be at the centre of identities within certain academic disciplines (such as engineering or mathematics), whilst almost inconsequential to others (such as linguistics or history). As such, this graduate attribute may greatly vary in importance to a student depending on which field of academic study the student may belong to. As most of the students surveyed in this study are undertaking STEM degrees and therefore are based in fields where numerical skills can be particularly important, a student’s perceptions of their numerical skills may offer some insight into that student’s identity and identity formation. However, as with other graduate attributes that are closely linked to corresponding academic fields, it is also important to be aware of potential identity

conflict; numerical skills have for example been shown to be impeded or improved by activating personal identity, such as student's ethnic or gender identity (Shih et al., 1999).

Numerical skills are often called quantitative skills in literature (Dvorakova & Matthews, 2017). Here, I denote these skills as '*numerical*' rather than '*quantitative*' to avoid confusion for students and ensuring this category is easier to distinguish from qualitative skills. Due to the high similarity in the words, we believed the change in description would aid reading comprehension for students. As such, for the purposes of this study, numerical skills are defined as '*skills and confidence in tackling logical, numerical, and statistical problems throughout one's professional and personal life, including working with large amounts of numerical data.*' This definition was designed to be universally understood by all student groups regardless of programme or personal background, therefore no changes to it were necessary.

3.5.1.7 Qualitative Skills

Qualitative skills are defined as a particular way of using one's experiences to interact and engage with the world (E. Jones & Killick, 2013) and the ability to see nuance and shades of grey in complex issues (University of Edinburgh, 2016). Qualitative analysis and a qualitative view of the world explores narratives by trying to understand the perspectives and contexts of others' reality over objective truth, and values nuanced judgment over measurement (Ezzy, 2002). The definition of qualitative skills depends greatly on the individual's own context, for example Varank (2007) defines qualitative skills as "*skills in language, literature, and social sciences, including geography, history, psychology, sociology, and philosophy.*" This aims to consider qualitative skills in a more general way, not as merely the opposite of numerical, quantitative skills.

Using qualitative skills can be seen as presenting one's identity to the environment by expressing themselves in specific and diverse ways; furthermore, mastery of and confidence in one's qualitative skills can be viewed as evidence that an individual has fully formed their (student or professional) identity (Bandura, 1992; Daicoff, 2014). When taken holistically with other graduate attributes, exploring the student's perceptions of their qualitative skills can then be used to judge the extent to which their professional and student identities have formed.

There are very few components to qualitative skills that would be specific to any of the student groups involved in this study, and so the definition used for this skill was judged to be universally

understood by all groups of students with no need for changes in between student groups. For the purposes of this study, qualitative skills are defined as *‘using a confident and reflective approach to understand nuance in issues, and drawing on the quality, depth and breadth of one’s experiences to engage with the communities and world around oneself.’*

3.5.1.8 Final List of Graduate Attributes Used in the Study

The seven attributes described above were chosen (communication, academic writing, teamwork, critical thinking, content knowledge, quantitative skills, and qualitative skills) because they are a mix of a wide variety of skills that feature heavily in the wider literature. Furthermore, these seven attributes represent the entirety of the University of Edinburgh’s graduate attributes (University of Edinburgh, 2016). They are however not a direct match; the graduate attributes used in this study are centred around more concrete and easier to understand concepts. A table matching the study’s graduate attributes to the University of Edinburgh Graduate Attributes and to the attributes found in literature is provided below in Table 4).

Table 4. Matching of the chosen graduate attributes to the University of Edinburgh graduate attributes and some of the attributes found in scientific literature.

Name of Graduate Attribute	Most relevant University of Edinburgh Graduate Attributes	Encapsulating the Following Attributes
Communication	Skill Groups: Communication	Generic: Digital literacy
		Generic: Listening skills
		Generic: Written communication ability/skills
		Generic: Oral communication ability/skills
		Career building skills: Computer literacy
		Career building skills: Innovation
		Self-management skills: Enquiring mind and analytical thinking
		Content specific: Advanced IT and software skills
		Content specific: Reading comprehension
		Geographical Context Specific: Cultural understanding
Writing skills	Skill Groups: Research and enquiry	Generic: Professional social capital
		Generic: Written communication ability/skills
		Generic: Adaptability and flexibility
		Career building skills: Innovation
		Self-management skills: Creativity
		Self-management skills: Independent working and autonomy
		Content specific: Research and enquiry
Teamwork skills		Geographical context specific: Cultural understanding
		Generic: Assertiveness

	Mindsets: Outlook and engagement	Generic: Problem solving
		Generic: Interpersonal skills
		Generic: Teamwork & leadership
	Mindsets: Aspiration and personal development	Generic: Professional social capital
		Generic: Transferable skills
		Career building skills: Ability to work under pressure
		Career building skills: Creative leadership
		Career building skills: Managerial and leadership skills
		Self-management skills: Ability and willingness to learn
		Self-management skills: Motivation and Initiative
		Geographical context specific: Cultural understanding
Critical thinking	Skill Groups: Personal and intellectual autonomy Skill Groups: Personal effectiveness	Generic: Critical thinking/appraisal
		Generic: Understanding of ethics and governance
		Generic: Adaptability and flexibility
		Generic: International perspective
		Career building skills: Curiosity about field, subject, and world
		Self-management skills: Ability and willingness to learn
		Self-management skills: Enquiring mind and analytical thinking
		Self-management skills: Having a global outlook
		Self-management skills: Metacognition & lifelong learning
		Self-management skills: Tenacity, perseverance, and resilience
		Content specific: Analytical skills
		Content specific: Creative appraisal of problems
		Content specific: Research and Enquiry
		Geographical context specific: Cultural understanding
		Geographical context specific: Indigenous awareness/knowledge
Content knowledge	From Skill Groups: Research and enquiry	Generic: Transferable skills
		Generic: Understanding of ethics and governance
		Career building skills: Capitalising on learning opportunities
		Career building skills: Curiosity about field, subject, and world
	Skill Groups: Personal and intellectual autonomy	Career building skills: Professional confidence
		Career building skills: Understanding labour markets
		Self-management skills: Discipline specific skills
		Self-management skills: Project management
		Content specific: Advanced IT and software skills
		Content specific: Creative appraisal of problems
		Content specific: Discipline/Core knowledge
		Content specific: Global and local field perspectives
		Content specific: Job specific competencies
Numerical skills	Skill Groups: Research and enquiry	Generic: Problem solving
		Generic: Transferable skills
		Career building skills: Computer literacy
		Self-management skills: Creativity
		Self-management skills: Financial skills
		Content specific: Advanced IT and software skills
		Content specific: Analytical skills
		Content specific: Creative appraisal of problems
		Content specific: Job specific competencies
		Content specific: Quantitative skills
		Content specific: Qualitative skills
Qualitative skills	Mindsets: Outlook and engagement	Generic: Problem solving
		Career building skills: Curiosity about field, subject, and world
		Career building skills: Capitalising on learning opportunities
		Career building skills: Creative leadership

	Mindsets: Enquiry and lifelong learning	Self-management skills: Enquiring mind and analytical thinking
		Self-management skills: Creativity
		Self-management skills: Tenacity, perseverance, and resilience
		Self-management skills: Metacognition & lifelong learning
Connected to Identity	Generic: Self-awareness	
	Generic: Self esteem	
	Generic: Foreign language knowledge	
	Career building skills: Ability to work under pressure	
	Career building skills: Capitalising on learning opportunities	
	Career building skills: Entrepreneurial skills	
	Career building skills: Knowledge of self/career identity, outlook, and engagement	
	Career building skills: Professional confidence	
	Self-management skills: Being comfortable with uncertainty	
	Self-management skills: Metacognition & lifelong learning	
	Self-management skills: Tenacity, perseverance, and resilience	
	Self-management skills: Work/life balance	

The definitions of each graduate attribute that were used in this study are shown in Table 5. Several differences were decided upon between the three student groups – Science students (denoted as STEM), Student Partnership Agreement participating students (SPA), and students participating in the Student-Led, Individually Created Courses (SLICCs).

Table 5. Definitions of the used graduate attributes.

Graduate Attribute	Definitions used for STEM students	Definitions used for SPA students	Definition used for SLICCs Students
Communication Skills	Engaging effectively (understand and be understood) with others through spoken and written means.	Engaging effectively (understand and be understood) with others through spoken and written means.	Engaging effectively (understand and be understood) with others through spoken and written means.
Writing Skills	Ability to write scientifically and to tailor one's writing to be understood by a wide variety of audiences.	Ability to write systematically and logically; and to tailor one's writing to be understood by a wide variety of audiences.	Ability to write systematically and logically; and to tailor one's writing to be understood by a wide variety of audiences.
Teamwork Skills	Drawing on one's initiative and experience to engage with others and work towards a common goal.	Drawing on one's initiative and experience to engage with others and work towards a common goal.	Drawing on one's initiative and experience to engage with others and work towards a common goal.
Critical Thinking	Ability to critically evaluate ideas, evidence, and experiences from an open-minded and reasoned perspective, and adapting	Ability to critically evaluate ideas, evidence, and experiences from an open-minded and reasoned perspective, and adapting to	Ability to critically evaluate ideas, evidence, and experiences from an open-minded and reasoned perspective, and adapting to new

	to new situations with sensitivity and integrity.	new situations with sensitivity and integrity.	situations with sensitivity and integrity.
Content Knowledge	Knowledge in a chosen scientific field and the ability to appropriately approach scientific problems.	Knowledge in a chosen academic field and the ability to appropriately approach projects and problems with expertise.	Knowledge in a chosen academic field and the ability to appropriately approach projects and problems with expertise.
Numerical Skills	Skills and confidence in tackling logical, numerical, and statistical problems throughout one's professional and personal life, including working with large amounts of numerical data.	Skills and confidence in tackling logical, numerical, and statistical problems throughout one's professional and personal life, including working with large amounts of numerical data.	Skills and confidence in tackling logical, numerical, and statistical problems throughout one's professional and personal life, including working with large amounts of numerical data.
Qualitative Skills	Using a confident and reflective approach to understand nuance in the issues, and drawing on the quality, depth, and breadth of one's experiences to engage with the communities and world around oneself.	Using a confident and reflective approach to understand nuance in the issues, and drawing on the quality, depth, and breadth of one's experiences to engage with the communities and world around oneself.	Using a confident and reflective mindset to understand nuance in the issues, and drawing on the quality, depth, and breadth of one's experiences to engage with the communities and world around oneself.

3.5.2 Measuring Changes in Identity and Belonging

Identity denotes an individual's intrinsic narrative of themselves and is changed and formed through interactions with their contexts. Similarly, belonging is a complex construct that changes and develops throughout a student's time at university, and as they experience significant milestones and experiences (such as student partnership). An individual's sense of belonging to a group forms one part of identity as well as contributing to multiple other factors such as confidence.

Furthermore, change in identity and increase in sense of belonging have been shown as two of the possible outcomes of participating in a SaP initiative (Cook-Sather et al., 2014; Matthews, Mercer-Mapstone, et al., 2019). Questions designed to elucidate a participant's perception of their identity and sense of belonging within the university, their field of study, and their chosen profession can thus shed valuable insight into a student's perceptions of the SaP initiative and of themselves.

3.6 Research Setting

Further to the context detailed in Section 2.4 on page 50, this section provides several details about the implementation of the study, the student groups, and the time taken to complete each part.

3.6.1 Setting and Sampling

Three broad student groups from the University of Edinburgh were chosen for this project: (1) undergraduate students from Schools in the College of Science and Engineering studying and surveyed in 1st semester of the 2020/2021 academic year (STEM S1), (2) undergraduate students from Schools in the College of Science and Engineering studying and surveyed in 2nd semester of the 2020/2021 academic year (STEM S2), (3) students that have completed a Student-Led Individually Created Course (SLICC), and students that participated in funding bids for Student Partnership Agreement (SPA). These three groups may have a few overlaps, for example students studying in a SLICC may also be from the College of Science and Engineering. Several Schools within STEM disciplines were chosen, allowing me to sample a diverse variety of science students and provide a representative cross-section of STEM disciplines from the College of Science and Engineering. STEM students from four Schools were surveyed: School of Biological Sciences, School of Engineering, School of Physics & Astronomy, and School of GeoSciences. General demographics of the STEM students that were surveyed are summarised in Table 6 under the title *STEM S1* and *STEM S2*.

Similarly, students who took part in SLICCs and SPA funded projects were chosen because of their prior involvement in partnership initiatives. I hoped that by engaging students that have direct experience with a student led initiative that may be considered partnership (see chapter 6 starting on page 224 for further discussion on this), I would capture a snapshot of how a small group of students who have experienced a specific partnership related project, perceive their graduate attributes to have been influenced by this exposure to partnership. On top of providing valuable information about the success of these initiatives to myself and the initiative facilitators, these groups were also intended as examples that allowed me to contrast these students' graduate attribute development with the other data sets from students across the College. General data on the students that undertook SLICCs and SPA funded projects that responded are summarised in Table 6 under the title *SLICC* and *SPA*, respectively.

Table 6. Information on the student respondents of questionnaires and focus groups.

Group	Students Contacted	Completed Questionnaire (Percentage of Population)	Consented to further contact about focus groups (Percentage of Population)	Completed focus groups/ interviews
SLICCs	149	25 (16.8%)	5 (3.4%)	4
SPA	39	1 (2.6%)	1 (2.6%)	1
STEM S1	~ 4455	41 (~ 0.9%)	5 (~ 0.11%)	3
STEM S2	~ 4455	60 (~ 1.5%)	17 (~ 0.38%)	6

3.6.2 Study Timeline

Questionnaires were distributed and focus groups were conducted separately for each of the three student groups, whilst ensuring that there were no overlaps with other essential University-wide questionnaires such as the National Student Survey during busier times in the semester. The entire workflow is summarised in Table 7, with additional detail of the data collection provided in Table 8 on page 77. All questionnaires were open for at least three weeks. Students were informed of the study twice by email; on the first day of the questionnaire, and then through a reminder email one week before the questionnaire closed. After completing the questionnaire, students had the option to opt-in to the focus groups. Focus groups occurred once the questionnaire closed based on the availability of the opted-in students and ran for up to an hour.

Table 7. Timeline of research activities. A. Chronological table. B. Gantt diagram of the activities also including some high-impact, external factors.

A.

Task	Dates
STEM Group: Ethical approval	Nov-19
Pilot: Original questionnaire pilot	Feb-20
SLICCs & SPA Groups: Ethical approval	Jun-20
SLICCs & SPA Groups: Questionnaire design	Jul-20
STEM Group: Revised ethics approval granted	Oct-20
SLICCs & SPA Groups: Groups questionnaire period	Oct-20
STEM Group: Questionnaire semester 1 period	Nov-20
SLICCs & SPA Groups: Focus group questions finalised	Nov-20
SLICCs & SPA Groups: Group focus groups and interviews	Nov-20
STEM Group: Focus group questions finalised	Dec-20
STEM Group: Semester 1 focus groups	Dec-20
SLICCs & SPA Groups: Transcriptions and data analysis	Jan-21 – Feb-21
STEM Group: Questionnaire semester 2 period	Feb-21
STEM Group: Semester 2 focus groups	Feb-21
STEM Group: Transcription and data analysis	Mar-21 – May-21

B.

Tasks	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21
STEM Data Group												
Revised ethics approval granted (originally granted Nov-19)												
Questionnaire semester 1 period												
Focus group questions finalised												
Semester 1 focus groups												
Questionnaire semester 2 period												
Semester 2 focus groups												
Transcription and data analysis												
SLICCs & SPA Data Groups												
Ethical approval												
Questionnaire												
Groups questionnaire												
Focus group questions finalised												
Group focus groups and interviews												
Transcriptions and data analysis												
Pandemic												
Lockdown/ Restrictions/ Remote Learning												

Focus groups ran throughout November and December 2020 for SLICCs, SPA, and STEM semester 1 student groups; for STEM semester 2 students, they were conducted in February 2021 (see Table 8 on page 77 for exact dates). Students that opted into focus groups at the bottom of the questionnaire were contacted through their preferred email address and asked to fill out a Doodle Poll to determine their availability for different times. Two SLICCs focus groups with two students in each were set for 15th November 2020, and the SPA interview was set for 18th Nov 2020. Due to a SLICCs student missing their assigned 2-person focus group, the student who attended ended up undergoing an interview on the 15th November 2020; the student who missed the group rescheduled for 18th November 2020 and also therefore undertook an interview. Two STEM semester 1 meetings were scheduled for 20th December 2020 and 4th January 2021 and contained two students and one student, respectively and therefore the student attending on 4th January also ended up having an interview rather than a focus group. Finally, STEM semester 2 focus groups were

scheduled on 21st February 2021 with two students, with the rest of the students taking part in interviews on 24th and 25th February 2021 due to scheduling issues.

Table 8. Data collection phases indicating dates and length of different steps of study.

Student Data Group	Questionnaire Dates	Questionnaire Length	Number of Focus Groups (no. in each)	Focus Group Dates	Focus Group Length
SLICC	Semester 1 (12 th Oct 2020 – 2 nd Nov 2020)	3 weeks (22 days)	3 (2, 1, 1)	15 th Nov 2020 (2x) 18 th Nov 2020	1 hr
SPA	Semester 1 (13 th Oct 2020 – 3 rd Nov 2020)	3 weeks (22 days)	1 (1)	18 th Nov 2020	1hr
STEM S1	Semester 1 (2 nd Nov 2020 – 7 th Dec 2020)	Up to 6 weeks (42 days)	2 (2, 1)	20 th Dec 2020 4 th Jan 2021	1hr
STEM S2	Semester 2 (1 st Feb 2021 – 25 th Feb 2021)	Up to 3 weeks (23 days)	6 (2, 1, 1, 1, 1)	22 nd Feb 2021 24 th Feb 2021 (2x) 25 th Feb 2021 (2x)	1hr

3.6.3 Procedure for Data Collection

Four questionnaires were released (for each of the four data groups) using Jisc Online Surveys to open and manage the surveys, on dates and timelines as specified in Table 8.

All focus groups were conducted online through the University's Microsoft Teams platform and all were recorded through the included function in MS Teams. Students gave written consent to be recorded and their answers used in the study during e-mail communication preceding the focus groups. Each focus group was kept to around an hour in duration, and each interview lasted around half an hour. All student interactions were commenced and ended with personal chit-chat to foster a friendly atmosphere. An introduction was given to the students at the beginning, consisting of a welcome and personal introduction of the facilitator; a background about what the project was about and the purpose of the focus group; the set of ground rules for the interaction, such as there being no wrong answers, the job of the facilitator to guide the discussion, and the maximum run time; and the opening question designed to get the interview/group started.

3.7 Description of Data Collection Methods

Both quantitative and qualitative data was collected to effectively answer the research questions posited. This allowed for triangulation, i.e. providing multiple sources of evidence to gain a deeper understanding of the data. Quantitative data encompasses numerical data and allows a researcher to compare metrics of different data groups. Furthermore, it allows a researcher to collect data from much larger groups of participants than would be feasible with qualitative data. Conversely, this also means that a certain sample size must be achieved before data can be considered reliable. Reaching a large enough sample size of quantitative data is often an issue when working with students, whilst qualitative data is useful for capturing broad information about a student group, and therefore qualitative data was collected in this study to augment the quantitative findings. Qualitative data concerns non-numerical data such as written text, spoken word, or multimedia. Collecting qualitative data allows a researcher to dig into great detail on a topic; in interviews and focus groups, the participants can also share unexpected insights that would not be possible to uncover when collecting only quantitative data. Furthermore, it is often the only type of data available to a researcher (Young, 1981). A mixture of quantitative and qualitative data was thus used to capture wider breadth of information from the students. Consequently, two data collection techniques were selected to capture this data; online questionnaires and focus groups.

Online questionnaires provide multiple benefits compared to other methods of data collection. They allow researchers to quickly collect data from a large group of participants. This increased inclusivity means that a larger group of participants can be reached and included in the study. In this project, the questionnaire participants were drawn from a specifically selected groups of students, allowing for control over who was invited to take part in the study and who was excluded (Friedman & Wyatt, 2006). As data is captured electronically directly from the respondent in online questionnaires, a large amount of accurate information can be collected quickly (Wyatt, 2000). Importantly, the distance between the researcher and participant means that participants will less likely feel they need to respond to the questionnaire if they do not wish to, and they are also less likely to feel compelled to provide answers they feel the researcher is looking for and therefore more likely to give honest answers. Similarly, within this study, online questionnaires ended up being ideal as they were possible to be effectively distributed despite the lockdowns caused by the COVID19 pandemic. The electronic nature of the questionnaires also means the questionnaires are a cheap way to reach participants, as well as allowing the researchers to attach extra materials (Gunn, 2002); in the case of this study, the format allowed for the definitions of the used graduate attributes to be attached in

the *More Info* box on every page of the questionnaire. Finally, questionnaires allow for capturing of both qualitative and quantitative data, the combination of which provide a greater depth of information (De Vaus, 1986).

There are also a few notable disadvantages to using online questionnaires. First, the online medium has the potential to reach large populations fast, which may not always be positive for the researcher. Working with large populations reduces the number of open text questions that can be asked and still keep a feasible study, as if the study gains a large number of responses, it may become unworkable to analyse so much qualitative data in an appropriate manner. Similarly, once the questionnaire is online, the researcher loses control over who accesses the study. This may lead to a biased sample (Wright, 2005) – in the case of this study, it may be possible that only the most engaged students who check their university email and School bulletins will respond. This confounded with the persistent worry about over-surveying students and the resulting survey fatigue raises worries about the representability of the collected data. After considering all these benefits and disadvantages, I decided to use online questionnaires as the first point of contact with the students. We also used the last page of the questionnaire to invite the participants to take part in focus groups.

Focus groups may confer several benefits when used in addition to other methods (Rabiee, 2004). For example, they provide a more naturalistic element as more than just the content, but also the emotions and interactions between participants are gathered (Krueger & Casey, 2009). Focus groups also allow flexibility in what is discussed and as such allow the researcher to look deeper into specific sections of their topic of interest (Greenwood & Levin, 2006; Morgan & Scannell, 1998). Conversely, being a group interview, focus groups have a social and public component. As such, the individual voice may get tempered through social norms (Grudens-Schuck et al., 2004). Similarly, the type of people that would agree to join a focus group tend to share certain characteristics, such as being outgoing or more engaged, and may therefore result in an overly homogeneous group; with my focus groups being sourced from an already small group of students, this homogeneity could be exacerbated.

One of the key challenges I faced in using focus groups in this study was poor attendance. Even at full capacity and response, often some had to reschedule at the last moment, resulting in an impromptu interview with the remaining student. Similarly, only one student that completed a SPA funded project signed up to participate in a focus group, which meant that I had to conduct an

interview with them. Finally, some students' availability did not match up with any other students, often due to being in a different time zone. To accommodate these students, interviews were scheduled with them at their convenience (often late at night or early in the morning on the weekend). Therefore, throughout the study, wherever I refer to focus groups, it should be noted that these only comprised two students, so were in effect quite similar to interviews.

As a large number of the focus groups became de facto interviews, the advantages and disadvantages of using interviews for data collection will also be elaborated upon (Opdenakker, 2006; Phellas et al., 2011). One of the most important advantages of interviews over focus groups is the greater flexibility afforded for both the interviewer and interviewee – within this study, the increased flexibility became of great import with students' packed schedules. Next, in a one-to-one setting, the non-verbal behaviour of the interviewee can be better observed than in a larger group. Finally, the flow of the questions can be adapted to better suit the individual, which results in a deeper and more authentic conversation with possibly higher quality data. This adjustment is more difficult in focus groups where the conversation tends to be more structured (Doody & Noonan, 2013).

Interviews also carry numerous disadvantages. Conducting multiple interviews as opposed to a single focus group increases the amount of time the researcher must spend collecting, transcribing, and analysing data, meaning that it is not feasible to complete a large number of interviews. Also, interviews are a more personal interaction and participants may be tempted to embellish depending on their perception of the interviewer or the interviewer's style of questioning may influence the outcome (Hill et al., 2008). While this effect is also present in focus groups, the increased number of people in the focus groups mean that the participant may not focus as much on the researcher. Any issues from this sudden switch from focus groups to interviews were mitigated through the design of focus group questions themselves (among other potential issues such as low-engagement from interviewee), as detailed in Section 3.7.2 on page 85.

Considering all these elements, I concluded that using focus groups and interviews in addition to traditional questionnaires would allow me to gain a deeper understanding of the data; furthermore, it would give me an opportunity to discuss the effects of the pandemic on the students' experiences.

3.7.1 Questionnaire Design and Features

The design of the questionnaire underwent multiple changes and redesigns. Following the first design and troubleshooting with supervisors and other colleagues, an informal pilot took place with 12 Honours-level students in their common room at the University of Edinburgh Kings Buildings on 12th February 2020. This led to a redesign that improved the questionnaire's quality and understandability (the first version of the questionnaire used can be viewed in Appendix 1 on page 288). I commenced the longitudinal study involving undergraduate STEM students soon after, which resulted in a limited data set that could not be used (as previously discussed). However, the designing and piloting of this questionnaire served as a valuable exercise that allowed the subsequent designs to move at a much faster pace and allowed the subsequent questionnaires to be more legible and understandable to the students.

Despite none of the data collected in the initial questionnaire from the longitudinal study being used, the lessons learned from the experiences were also a particularly useful tool for improving the questionnaire eventually used in the study. First, the responses that I received uncovered an issue with questionnaire logic in the system, where all participants were made to skip a page of the questionnaire, regardless of whether their answers warranted the skip or not. It was crucial to pick up on this mistake as it would have otherwise severely limited the use of the quantitative data. Second, the style and content of the answers allowed me to make further adjustments to the design of the questions to improve the legibility of the questionnaire. Third, the questionnaire was forwarded to the students through contacts in each of the participating Schools and in one case it was not sent to the right year group of students (which was discovered when questionnaire participants referenced honours year material in their answer instead of 1st year material). This allowed me to improve on the design by including a few demographic questions to ascertain that the students answering the questionnaire were actually a part of the desired demographic.

The questionnaires were designed to take no more than 15 minutes to answer, with the average completion time being about 10 minutes during the pilot on 12th February 2020. The full set of questions for STEM students can be found in the appendices; see Appendix 2 on page 290 for the questionnaire from semester 1 and Appendix 3 on page 293 for questionnaire from semester 2. Similarly, the full set of questions in the questionnaire for SPA students can be found in Appendix 4 on page 296, and questions for SLICC students in Appendix 5 on page 299.

There were several differences between the questionnaires for the three different student groups. Firstly, as the STEM group was sampled twice, their questionnaires served a slightly different purpose from one semester to the next. In general, the semester 1 questionnaire asked students to consider their last completed academic year, whilst semester 2 questionnaire asked the students to consider their current academic year. Second, the STEM questionnaire asked students to think about a SaP experience of their choosing and did not prompt them with a specific SaP initiative. This affected the questionnaire layout (see Figure 2 on page 83) as well; because SLICC and SPA students had a specific partnership initiative to consider, they were prompted with questions about it first and then asked about their studies in general. Conversely, STEM students were asked about their studies in general first, then prompted to think of a specific partnership experience of their choosing. If they did not identify any experience, their questionnaire skipped the page asking about their partnership experience. The differences in questionnaire mapping are illustrated in Figure 2 on page 83.

The questionnaires for the SLICC and SPA students also varied slightly from each other. Whilst the questionnaire for the STEM students was designed by myself under supervision and with collaboration with the PhD supervisors, I involved the facilitators of the SLICCs and SPA initiatives were involved in the questionnaire design for their respective students. This enabled more collegiality between myself, the PhD supervisory team, and the initiative facilitators and enabled me to benefit from the insights of these experienced colleagues, whilst also allowing me to include questions that were specific and relevant to these groups of students. The SLICCs group's questionnaire therefore reflects the facilitators' specific interests in reflective practice and mindsets with additional questions on reflective practice that the facilitators found useful to ask. Conversely, the facilitators of the SPA projects did not request any extra questions to be added to the questionnaire. Given that the core of the questions remains the same and is directly comparable, the addition of an extra set of questions was not judged to impact the comparability of the data, but rather to enhance the potential usability of any data gathered.

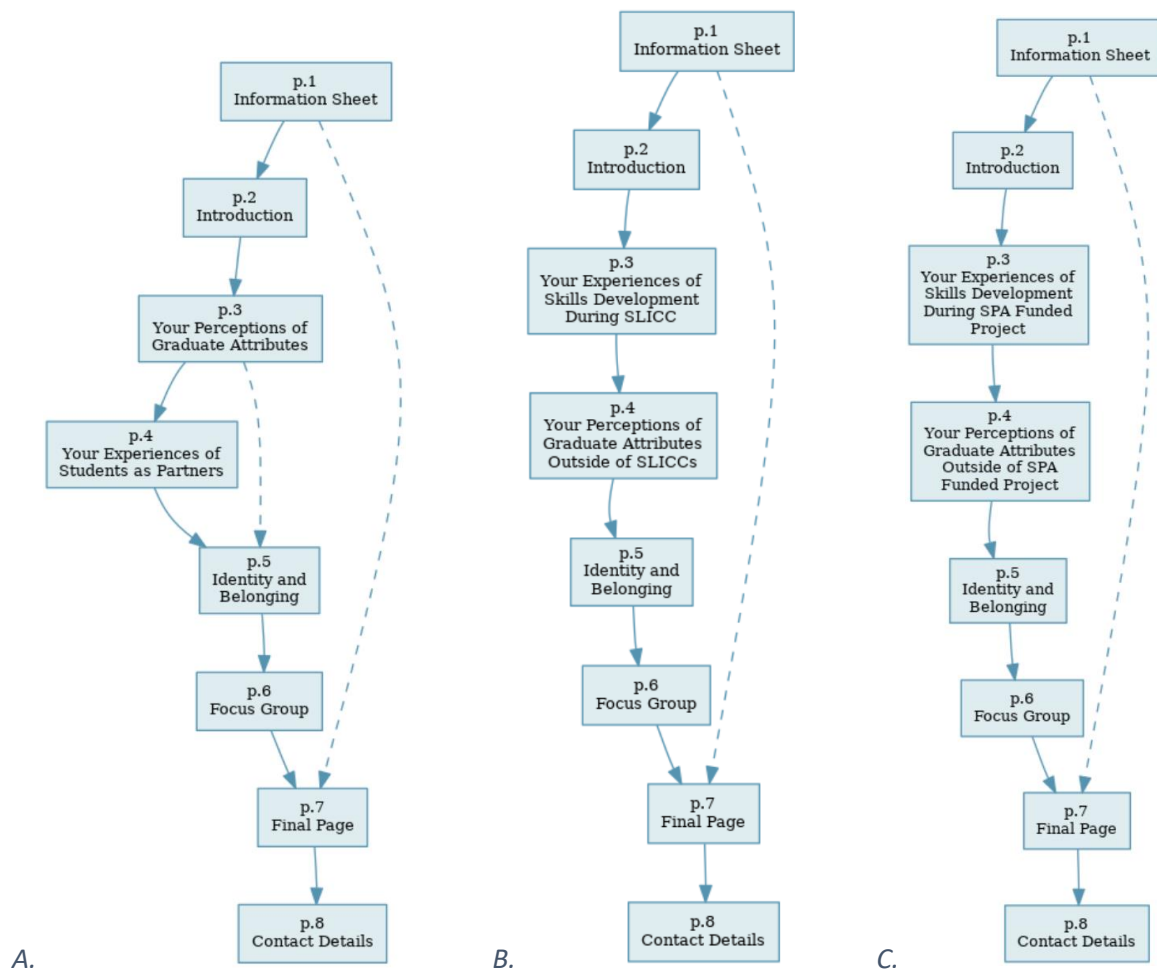


Figure 2. The different questionnaire maps of the three groups. A. Questionnaire map for STEM student group. B. Questionnaire map of SLICC student group. C. Questionnaire map of SPA student group.

3.7.1.1 Questionnaire Question Types

Within the questionnaire, several question types were used to capture a wide variety of data of various data types as discussed above. Overall, the final questionnaire contained a mix of different question types to capture as much data variety as possible. Each questionnaire contained two consent questions: the first to opt into consent for the questionnaire itself, and the second to opt into potential future focus groups. The questionnaire also contained demographics questions to determine metrics important to the study (such as selecting what School and programme the student attended). Next, the questionnaires contained quantitative questions (mostly Likert scale and binary yes/no questions), and qualitative questions (short open text questions). Here, each question type is explained in detail, along with reasoning for using the specific types and discussion of limitations.

Many of the questions were formed in the yes or no format, otherwise called binary answer format questions (Dolnicar & Grün, 2007). This was done to reduce the questionnaire length as much as possible, as data quality decreases when questionnaires become too long (Dolnicar et al., 2011). Consequently, reducing the amount of time a questionnaire will take may serve to increase the response rate (Bednall & Shaw, 2003). Furthermore, binary format questions have been shown not to decrease validity of the data compared to Likert scale questions (Grassi et al., 2007). Binary answer format questions are however limited in the amount of information they can convey, especially when measuring perceptions (Dolnicar, 2003). As such, the questionnaire applied binary question formats sparingly when applicable and when the question did not concern student perceptions.

Next, Likert scale questions were used throughout. Likert scale is a psychometric response scale often used in questionnaires to judge the respondent's degree of agreement or disagreement with a specific statement (Likert, 1932). The scales usually take the form of a five, seven, or nine-point scales with a neutral answer (for example, "no change" or "neither agree nor disagree") in the middle. Less commonly, scales with an even number of points may be used to force the respondent to pick a choice that is not a neutral answer (Bertram, 2007). When multiple Likert scale questions are asked, each can be analysed separately, or the answers to related questions may be summed together to create an overall score. This allows the researcher to gain a higher level of understanding about the respondents. Within this study, five-point Likert scales were used exclusively, with two negative answers, a neutral answer, and two positive answers. The only exception to this was in questions about how much opportunity students were given to develop specific skills, which contained a five-point Likert scale ranging from "no time" (0%) to "all the time" (100%). These scales provided enough options for students while also not being overly complicated.

Likert scales have several limitations that must be accounted for when analysing such data. First, questions are written by a researcher with possibly different background and linguistic understanding to the study's participants. This presents issues as it is unlikely participants will be responding with the exact same linguistic interpretation of the question in mind compared to the researcher and to other participants. The individual answers may therefore vary based on personal interpretation. Similarly, it cannot be assumed that the participant will perceive the distance between the points on the scale as equal. As such, Likert scale data should not be perceived as interval data, and should be treated as ordinal data (Bertram, 2007). Next, even with ideal questionnaire design, Likert scales represent simply a best fit option chosen by the participant. This

vague fit is then sometimes treated as numerically accurate and statistically tested under the assumptions that the choices are infinitely numerically accurate and that there are infinite intervals that are exactly distanced. Finally, no question is asked in a vacuum; questions may affect each other in terms of what answers participants give, and given the length of the questionnaire, they may also experience questionnaire fatigue which reduces their accuracy even further. Within this study, Likert scales were judged to be a useful way to collect large amount of data from the specific student groups; the questions were piloted with the target audience to minimise the chances of respondents misunderstanding questions, and an initial analysis of the Likert scale data was instrumental in informing the development of the focus group questions.

The final type of question used was open text questions that captured free text qualitative data. The main advantage of open box questions is that participants are not constrained by pre-set choices and thus the questionnaire can capture a larger variety of responses and possibly uncover surprising new information. The chief disadvantage of open text questions is that responding to them increases questionnaire time and may make the participants less likely to engage with the full questionnaire. Whether an open text question improves or impedes the questionnaire is as such highly contingent on the design of the question. Firstly, an overly large question box size has been shown to reduce question response rate (Keusch, 2014; Zuell et al., 2015); to combat this, the study's open questions were sorted into two different size categories by adjusting the maximum amount of characters allowed – small open text boxes for text predicted to be short and larger open text boxes for larger boxes. Secondly, the language of the question matters. Questions need to be written in open-ended but precise language, allowing the respondent to expand on their answers at will.

3.7.2 Focus Group and Interview Design and Features

The focus group questions were designed to allow a looser, discussion-like structure to the interviews that would let the participants set the direction of the talk and let them delve into issues of interest to them (Hancock & Algozzine, 2017). As such, questions were designed to be a guide around four main themes; students' motivation to complete a SaP project, students' future outlook, students' identity and belonging, and the effects of COVID19. The questions were drafted from an initial analysis of the data of the STEM, SLICC, and SPA questionnaires by noting down the trends immediately evident in those datasets and exploring the evident differences between the wider group of responses and the responses of the focus group participants. Next, questions designed to address the COVID19 pandemic of 2020 and the consequent changes to the typical student

experience were included based on research into the current situation. These questions were then critiqued by the PhD supervisory team (Dr. Bovill and Prof. Hardy), and subsequently further honed and defined. Additionally, the focus group questions then underwent a further review after every focus group concluded to ensure the questions worked in context and were appropriate. During this last step, there were no major changes to the questions.

The final design incorporated and focused on the four main themes of a SaP project, future outlook, identity and belonging, and COVID19. For the most part, these sections were approached in the same order within each student group, with some minor diversions between focus group instances. The intended flow of the focus groups for each student group is summarised below in Table 9.

Table 9. Flow of topics within the different focus groups conducted.

STEM Semester 1 and 2 Focus Group Question Flow	SLICC Focus Group Question Flow	SPA Funded Initiative Focus Group Question Flow
1. General Graduate Skills Introductory Questions	1. Motivations for SLICCs	1. Motivations for SPA Funded Project
2. Determine if anyone had a significant academic experience that could be considered SaP	2. Future Outlook (about half the questions)	2. Future outlook (about half the questions)
3. Motivations for most significant academic experience	3. Identity and Belonging	3. Identity and Belonging
4. Future Outlook	4. COVID19 Effects	4. COVID19 Effects
5. Identity and Belonging	5. Future Outlook (2 nd half of questions)	5. Future Outlook (2 nd half of questions)
6. COVID19 Effects		

There were a few notable differences in questions targeted at different student groups. As the SLICCs and SPA student groups are similar within the purposes of this study, the focus group questions aimed at these two groups were likewise very similar. Each question set focussed on the initiative of choice, with the SPA targeted questions being slightly more individualised as only one student consented to take part, turning the focus group into a de facto interview. The differences between these focus group questions, and the STEM focus group questions were a bit more notable. As there were focus groups planned where none of the students attending mentioned they participated in a SaP initiative, questions were designed to dig into the experiences within the academic setting that were not immediately considered to be SaP, as well as exploring experiences throughout the year (including the impact of COVID19) that would provide a sort of baseline. The SLICCs group questions can be found in Appendix 6 on page 302 and the SPA group questions in Appendix 7 on page 303. Furthermore, the questions asked in semester 1 focus groups focussed

more heavily on the past, whereas semester 2 focus group questions were more focused towards the future; the overall structure of the focus groups was however the same. The SLICCs questions can be seen in Appendices 8 and 9.

Potential issues over sometimes sudden switches from a focus group to an interview (in the event of no-shows) were mitigated through the way questions were prepared. The questions were designed with a large amount of redundancy and overflow, with the expectations of not having the time or need to answer all questions during focus groups to allow for a free-flowing style and to allow group members to build ideas off each other through personal interactions. During impromptu interviews, this expanded question list was used more strictly, allowing me to seamlessly transition into interviews where needed.

3.8 Ethics

As the study involved students and therefore human data, ethics approval was necessary. Ethics approval was sought from the School of Physics and Astronomy ethics board in three rounds. The first ethics approval concerned the longitudinal study of students from the Schools of Physics and Astronomy, GeoSciences, Engineering, and Biological Sciences, and which was granted on November 21st, 2019. The initial implementation stage of this study did not go as planned, in part because it coincided with the COVID19 lockdown, which resulted in an extremely limited response rate. Due to this, I decided to expand the study by including two extra cohorts of students; current students who completed the Student-Led, Individually-Created Courses (SLICCs) and current students who were part of Student Partnership Agreements (SPA) funded projects. This required a further ethics application, and this second ethics approval concerning collecting data from SLICCs and SPA students was granted on June 4th, 2020. We also decided to increase the possible impact of the study by expanding the opt-in questionnaire to all students in the selected Schools rather than following one cohort of students longitudinally as planned in the original study. This new approach consisted of one questionnaire in each semester of the 2020/2021 academic year, and a set of focus groups following the questionnaires. Using focus groups was intended to mitigate against some of the detrimental impact of coronavirus on the response rate for the study. The proposed changes required me to submit an additional ethics proposal to extend the permissions given in original ethics application. The third ethics approval concerned the change from a longitudinal study

following a single cohort of students throughout their degree to a snapshot study concerning all the year groups in our selected STEM schools and was granted on October 6th, 2020.

As the SPA funded project contained only one participant, their responses may potentially be more readily identifiable than other participants despite the anonymisation process. To this end, the student was reached out to again on the 2nd September 2021 to inform them of this; the student responded by providing further informed consent for their data to be used despite the concerns over potential de-anonymization.

3.9 Data Analysis Methods

This section provides a systematic recollection as well as a critical reflection of all the methods used to analyse the collected data sets, including discussion of the study's weaknesses.

3.9.1 Data Preparation and Cleaning

The questionnaire data was exported from the Online Surveys website as a collection of Excel (.xlsx) files, one for each questionnaire. The files included all data – both quantitative and qualitative questions – and included unique response numbers for each respondent. The quantitative data was processed in Excel by converting Likert Scale questions to representative categorical values and using non-parametric statistical methods as defined below.

The questionnaires generated several quantitative responses to questions that were used to describe student perceptions of their graduate attributes, their identity, and their belonging. Each of the graduate attributes were examined in turn using three variables. First, students' perceptions of change in their ability ranging from greatly deteriorated to no change to greatly improved. Second, their perception of change in their confidence in the graduate attribute, ranging from much less confident to no change to much more confident. Third, the students' perception of their opportunities to develop their skills in the graduate attribute, ranging from never to sometimes to all the time. Together, these three variables provide information on the students' development during the semester in question that could then be used to compare different student groups. The structure of these variables can also be flipped to allow the researcher to compare student change in ability, confidence, and opportunity to develop across all graduate attributes, which can illustrate the

differences between student groups in these metrics more fully. Similarly, identity perceptions were measured using four Likert scale questions. Together, these four variables create a fingerprint for the students' perceptions of specific relational identities. Finally, students' perception of belonging was measured using six or more variables that captured the students' comfort and sense of belonging within their university and field of study.

Each focus group or interview was saved as an MP4 file, transcribed into a Word document (using oTranscribe to aid the transcription process), and anonymised in the process by using code letters for participants' names in the transcript. The transcriptions included filler words such as "umm" and "like" and repeated words. Large, expressive actions and obvious non-verbal language, such as vigorous nodding, laughing, or holding up objects to camera were also noted. These actions were flanked by asterisks in the transcripts to separate the actions from the written speech. During periods of bad connection when the feed would cut out, sections were marked as missing by multiple dashes indicating approximately one second of feed lost per dash. Conversely, several parts of the interviews/focus groups were not included in the transcript, namely the personal chat before the formal introduction, the facilitator introduction, and the chat after the last question, if applicable. The transcript was timestamped at two-minute intervals, as well as in sections where the feed cut out or it was not possible to decipher what the student was saying.

3.9.1.1 Member Checking of Interview Transcripts

Once the transcripts were completed, all participants were sent the transcript from the interview or focus group they attended. Participants were given the chance to check the content of the interview and reaffirm their consent with the material of the interview, thus allowing for fully informed consent to be acquired (Cousin, 2009). No participant expressed any large issues with the contents of the interview transcripts; one participant corrected the transcript on the acronym for their School, and another corrected the name of their degree. Many were surprised at how many filler words they used and expressed a wish to be able to edit their statements for grammar and coherence. Whilst the transcript was left unchanged, quotes used to represent themes in the results section were edited for coherence without losing any thematic meaning by removing filler words and stall words such as umm where appropriate and replacing those with "...".

3.9.2 Statistical Approaches for Comparing Individual Questionnaires and Questions

Multiple approaches were used to determine the statistical significance of differences in answers to individual questions between student groups, as well as comparing the differences within specific sections of the questionnaire between different student groups. Here, the statistical approaches are broken down by quantitative question type (Likert scale style and binary answer style), with reasoning given for each of the statistical methods used, and how data was treated.

As mentioned above, there are multiple limitations of Likert scale questions that must be observed when analysing the results of these questions. To overcome these limitations, multiple statistical tests were considered and ultimately decided against, including ordinal logistic regression (Allison, 1999), ordinal regression analysis, Cronbach's alpha, fuzzy probability, and Pierson's correlation. Ultimately, methods were considered based on how the data was to be interpreted. Individual Likert scale questions were summarised by central tendency (using median and mode) and variability (using inter-quartile range). To determine if there are any statistically significant differences, non-parametric tests were used.

Three common non-parametric tests were initially considered; the Wilcoxon signed-rank test, the Kruskal-Wallis test, and the Mann-Whitney U test. Wilcoxon signed-rank test is a non-parametric equivalent to the one-sample t-test but can be used to analyse data collected using paired-sample design. It assumes that the population distribution of the variable is approximately symmetric and that the variable tested is anything but nominal (Rosner et al., 2006). Due in part to the fact that respondents to the questionnaire were self-selected and are therefore potentially at the fringes of the population (a known limitation of self-selected data samples), little of the Likert scale data is symmetric, meaning that this test would be inappropriate for large portions of the collected data. The second reason this test would not be appropriate is due to the data collection method; as the questionnaire data is anonymous, pairs cannot be created between the data points.

Next, Kruskal-Wallis can be described as the non-parametric equivalent to one-way ANOVA, allowing testing for differences among more than two samples. It assumes that the variables being tested are not nominal, the observations from the groups are independent of each another, and that all groups have a similar distribution (McKight & Najab, 2010). Due to the issues with distribution described above, this test may not always be appropriate as the skewness can vary significantly among the student groups.

Finally, Mann-Whitney U test allows for analysis of non-normally distributed data and is the non-parametric equivalent to an independent two-sample t-test. The test further assumes that the data compared is not-nominal, the distribution is similar between groups, and observations are statistically independent. Due to the nature of the data samples, where the SLICC student group may theoretically contain some of the same members of the STEM student group at the same point in time, the assumption of full independence between the groups could be contested. As the questionnaires are anonymous, it is not possible to conclusively prove that any paired data points exist; however, it is very unlikely that any student would answer two similar questionnaires one after another, especially considering how many questionnaires students are asked to fill out and the resulting questionnaire fatigue (Porter et al., 2004). As such, for the purposes of this study, I assumed that there were no students who answered multiple questionnaires and therefore the data groups are independent. To further ensure this, all the STEM group qualitative data was scanned for the mention of SLICCs. If a potential student answered both questionnaires, they would likely mention their SLICCs experience in the sections asking for information on learning and SaP opportunities. There were no mentions of SLICCs in any of the data collected in the STEM semester 1 group or in the semester 2 group. Therefore, it is reasonable to assume that no such double up exists, making the Mann-Whitney U test appropriate to test significance of single Likert scale questions.

In some cases, several related Likert scale answers could be summed together to produce scores for specific sections or to measure a single latent variable, that could then be compared between student groups. When Likert scale answers are summed together, they may be treated as interval data and provided that the questions summed together all used the same Likert scale, some researchers suggest that parametric statistical tests can be used (Lubke & Muthén, 2004). In this case, it would be possible to use ANOVA models to analyse the statistical differences between samples. However, the debate over whether Likert scale data can be considered parametric even in this case is still not settled (see for example Carifio & Perla, 2007; Glass, Peckham, & Sanders, 1972; Jamieson, 2004; Lubke & Muthén, 2004; Murray, 2013). Upon further reflection on the data, I decided to not perform analysis on any summed together Likert scale data, as I felt that this would result in too much detail being lost with too few benefits to this type of analysis.

As Mann-Whitney U test does not provide any graphical representation of the data, the compared groups were also visualised at this stage by using the percentage agreement of each Likert scale. Percentage agreement is the measure of how many students in the sample agree with a Likert scale

statement or question and is calculated using the formula below. Within this study, students that agreed with a statement chose one of the top two Likert options (for example, “somewhat agree” or “strongly agree”):

$$\% \text{ Agreement} = 100 * \frac{\text{Number of students that agree with statement}}{\text{Total number of students that responded to statement}}$$

This calculation produces continuous data and has been previously used with perception data (Dvorakova & Matthews, 2017). However, as this results in a single value for each perception in each group with no standard deviation, no statistics were done. The method regardless provides a valid graphical representation of the data that allows the reader to orient themselves in the data within the context of the statistical tests.

The initial statistical analysis and exploration of the data was performed in Excel and then repeated and finalised using IBM SPSS Statistics Version 24. Graphical representation of the data were created in both Excel and SPSS.

3.9.3 Qualitative Data Analysis Approaches

As explained in previous sections, analysing qualitative data within the study was not performed using a single approach, but rather drew on multiple approaches to create an individualised methodological approach that fit this study (Bryman, 1994; Drisko, 2005). Aspects of grounded theory analysis were used, with some influences from heuristic theory. Here, the practical application of these two approaches is explored in detail through examples.

After transcription, a two page section was selected and coded in Word separately by me and the supervisory team, Dr Bovill and Prof Hardy. The codes chosen by each team member were then collated and discussed to further inform what techniques would be appropriate to use during further coding. NVivo 12 was then used to organise the codes in all the focus group transcripts and open text questions going forward (Bazeley & Jackson, 2013). NVivo 12 has the advantage of keeping track of the frequency of each code and allows the researcher to identify points of interest through the memo function.

Analysis of this data then occurred in multiple stages. In the first stage, generation of concepts occurred after close reading where the recurring themes and issues were identified in the transcripts of the focus groups and interviews. As according to grounded methodology, care was taken to allow themes and theories to emerge through reading of the data, rather than intentionally searching for answers to specific questions. The focus groups and interviews were coded in chronological order and re-coded multiple times as new codes and themes became apparent and emerged from the data. Beyond themes, I also focussed on coding the *settings* (such as the code *Explanation of Initiative* which denoted all the times students were giving an explanation of activities they undertook during a SaP initiative) discussed by the participants and the participants *participation* in the settings (such as the code *Motivation for Doing Initiative* which denoted all the times students spoke about why they decided to join a SaP initiative) as a secondary set of codes (Lofland et al., 2005). These codes often overlapped with the thematic codes identified in the first stage and served to provide a helpful roadmap through the transcript for further analysis. At this stage, care was taken to look at the transcripts without preconceptions of what the codes should be. Once all the focus groups for a particular student group (STEM semester 1, STEM semester 2, SLICC, and SPA) were coded, the codes were cleaned up to merge codes that were too similar or split up codes that included multiple thematic ideas; for example *Losing Activities Due to COVID19* and *Less Chance to Carry Out Planned Activities due to COVID19* were merged into one code – *Losing Opportunities Due to COVID19*. Similarly, for example *Excitement for the Future* and *Hope for the Future* were merged into *Positive Outlook on Future*. Next, the codes, where appropriate, were organised into thematic groups, creating an initial taxonomy. For example, codes such as *Being Isolated due to Pandemic*, *Keeping Occupied in Lockdown*, and the above *Losing Opportunities Due to COVID19* were all grouped under the theme of *COVID19 Effects*. Similarly, multiple codes were at this stage structured as sub-themes; for example, in the theme of *Developing Graduate Attributes*, the code of *Developing Time Management* contains a more specific sub-code of *Flexible Working*, as all mentions of flexible working were in direct relation of it aiding in developing better time management. Finally, the rest of the qualitative data (sourced from the open text questions in the questionnaires) was also introduced and coded, with particular attention given to the focal themes identified so far in the focus groups and interviews. At the end of this stage, I identified 8 overarching themes.

This provided a useful structure for the second stage of the analysis, which involved systematic refinement of the originally identified themes through a series of re-coding exercises. Care was taken to understand the data and identify themes and codes that emerged. Based on this, multiple codes were added, and the initial thematic structure of codes was reformulated. This stage served as

a 'check-up' to minimise bias and draw out further themes that may have been missed in the earlier stage (the coding hierarchy can be seen in Appendix 10 on page 306).

The other type of qualitative data comes from the questionnaires; at multiple points throughout the questionnaire, students were given an opportunity to expand on their answers in free text boxes. These answers were then compiled, coded using the same principles as outlined for the other qualitative data, and organised into tables of data. The answers were sorted into themes, which were then explained using examples from students as appropriate. Direct quotes were also used to further illustrate different themes. As the answers were effectively disordered lists, the number of how often a particular theme was mentioned was noted where appropriate; however, these numbers do not necessarily match up to the total number of students as some students would give multiple examples while others gave no examples at all.

Throughout the coding and analysis, care was taken to be cognizant of my own perspective as a researcher and a student, and to be aware of the genuine connections evoked throughout the data collection process that was reflected in the transcripts. Being influenced by heuristic inquiry, I allowed myself reflection on my own experiences in comparison to the student participants, and used this reflection to form a more nuanced comprehension of the shared experiences. This allowed me to understand the context more deeply and allowed me to discern the intricacies of the codes within the data as they were emerging.

3.10 Limitations

The preceding sections have hopefully painted a picture of the study's strengths; however, several limitations of the study must also be acknowledged. Within this section, the limitations caused by the methods and methodology used and the limitations caused by the student groups invited to participate are explained, along with notes of the limitations caused by the context of the study. These limitations are important to consider before exploring the results of the study. Limitations of the interpretations of the results are then further expanded upon in chapter 6 starting on page 224.

3.10.1 Limitations Inherent in the Methods

While the methods used within this study allowed for a great amount of flexibility and ultimately made it possible to complete the study, there were several limitations in the study due to the methods chosen.

3.10.1.1 Data Collection Limitations

First, a relatively low number of students answered the questionnaires compared to the number that was contacted for the study. This may have limited the reliability of the results, especially when considering the reliability of the quantitative data, where small variations between groups may have achieved statistical significance due to random sample error rather than any discernible difference between the groups. To overcome this, no one result is considered in isolation and care was taken to verify any potential results across the entire dataset. The participant number was considered adequate and appropriate for qualitative data.

Second, whilst every care was taken to recruit participants impartially, the study sample cannot be considered truly representative. The issue starts with the opt-in nature of the questionnaire. Those that respond to the questionnaire are likely to be the ones that are either already well engaged with their studies or feel strongly about the experience in question. Therefore, the collected data is likely to be of the outliers – those that either had an especially good or especially bad experience - rather than a representative sample. This may hold especially true throughout the duration of this study as students are currently surveyed at a higher rate than usual due to the novel situation of wide scale hybrid learning. As such, questionnaire fatigue is a much more likely concern. Similarly, the students that took part in the focus groups are a further step removed – having opted into the focus groups at the end of the questionnaire, it can be said that they are the keenest of the keenest.

Next, the inherent limitations of focus groups and interview methods must be acknowledged. Conversations are said to capture the intentions and beliefs, rather than their actions (Arksey & Knight, 1999; Woolmer, 2016). As previously discussed in the literature review section of this thesis, perceptions were sought out as they provide a useful window into the participants' experiences and identity. Nevertheless, care was taken during the analysis to embrace the data as subjective personal perceptions rather than objective accounts of events and actions. Interviews may also be limited by societal pressure where participants may not be as honest in order to maintain good image in front of the researcher; in focus groups, this societal pressure may intensify as participants need to be

cognizant of the other participants in the group as well (Grudens-Schuck et al., 2004). One advantage of focus groups comes from the building of ideas among the participants. However, within this study, focus groups ended up having at most two participants (not including the researcher) due to the issues with low participant engagement with the research and scheduling difficulties. This made the group numbers not ideal for facilitating the sort of inter-participant interaction that focus groups are capable of (Krueger & Casey, 2009) and that was desired, resulting in the focus groups being quite similar to interviews.

Due to the 2020/2021 lockdowns, all data collection was conducted online and therefore there was no chance to interact with students in person or to be able to promote the studies. Therefore, some body language cues may have been missed in conducting the focus groups and online interviews. However, the video recording allowed for replay of the group and so visible and extra expressive body language was easier to include in the transcript compared to the standard audio recording of focus groups and interviews. The notes on body language, such as students holding up items to the camera, were used during the analysis process as reminders of context of specific sections and to differentiate if something was said sarcastically, in jest, or seriously, so as to not misrepresent the meaning of what students said.

Finally, there are multiple constraints created by the changing of the study design from a longitudinal study to a snapshot study before data collection began. The data collected through snapshot design will provide less evidence of changes in attributes over time. However, given the time constraints of a PhD, the choice to switch was justified as it still provided insightful and interesting data. Similarly, considering the significant changes that learning and teaching underwent during the pandemic, a longitudinal study design could have possibly limited any data interpretation as students across the different years would have experienced a significantly different University environment. Furthermore, multiple different year groups took part in the study, allowing for comparisons across year groups in what could be considered a pseudo-longitudinal study.

3.10.1.2 Data Analysis and Interpretation Limitations

In the questionnaire, Likert scales were used to judge the change in abilities, change in confidence, and opportunity to develop skill. While the questions were asked independently of each other, it may be reasonable to assume that these questions are not actually independent; for example, students that had more opportunity to develop a skill would perceive their abilities to have

improved more and would perceive an increase in confidence. Similarly, a student that feels more confident in a skill could feel that they improved in that skill more. This would mean that data from these three questions could not be treated as independent and may need an adjustment in analysis methods of the dataset as a whole.

Next, the questions on identity within the questionnaire suffered from multiple limitations. First, the questions themselves were limited to only a handful of specific identities. Second, the use of Likert scales may have suggested that these identities should be quantified and thus may not have adequately represented the true breadth of identity. This limited the overall use of that data as very few appropriate conclusions could be drawn from it. This was further observed when students were asked about their identity during the interviews and focus groups and revealed a deeper complexity to the situation. Identity requires more contexts than just a Likert scale, as seen in the example of the student who did not consider themselves a student. So using Likert scales for such a complex situation may not be the most effective approach, resulting in any interpretations made through the Likert scale identity and belonging questions to be extremely weak. This issue was further explored in section 5.3 on page 200.

The interpretations employed within the study often border on extrapolation, especially when examining patterns and progressions of students across the year groups. As this is not a longitudinal study, it cannot be accurately claimed that there is any progression – the students in different years are different students with little connection to each other. As such, within the questionnaire, while some year-by-year patterns may become apparent, they cannot be said to exist based on the questionnaire results alone. However, as many students reflected on their perceptions in their previous years during their focus groups and interviews, the perceptions of these students were used to strengthen any claims of potential progression.

3.10.2 Limitations of Studied Student Groups

Some limitations to the transferability and level of conclusions that could be drawn were also due to the student groups that were chosen for this study. Within STEM S1 and STEM S2, while the groups are named after STEM, only four STEM Schools were formally sampled from. As such, the sample is specific to these four Schools and cannot be said to represent all science, technology, engineering, and mathematics students. Furthermore, in the first semester group, only first year students took

part in the focus groups and interviews. This was not planned and further impedes some of the comparisons that may have been possible otherwise.

Similar limitations were observed with the SLICCs student group. First, it is necessary to note that this group of students is much more diverse and distinct to the STEM groups as can be seen in a comparison of students' perceptions of their year in Appendix 29 on page 329. This may mean that the perceptions of the effects of SaP experiences cannot be adequately compared between the SLICCs group and the STEM groups as these two groups are too different and do not share the same baseline. However, the students in these groups do have many characteristics in common – as such, the comparisons were employed with appropriate care. Second, only students who completed their SLICCs at the beginning of the pandemic induced lockdown responded to the questionnaire and focus groups, meaning that the transferability and wider use of this data is severely limited. Next, a high error rate was observed in this dataset when it came to student's reporting of their current year group. As further discussed in the results in following chapter, the only first year student who supposedly answered the questionnaire must have misidentified themselves as it is otherwise impossible to be in first year and having completed SLICCs due to the restrictions placed on who can enrol in a SLICC. Similarly, another student that identified themselves as a 3rd year later spoke about their experiences in 4th year in some of the free text questions. This led me to conclude that a significant number of students possibly misunderstood the initial question of their current year group as a question about when they completed their SLICCs instead. As such, the year group demographic data should be approached cautiously and consequently splitting the combined dataset by year group will not yield accurate results.

Finally, the limitation of the SPA funded project group is obvious – only one student within this group responded, thus severely limiting any potential comparisons and conclusions that could have been drawn. To mitigate this, this one participant's data is approached from a more qualitative perspective.

3.11 Transferability

The transferability and generalizability of the data and results included in this thesis must be considered. Transferability evaluates how applicable the findings and conclusions within one context are to another context in qualitative research. Generalisability or external validity describes how

applicable study findings are to other contexts in quantitative research. Within this study, multiple types of transferability and generalisability were evaluated. It is relatively simple to establish transferability and generalisability between the three data groups of the study (the STEM undergraduate students, the SLICCs students, and the students in the SPA funded project). This internal transferability effectively evaluates how applicable it is to compare the three student groups. The groups do have a significant overlap, for example a student completing a SLICC can come from one of the STEM schools, and therefore be included in both samples. Similarly, all the students in these three samples come from the same university and therefore share several other situational contexts. Given all the similarities between the groups, the SLICCs and SPA groups were considered to be similar to STEM students and the results could be combined and compared, with the distinction that SLICCs and SPA students have completed a SaP initiative.

Transferability and generalisability to other contexts such as other students studying undergraduate degrees at other universities or other fields, or other SaP initiatives is more difficult to establish. Within this thesis, it is my intention to provide a robust and rigorous description of all the methods and results to allow the reader to ultimately make the judgement for themselves (Lincoln & Guba, 1985, 1986).

Chapter 4 Results: Quantitative Data

To provide a clear narrative, the results and discussion are split into three chapters; the first chapter (Chapter 4 starting on page 100) presents the data obtained through the four questionnaires; the second results chapter (Chapter 5 starting on page 187) presents the data collected through the focus groups and interviews; chapter 6, starting on page 224, thoroughly discusses the trends across the entire data set and in relation to the literature, also discussing how the findings have answered the research questions. This narrative was carefully chosen to represent the data openly and without bias; the first chapter forms an introduction to each of the four student data groups to allow the reader to become acquainted with each of the data groups in turn. To this end, it also provides comparisons and contrasts between the different data groups, before bringing the whole dataset together as a whole. This allows chapter 5 to delve into examination of themes found across the entire dataset, rather than separating out each data group again. In this way, the structure is both chronological (questionnaires are explored first, then focus groups and interviews), as well as starting from disparate and concluding in the whole.

While the separation roughly falls between quantitative and qualitative data, the following chapter does include some qualitative data in the form of open text responses from the questionnaires. Where appropriate, the text students wrote within these open text questions are shared as quotes to highlight specific points.

Chapter 4, the first chapter of results and discussion, deals with the quantitative representations of the data. As a lot of data is introduced here, the chapter has a specific structure to present the data in a way to representatively introduce each student group and allow for comparisons at the later stage. After an overall demographics section, the sections present each dataset in turn, arranged from the most general data to most specific – from STEM semester 1 (S1), to STEM semester 2 (S2), to SLICCs, to SPA. Cross-section themes and statistics are then explored in individual sections, starting from the most specific comparisons to examining the data as a whole. Finally, individual

small sections are centred around data figures, with each figure first explained and interpreted and then discussed.

4.1 Demographics of the Student Groups

This first section introduces the respondents to the surveys and participants in the focus groups in terms of their Schools and year groups. I then discuss the implications of each group on the data they provided, as well as discussing the similarities and differences between the groups.

4.1.1 STEM Semester 1 Demographic Data

The survey group for STEM semester 1 (S1) consisted of 37 opted-in respondents spread across all five undergraduate years. The largest group of students who answered the questionnaire were in first year, which was reflected in the focus group demographics too as only first year students took part in the focus groups. Three first year students were spoken to across two focus groups; two of the students were from the School of Physics and Astronomy, and one student was from the School of Biological Sciences.

Table 10. Basic demographics of the respondents to the STEM semester 1 survey.

Student Group	Consent to Participate		Year	
STEM S1	Consented	37	1 st year	13
	Did not consent	4	2 nd year	9
	Total	41	3 rd year	8
			4 th year	4
			5 th year	3
			Not stated	0
STEM S1 Focus Group	Opted in	6		
	Participated	3	1 st year	3

The majority of respondents to the first semester survey were from the School of Physics and Astronomy (n = 17), followed by the School of Biological Sciences (n = 9) (Figure 3 on page 102). Several students were from Schools that were not directly invited to participate in the questionnaire. This may be due to students taking optional subjects in the Schools that were surveyed and thus

getting the emails inviting them to participate, or due to students studying joint degrees in more than one School switching degree programmes from other Schools. Similarly, the reason the School of Engineering was underrepresented (compared to the actual size of the School) may be due to the invitation to participate in the questionnaire not being sent to the students directly in that School, instead the invitation to participate in the study was placed within the weekly bulletin; this may have created a second barrier for students to access the questionnaire.

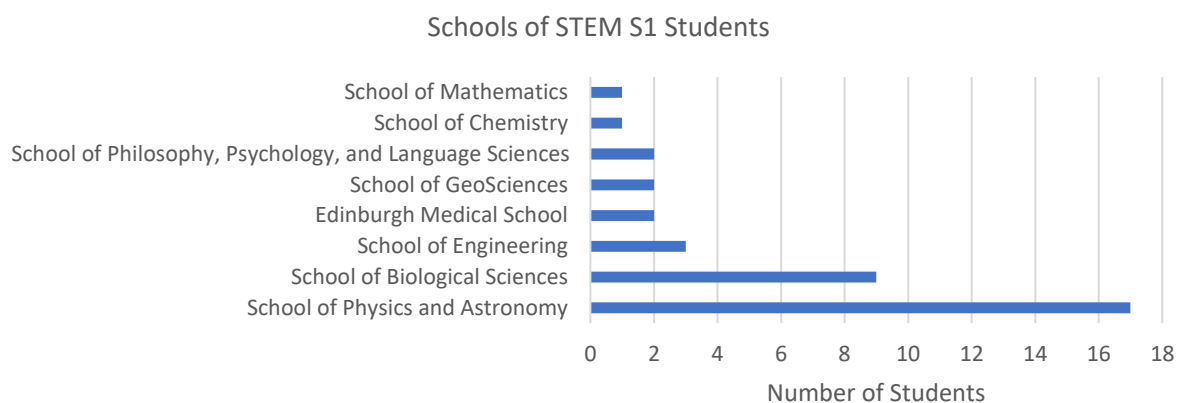


Figure 3. STEM S1 survey respondents' Schools.

4.1.2 STEM Semester 2 Demographic Data

Many more STEM students participated in semester 2 (S2) questionnaire compared to the first semester. As can be seen in

Table 11, altogether, 59 students completed the questionnaire, spread across all five undergraduate years. The majority of students who responded were currently completing their 3rd year (n = 17), but other years were also well represented. Focus groups reflected this spread with six students taking part in the focus groups/interviews. Three students were completing their 3rd year, one was in their 4th year, and one in their 2nd year. The students who attended focus groups/interviews came from the School of Physics and Astronomy (n = 3), School of Biological Sciences (n= 2), School of Engineering (n = 1).

Table 11. Demographics of the STEM S2 data group.

Student Group	Consent to Participate	Year
STEM S2	Consented 59	1 st year 13
	Did not consent 1	2 nd year 13
	Total 60	3 rd year 17
		4 th year 11
		5 th year 4
		Not stated 2
STEM S2 Focus Group	Opted in 15	1 st year 1
	Participated 6	2 nd year 1
		3 rd year 3
		4 th year 1

Semester 2 students were based in a wider range of Schools (Figure 4 on page 103). While the majority of students came from three of the Schools that were sampled - School of Physics and Astronomy (n = 24), School of Biological Sciences (n = 16), School of GeoSciences (n = 5), a number of other schools were represented, notably the School of Chemistry (n = 5). Again, this may be due to students taking subjects outside of their Schools or studying fields that are part of more than one School, such as Biochemistry. Again, the School of Engineering was underrepresented in the data, possibly due to the same reasons as in the previous semester.

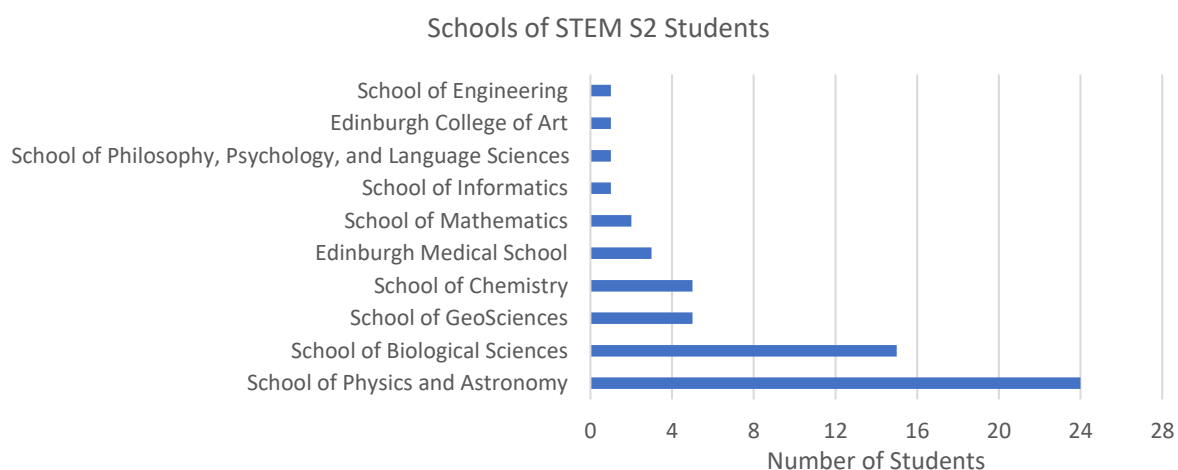


Figure 4. STEM Semester 2 survey respondents' Schools.

4.1.3 SLICCs Demographic Data

All current students who have in the past completed a SLICC were contacted with an invitation link to participate in this study; of those, 25 completed the questionnaire. Students were mostly in their

second and third year of undergraduate study (Table 12 on page 104), which is understandable as all students reported completing their SLICCs in the summer before the questionnaire. As SLICCs are only available to students who have completed their first or second year, students would be entering the year after during this study. One student selected their year of study as first year; since this is impossible due to the timing of SLICCs, this may have been an error or misunderstanding.

Four third year students participated in the focus groups. They came from four different Schools: School of Informatics; School of History, Classics, and Archaeology; School of Physics and Astronomy; and School of Philosophy, Psychology, and Language Sciences. This small group represents well the diversity evident in students who undertake SLICCs, especially in comparison to the STEM student groups. This is understandable as SLICCs are not limited to any one School within the University, and its structure (focused on reflection, reports, and essay writing) may disproportionately attract students from the arts, humanities, and social sciences.

Table 12. Demographics of the SLICCs student data group.

Student Group	Experience Year		Year	
SLICCs	2020	25	1 st year	1
			2 nd year	10
			3 rd year	13
			Not stated	1
SLICCs Focus Group	Opted in	5	1 st year	0
	Participated	4	2 nd year	0
			3 rd year	4

SLICCs students came from ten distinct Schools within the University of Edinburgh (Figure 5).

Humanities are indeed heavily represented in this student group; the majority of students were from the School of History, Classics, and Archaeology (n = 5). Four students were from the Edinburgh Medical School. This is understandable as the SLICCs initiative was started within the Medical School and is still marketed specifically towards medical students.

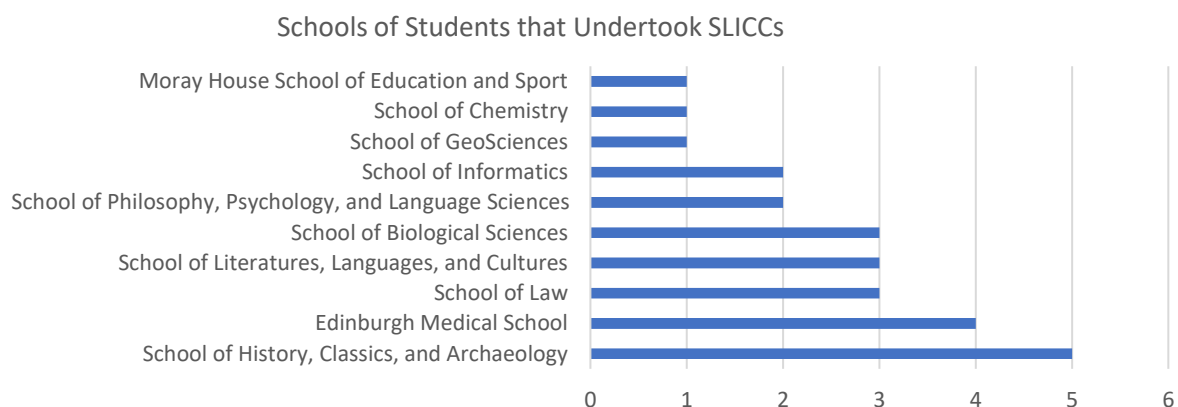


Figure 5. Schools of students in the SLICCs student data group.

4.1.4 SPA Demographic Data

The data collected from the Student Partnership Agreement funded project comes from only one data source as only a single student responded to the survey. As the entire dataset consists of a single data point, no statistics were deemed possible, and the demographics below are also thus a profile of this single participant (Table 13). As this participant also agreed to an interview, the demographics for the focus group are the same as for the questionnaire. While the usability of this singular data point is somewhat reduced in terms of statistics, the student's response nevertheless offers a useful perspective on an interesting SaP initiative worthy of detailed examination.

Table 13. Background of the student involved in the SPA funded project.

Student Group	School	Programme	SaP Project
SPA	Edinburgh College of Art	Postgraduate Taught	Organising and running a drawing workshop

4.2 STEM Semester 1 Data Group Quantitative Representations

Within this section, the data collected in the STEM semester 1 (STEM S1) questionnaire will be examined in detail, in a way that allows each aspect of the data to be examined independently, followed by examination and discussion in the wider context.

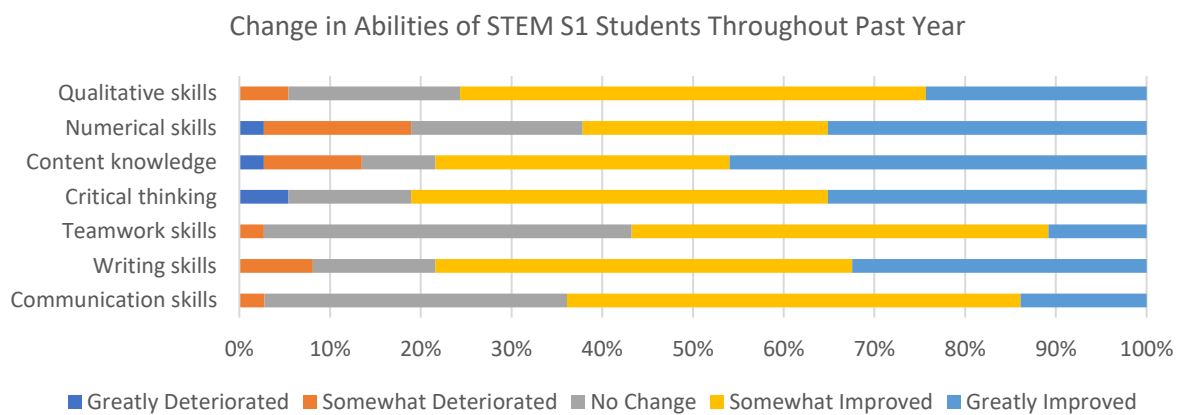
4.2.1 Experiences of SaP from general learning and teaching

In the first part of the questionnaire, students shared their perceptions of their past academic year in general, with no mention of SaP or other engagement initiatives. This allowed me to collect baseline data for completing comparisons later on; however, the data is interesting in its own right. In this section, the results are interpreted on their own.

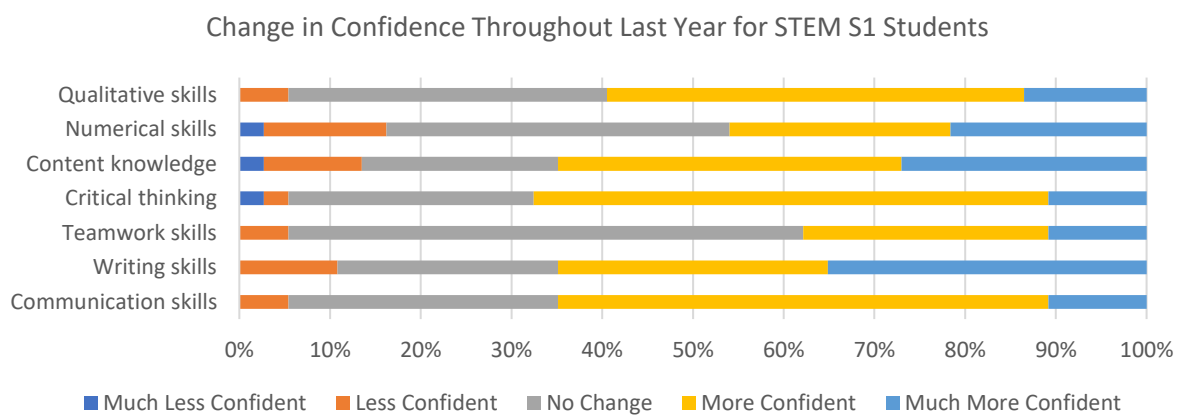
The students' responses were quite varied (Figure 6 on page 107). Most students reported improving in their abilities in the respective graduate attributes; however, a sizable minority of students reported their skills deteriorating, especially in numerical skills, content knowledge, and critical thinking, although these were also the areas that other students reported the greatest development (Figure 6.A). Similarly, most students reported becoming more confident over the last year, but at least 30% of respondents reported either no change or deterioration of their confidence in their graduate attributes. Again, for numerical skills, content knowledge, and critical thinking, two students reported becoming much less confident in each (Figure 6.B). Finally, students reported having much less opportunity to develop the specific skills throughout this last year. Students had the opportunity to develop their content knowledge the most, and fewer students had the opportunity to develop teamwork (Figure 6.C).

The data is overall quite positive in how many students reported progress within their skills development across the three questions. The data represents expected trends in progress; in general, students are expected to improve in each of the graduate attributes throughout their studies.

A.



B.



C.

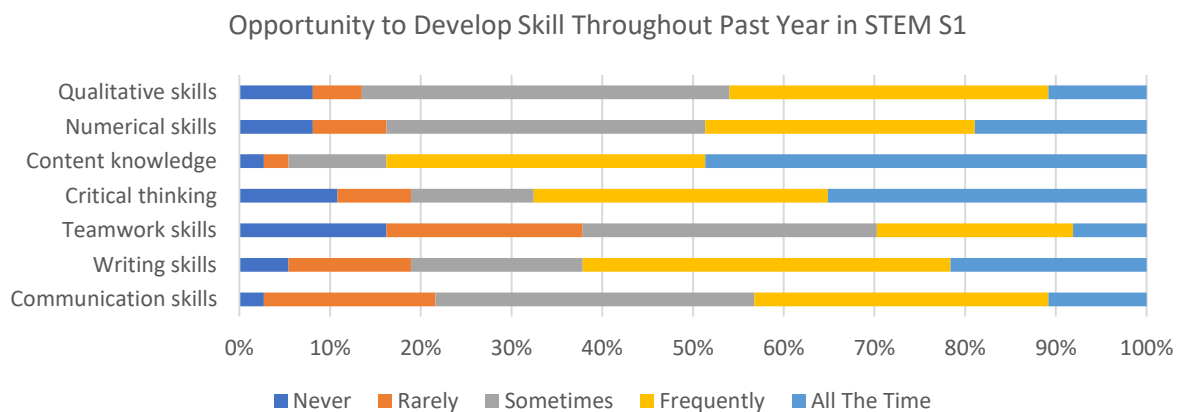


Figure 6. Perceptions of STEM S1 students (n = 37 for all attributes except for communication skills in A, where n = 36) on their abilities throughout the past year (academic year 2019/2020). A. Change in abilities in each of the graduate attributes. B. Change in confidence in each of the graduate attributes. C. Opportunity to develop each of the graduate attributes.

Particularly interesting is that many students reported not having much opportunity to develop particular skills (for example, 37.8% of students stating they had rare or no opportunity to develop

their teamwork skills). This may be due to the pandemic changing the mode of learning and significantly reducing the opportunities students have available to them. This can be especially seen in the lack of overall development in teamwork skills across all three metrics, which is a skill that can be difficult to work on during emergency online learning. This may be due to several factors. For instance, a member of the focus group (expanded upon in chapter 5, starting on page 187) suggested that opportunities for informal, spontaneous, and voluntary collaboration and teamwork were severely impeded by the global situation – especially in semester 1, when students were still adapting to online learning. Similarly, students lost the opportunity to meet without having access to defined physical spaces and struggled to translate their study habits to online. Finally, students had reduced opportunity for teamwork without classes such as laboratories, workshops, and practicals that usually enabled students to work in small groups or alongside each other.

In the context of the pandemic, it is encouraging that students ranked their progress in content knowledge highly, implying that many students made the switch to hybrid learning without many issues. The sizeable minority that reported deterioration in ability and confidence may be in part explained by the new mode of learning not being suitable for every student; with other factors that may affect this possibly being the stress and mental health strain brought on by the pandemic or simply the skills not being built into the courses that students experienced that year. Similarly, while students reported low opportunities to develop the specific skills asked about here, many went on to clarify during the focus groups and interviews that they had the chance to develop different skills this year due to the pandemic.

4.2.2 Experiences of SaP Initiatives in STEM Semester 1 Group

Fourteen students out of 30 (total student $n = 36$, 6 students did not answer this question at all) reported that they considered their significant learning experience to be partnership; a further five students identified that whilst the most significant learning experience they had was not SaP, another one of their experiences was. The 14 students that answered with a named initiative were then asked a further question about the experience they self-identified. These 14 results were thematically coded and are presented in Table 14 on page 111. A summary is provided below.

Students writing about their perceived SaP experiences stressed the interactions they had with their lecturers/tutors and the other classmates and noted how different this felt to other classes. Students especially considered workshops as a form of SaP above other types of instruction (experiences such

as tutor-led problem-solving or practical, regular classes), noting the chance to approach and solve content problems differently, and being able to take part in small group discussions. One first year student even mentioned her extra preparatory classes taken in high school as a form of SaP due to the shift in the environment and opportunity to interact with her teachers in a different way. This specific case is further explored in a focus group (detailed in chapter 5 starting on page 187). Interestingly, some students mentioned online classes specifically as a source of partnership, noting that it was a novel and enjoyable way to engage with their studies as well as the others on the course. The interactions between students' perceptions of their skills, SaP, and new approaches to learning were further explored in the focus groups through questions about the pandemic and are detailed in section 5.6 starting on page 218.

Students similarly pointed towards experiences that occurred within the curriculum but were not conducted in a typical class setting, which they considered to be SaP. A student for example suggested their field trips were a form of SaP, stating that they are *"definitely a large component of my degree, and they really help to both solidify and visualise the knowledge/techniques not only do you learn but you make friends and build professional relationships with members of staff."* Another student considered becoming a tutor themselves as partnership, as they could test their own content knowledge when teaching it to others. Similarly, students pointed to project work and report writing as a form of partnership, identifying the autonomy they were afforded as one of the main aspects of their experience: *"Every part is controlled by the student, there is very little hand holding at this point."* This point of progressing towards increased autonomy and more student directed learning (thus developing self-agency – the ability to act proactively and self-reflectively to create some sort of effect effect), and in turn perceiving being more trusted by the institution to carry out such work, was similarly echoed by SLICCs students during the focus groups and will be further discussed in the sections below. This idea was also taken further by some students as the phrasing of the question did not necessarily lead students to only speaking about initiatives or experiences with staff. Several students spoke about studying on their own time being their greatest learning experience, with one student suggesting they would consider this SaP.

While the questionnaire was written in a way that directly asked for experiences within university, some students spoke about significant experiences that occurred outside of the University. Students referenced initiatives such as Model United Nations (UN), World-Wide Opportunities on Organic Farms (WWOOF), or simply living abroad and working in industry. Students wrote about how these

experiences allowed them to become more flexible and adaptable, and able to learn about issues and skills beyond the curriculum.

Not all students who shared their most significant learning experience considered this experience to be a type of partnership. Students would often refer to the staff as experts (*"Demonstrators and tutors are there for a reason"*) or refer to their own place in the power hierarchy by considering themselves as students in the traditional way (*"Students as Students"*). A full thematic list of the diverse learning experiences is available in Appendix 11 on page 308.

Students considered a large number of assigned projects or coursework as SaP that would not be considered as such within the SaP literature. This may be because students usually do not share in the decision making and direction setting of the project in the pre-Honours years – instead, they complete assignments assigned to them as requested by staff. This interpretation was perhaps to be expected, as everyone interprets partnership differently. Designing and running SaP initiatives requires a significant amount of work from all parties involved. When students describe a learning experience as a partnership, despite how such an experience could be defined in the academic literature or by others involved, this may be because that learning experience contains some elements of partnership that students are identifying; such as greater student agency, sense of trust placed in students, shifts in the learning environment, or opportunity to work with the teacher in a different way. This is especially likely, considering the definition of SaP that students were provided (*"an experience where your expertise was considered just as important as the staff members you worked with"*), which is consistent with the partnership elements that students associated with it, such as agency or autonomy.

Table 14. Types of perceived SaP experiences STEM S1 students engaged in (n = 14).

Theme of Experience	Perceived Partnership	What made it significant? (According to students)	Student's Activities	Length of Involvement
High School Extra Prep Classes	SAT classes	Good class environment (productive and motivating) Good peer interactions Deep learning	Class discussions Group study	6 months
In Class Experiences (workshops)	Workshops	Communicating in general with lecturers/tutors	Programming	Once a week each semester
	Workshops	Approaching problems differently	Small group discussions Answering content knowledge questions	Throughout the course
Online Class Experiences (online presentations, online lectures)	Synchronous Online lectures	Enjoyable learning experience Developing many skills simultaneously	Small group discussions Answering content knowledge questions	All semester
	Lectures	Getting motivated and enthused in a subject by lecturers	Watching lectures Answering content knowledge questions Learning new ideas	3 hours a week
	Online presentations	Novel activity for the student	Presenting project online	All semester
Practical Experience in Curriculum (field work, tutoring)	Field trips	Solidifying and visualising content knowledge/technique Making friends Building professional relationships with staff	Learning data gathering techniques Large group project and presentation	1 week (before COVID19)
	Tutoring	Testing understanding of own content knowledge	One-to-one weekly tutoring Group fortnightly tutoring	4 months
Practical Experience Outside Curriculum (living abroad, industry experience, WWOOF, Model UN)	Model United Nations	Approaching a problem in different ways Continuous opportunities for growth Improving public speaking/stage fright Increasing knowledge about global issues	Attending conferences Attended meetings Participated in mock debate	Unspecified
	Living abroad and industry experience	Becoming flexible and adaptable to new situations Communicating with strangers Developing skills not taught at university	n/a	1 year
	WWOOF	Living outside of home	Helped farmers harvesting	2 weeks
Research, Project Work, and Assignments	Research (report and article writing)	Learning how to write scientific articles	Reading research Writing a scientific paper	Whenever doing a lab report (1 or 2 per semester)
	Project work	Fully autonomous process	n/a	All semester
	Lab reports	Getting familiar writing long text	n/a	1 semester
Self-study	Studying alone	Taking time to learn at own pace	Reading	Since childhood

The learning experiences reported as significant by students here are also reminiscent of the research on High Impact Practices (HIPs). These are teaching and learning practices that have been researched in detail and shown to create positive outcomes for students regardless of their background (Kuh, 2008). Just like partnership, HIPs have been shown to be beneficial for students (see for example Johnson & Stage, 2018; Kilgo et al., 2015; Myers et al., 2019); however, the specific practices may not be creating the positive outcomes as much as the characteristics of HIPs that promote practices such as reflection and faculty-student interaction. In a similar way, the experiences reported here by students may be beneficial because students are experiencing some of the characteristics of partnership that lead to positive outcomes for the students. Encouragingly, this could mean that there could be benefits to a larger population of students from ensuring learning experiences within the curriculum are designed to focus on these partnership characteristics when full, established partnership initiatives are not feasible.

Of note in this respect are the course-based experiences mentioned by students, displayed in the *In Class Experiences* theme, as well as *Online Class Experiences* theme in Table 14 on page 111.

Students reported that these experiences were made significant thanks to their interactions with their lecturers/tutor, often in a way that personally motivated the student. This theme of interpersonal relationships has been echoed across other student groups and within the focus groups, suggesting that fostering genuine and authentic interpersonal relationships may be the key to creating experiences that are perceived as SaP by the students, as well as experiences that contain some of the elements of SaP.

4.2.2.1 Likert Scale Responses about SaP Initiatives

Before considering the perceptions of graduate attributes within SaP, a limitation in the data collection must be addressed. Due to a limitation in the survey design, not all students noted down what SaP experience they were referring to when completing the SaP section of the survey. Specifically, if students noted down that their SaP experience was not the most significant learning experience of the year, they were not asked to name the experience they considered SaP. This meant that for five survey respondents, it is not immediately clear what experience they are referring to. This only became apparent during the data analysis stage once all data had been collected (and is as such present in both the STEM S1 and the STEM S2 questionnaires).

The majority of students reported improvements in their abilities throughout their SaP initiative (as seen in Figure 7 on page 114). In particular, communication skills were the most improved of the

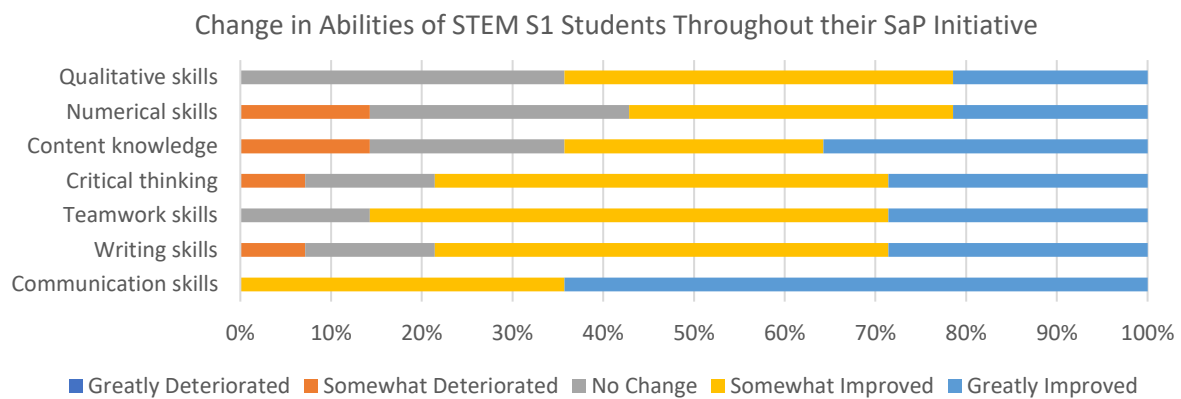
graduate attributes with all students reporting that they improved their communication during their SaP initiative. Similarly, while 35.7% (n = 5) of the students reported no change in their qualitative skills and 14.3% (n = 2) have reported no change in their teamwork skills, the rest of the respondents have reported improvements in these skills.

The same trend was seen when it came to students' reported confidence. Only 2 students (14.3%) reported being less confident in numerical skills and 2 students (14.3%) in their content knowledge; the rest of the respondents reported either no change in their confidence, or more commonly, reported increase in confidence. Again, all students reported increased confidence in communication skills.

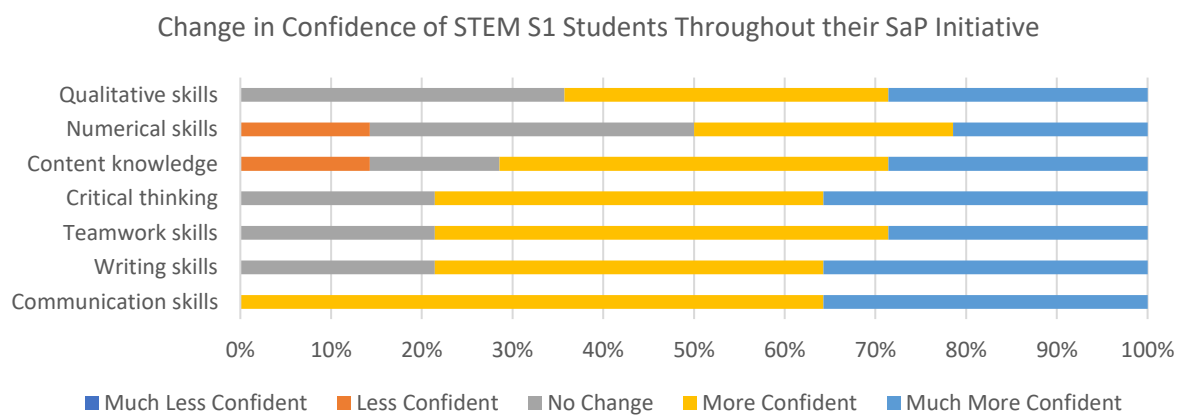
Interestingly, the responses are much more varied when it comes to students' perceptions of their opportunity to develop their skills. For every skill, at least one student stated that they had no opportunity to develop a skill. In general however, students reported frequent or constant opportunities for development. Communication skills and numerical skills are again the outliers, with 85.7% of students (n = 12) reporting having frequent or constant opportunities to develop their communication skills and conversely only 43.9% (n = 6) of the students having same amount of opportunity to develop their numerical skills.

As mentioned above, relationships appear to be instrumental within the SaP experiences. Students reported large improvements in their communication skills, suggesting that the relationships fostered through SaP also serve to develop these skills. However, there is an interesting disparity between how communication skills are represented. All students reported getting more confident and improving in their communication, but at least one student reported that they had no opportunity to develop the skill. This may point to an error in completing the questionnaire, a lack of reflection on the students' part, or possibly students conflating their improvement and confidence from other projects and not just answering about their reported SaP experience.

A.



B.



C.

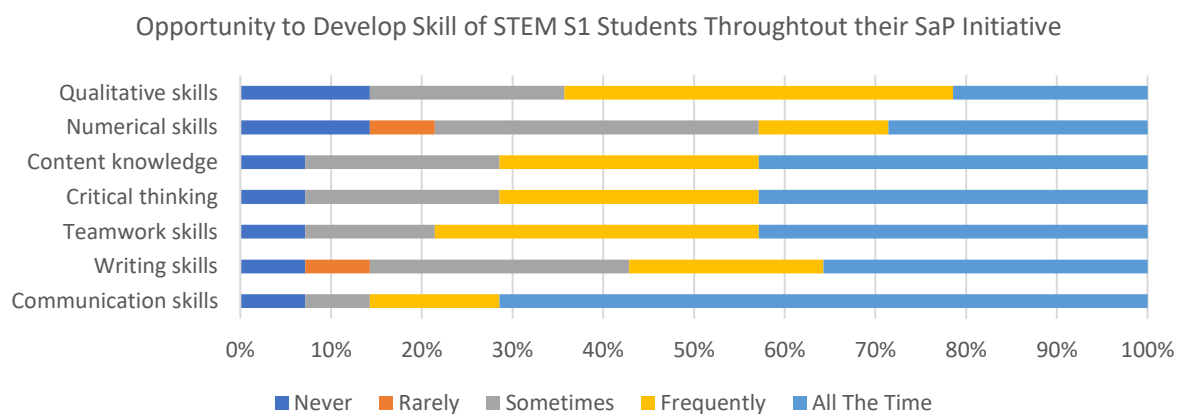


Figure 7. Perceptions of STEM Semester 1 students ($n = 14$) throughout their SaP initiative. A. Change in abilities in each of the graduate attributes. B. Change in confidence in each of the graduate attributes. C. Opportunity to develop each of the graduate attributes.

The wide distribution of responses about how much opportunity students had to develop skills throughout their SaP experience is likewise interesting, especially when considered in the context of the type of SaP students were reporting (as seen in Figure 14 on page 145). Students are

overwhelmingly reporting activities that could be considered as regular, commonly occurring classroom interactions. Taken together with the fact that the students surveyed here are studying STEM, it is surprising to see that for example over 20% of students reported having rare or no opportunity to develop their numerical skills. To explain this apparent discrepancy, the wider context must be considered. Namely, it is important to note that the group responding to this part of the questionnaire is small ($n = 14$), and a single student thus represents over 7% of the group. As such, the seemingly high proportion of participants reporting no opportunities to develop skills actually represents one or two students. Further, considering that many students chose to speak about solitary tasks such as self-study, it may be more understandable why students felt they did not have many opportunities to develop certain skills. In part thanks to the population in this part of the study, any conclusions developed based on these graphs should always be carefully considered within this wider context.

4.2.3 Graduate Attributes Comparisons in STEM Semester 1 Data

To compare the data between students' perceptions of their skills within a SaP initiative (denoted as *Throughout SaP*) and throughout the year (denoted as *Outside SaP*), various methods were used. First, to visualise the differences more clearly, percentage agreement was calculated. Percentage agreement, as previously explained in Section 3.9.2 on page 90, denotes how many students agree with a Likert scale statement, in this case selecting either of the top two options. This method does not account for dispersal of the data, such as the fact that students reported greater amount of negative development (for example, deterioration of skills) within their studies compared to their perceived SaP initiatives (comparing Figure 6 and Figure 7 on pages 107 and 114 respectively), but nevertheless provides an important insight into the dataset and the comparison of the previous figures. Second, the differences in graduate attribute perceptions were then statistically evaluated using the Mann-Whitney U test (Appendix 12 on page 310), allowing me to judge the extent and statistical significance of the visualised differences. Unlike when comparing the SLICCs student groups, the groups are not equal in size. The comparison here is of a subset of students (those who completed a self-perceived SaP project) to the total of the student group (all the students who completed the survey; the Outside SaP bar). However, all the assumptions necessary to carry out statistical testing are still honoured; therefore, the disparity in group size does not cause any issues to analysis.



Figure 8. Differences in percentage agreement with improvement in each of the graduate attributes of STEM S1 students. ($n = 14$ for Throughout SaP and $n = 37$ for Outside SaP). Asterisks illustrate statistically significantly different groups as calculated in Appendix 12. A.-G. Graphs split by percentage agreement for each of the graduate attributes.

Using this comparison, numerous differences can be seen between the groups. In general, more students developed their skills in a positive way during their SaP initiative compared to the rest of their year. The largest difference in this direction occurred in communication skills and teamwork skills, where students' agreement differed by as much as by 48.8%. These differences were statistically significant for all questions of communication and teamwork ($U < 165$, $n_{out} = 36$, $n_{in} = 14$, $p < 0.05$). Other skills did not have as much difference between the groups, with some skills such as numerical skills showing almost negligible differences. Similarly, all the skills other than communication and teamwork showed no discernible pattern of answers, with the percentage agreement differences seemingly random, and no statistically significant differences.

These figures show how graduate attribute development differs between standard teaching and what students consider to be SaP initiatives. What makes this data interesting is that participants were not experts on the meaning of SaP, having only been given one possible definition of SaP and no specific examples or initiatives. Considering that students reported teamwork and communication skills as significantly more developed during their perceived SaP, this may thus suggest that students considered learning experiences that included increased interaction with staff and peers as partnership. This was not entirely unexpected as this trend was repeated in other data groups and reiterated in the focus groups. Alternatively, this trend could also suggest that students are all reporting the same or similar partnership initiative, thus resulting in similar progress in specific graduate attributes by the students; this is however disputed by the sheer variety of learning experiences elaborated on in Table 14 on page 111.

Finally, it is valuable to approach the dataset from multiple angles. Thus far, the data was treated as a set of distinct groups. However, students that answered the 'Inside SaP' section also answered the 'Outside SaP' section of the questionnaire; therefore, it may be disingenuous to not consider them as instead two different groups of students – those that have completed some sort of SaP (and may therefore see the effects of it outside of the SaP initiative), and those who had no SaP experiences. To visualise the data in this alternate way, the group was re-divided (as seen in Appendix 13 on page 311). While this subdivision resulted in the data groups being so small that no statistics would likely be accurate if performed, there are still some interesting insights in this data. Upon examination, there are differences between the group of students who reported having a SaP experience (SaP+ Group) and the group of students who did not report any SaP (SaP- Group) in how many students reported positive progress across all graduate attributes. In some skills, such as communication, qualitative skills, and teamwork, SaP+ group reported markedly higher percentage agreement across

ability change, confidence change, and opportunity to develop. Within other skills, such as content knowledge, the trend seems to be reversed (however the extent to which this is the case is exceedingly small). Several other skills do not seem to exhibit any patterns. When examining this data grouping from the viewpoint of whether comparing the SaP results to any of these other Outside SaP groups would change the conclusions reported above, the question of how much students had the opportunity to develop skills comes up repeatedly – in writing skills, critical thinking, and possibly qualitative skills, the conclusions about how much opportunity students had to develop these skills would be unlikely to be as strong as they were. This may point to a difference in perception of SaP+ students compared to SaP- students. However, the differences between these groups are still minor and are unlikely to significantly affect any of the discussion presented here.

4.2.3.1 What helped students develop each graduate attribute, in and out of SaP in STEM S1

To gain further insight into what sort of learning tasks students considered to be important to them and how that differed between during SaP and outside of SaP, activities were thematically organised from their free text responses in the survey. This process was completed iteratively as explained in detail in section 3.9.3 starting on page 92. Quantitative comparisons are hard, if not almost impossible, to do as the group sizes are not the same, and not all students answered the question fully. As such, the numbers listed aim to provide a general frame of reference for the type of activities considered important by the students. The total number of students who answered the specific question in the questionnaire is included at the bottom of each table; as many students provided more than one answer, this number does not necessarily match the sum of student answers in any particular column. Furthermore, the data is prepared and analysed using qualitative methodology; this data should be treated as a qualitative dataset. Consequently, while some activities are mentioned more often than others, it cannot be argued that they are more significant than other activities to students.

The following tables reveal several overlaps in significant learning experiences in SaP initiatives and throughout the year. When discussing their communication skills (Table 15), students mostly identified working within their courses, working on assessments, and working with their peers as the most important learning experiences both throughout SaP and outside SaP. As one student wrote, *“regular discussions in online lectures and in workshops”* was their most important learning experience, noting the importance of the frequency of these interactions. Interestingly, students mentioned personal communication and university participation as activities during which they

developed their communication throughout the year but did not mention these same categories when speaking about their SaP initiatives. This was striking as a number of these students then went on to identify the experiences they wrote about as SaP initiatives in their own right (see for example World-Wide Opportunities on Organic Farms, or WWOOF, as a SaP initiative in Appendix 11 on page 308).

Table 15. Activities that developed communication skills in STEM S1 students.

Communication skills	During SaP	Outside SaP
In course assessment: presentations, essays, team projects	6	9
In course work: tutorials, workshops, lectures, breakout rooms, team meetings, talking on virtual platforms	2	15
Personal communication: living abroad, work experience, WWOOF, tutoring others	0	3
University participation: Students as Change Agents presentation, School competitions, student rep meetings	0	3
Working with peers: meeting new people, asking questions, group discussion, asking for help from others	5	9
Working with tutor/staff member: Q&A sessions, emails to teachers	1	3
None or n/a or rarely developed	0	2
Total Answered	11	31

When considering their writing skills (Table 16), students mostly spoke about their assignments and assessments, as well as the essays and theses they wrote. These two thematic categories are distinct here as many students made this distinction compared to other skills. Beyond writing for some sort of assessment which constituted the majority of learning activities for the students both within SaP and outside of it, students also mentioned the importance of the writing process to them as part of SaP and outside SaP.

Table 16. Activities that developed writing skills in STEM S1 students.

Writing skills	During SaP	Outside SaP
Assignments and assessments: reports, hand-ins, exams	7	11
Essays and thesis: writing, midterm, and final essays	3	13
In course work: note taking, field note taking, tutorial work, projects	3	5
Research: scientific article writing, grant proposals, critical reviews	0	3
Writing process: Using different writing styles, planning writing, writing for different audiences	2	2
None/Never a specific focus of activity	0	3
Total Answered	10	31

Next, students reported building their teamwork skills primarily through activities within their courses and through group assignments (Table 17). Interestingly, many students specifically mentioned working with their peers as an activity by itself, such as adapting to working in diverse groups.

Table 17. Activities that developed teamwork skills in STEM S1 students.

Teamwork skills	During SaP	Outside SaP
Group assignments: presentations, projects, lab partners	2	6
In course work: tutorials, labs, zoom calls, workshops, experiments, field work	4	15
Personal development: creating a team resolution, overcoming hard tasks together	1	1
University participation: student representative work, Students as Change Agents programme	1	1
Working with peers: working in a group, discussions, working with those of different backgrounds, study groups	3	6
None or n/a	2	4
Total Answered	11	31

While critical thinking activities were similarly skewed towards course participation and assessments, students did mention a greater variety of learning activities beyond that, showcasing more individualised responses (Table 18). Students for example spoke about working with peers as well as personal development as a way they most developed critical thinking, suggesting that developing this graduate attribute is a relatively individual and personal experience.

Table 18. Activities that developed critical thinking in STEM S1 students.

Critical thinking	During SaP	Outside SaP
Assessments: essays, exams, lab report, ICAs	1	9
Course participation: in lectures, tutorials, workshops, PBL	3	15
Personal development: critical thinking questions, independent interpretation of information	1	2
Practical work: adapting to problems in the field, designing a course	2	3
Research: analysing papers and articles, overcoming research challenges, writing thesis, annotating a bibliography	2	4
Working with peers: working in a group, discussions, study groups, peer review, constructive dialogue with others involved	1	6
Other: thinking of ways to solve global issues	1	0
None or n/a	0	3
Total Answered	9	29

Comparatively, content knowledge development was not as diverse (Table 19). Students mostly mentioned in class work and assessments, with very few other ways to develop the skill mentioned. This lack of diversity was commented on by one student, who wrote that they “*learn best by reading so I can learn at my own pace. There hasn't been much reading required for my course.*”

Table 19. Activities that developed content knowledge in STEM S1 students.

Content knowledge	During SaP	Outside SaP
Assessments: essays, exams, ICAs, lab reports, quizzes, hand-ins	2	10
In Class work: workshops, lectures, lecture discussions, lab demos	2	20
Personal development and independent study: readings, studying course notes, increasing knowledge on global issues	1	7
Practical work: designing a course, learning new techniques on field trip	2	0
Research: reading to complete task, reading to prepare for class	2	1
None or n/a	0	2
Total Answered	8	30

Numerical skills were also not as diversely developed as some of the other graduate attributes, focusing on assessments and class work, with the distinction that several students named specific courses they identified as most important, while other students simply suggested the skill was developed across all their coursework (Table 20).

Table 20. Activities that developed numerical skills in STEM S1 students.

Numerical skills	During SaP	Outside SaP
Assessments: exams, projects, applying statistics in project work, lab worksheets	2	10
In class work: lectures, tutorials, workshops, practicals, discussions	1	11
Practical work: developing a course, coding, programming, data analysis	1	3
Statistics/maths course/course components	0	4
In all coursework	0	3
None or n/a	1	2
Total Answered	5	26

Finally, qualitative skills followed a similar trend as numerical skills, with course participation and assessments being seen as most common important learning experiences (

Table 21). Finally, students were not always able to identify what learning experiences let them develop this skill, suggesting it developed throughout the year in general or that there were no specific learning experiences.

Table 21. Activities that developed qualitative skills in STEM S1 students.

Qualitative skills	During SaP	Outside SaP
Assessments: ICAs, essays, presentations, video production, portfolio	4	9
Course participations: discussions, tutorials, labs, lectures, workshops	2	8
Personal development: reflecting on feedback and marks	0	2
Practical experience: discussions, developing a course, giving feedback on work/presentations	3	0
Research: researching and writing thesis, data analysis	1	2
Improved in general	0	1
None or n/a or Unsure	0	3
Total Answered	7	22

Across all tables, students pointed to practical work as being an important part of their SaP experience; in some cases, such as content knowledge and qualitative skills, these practical learning experiences were noted only during SaP, further showing that SaP is seen as a more practical teaching approach.

In general, across all graduate attributes, students considered assessments and in course participations, such as lectures or tutorials, most often when considering their skill development outside of SaP. Within SaP, students would also often point out working with peers on top of classwork and assessments as a way to develop their graduate attributes.

It is important to note that students would often speak about learning experiences outside of SaP that they would later go on to denote as being a SaP initiative. This is not surprising as the SaP section of the questionnaire was given after the general section – as students' most significant learning experience was usually also their SaP experiences, it makes sense that they would discuss it in both sections. It may also suggest that the definition of partnership supplied to the students was not sufficiently clear and understandable. This is a notable constraint to be aware of when reading this data.

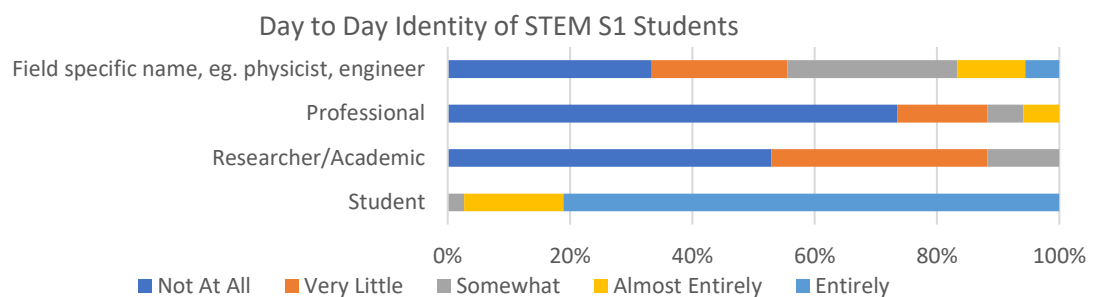
4.2.4 Experiences of Identity and Belonging in STEM Semester 1 Data

All students were asked Likert scale questions about their identity and belonging (Figure 9 on page 123). As seen in Figure 9.A, the participants overwhelmingly identified themselves as students. Conversely, very few students would consider themselves as any of the other offered identities, with the second most popular identity being specific to the participant's discipline with 16% (n = 6) of students considering their identity to be somewhat to entirely theirs, and the least considered

identity being that of a researcher/academic (no students considered themselves to be researchers almost entirely or entirely).

Next, Figure 9.B, which represents the participants' perceptions of belonging, echoes the findings in identity. The majority of students agreed or strongly agreed that they feel part of their academic community and discipline ($n = 28$, 76% and $n = 22$, 59% respectively). Similarly, most students agreed that they felt comfortable being a university student ($n = 28$, 76%) and felt established in their academic field ($n = 24$, 65%). Conversely, almost no students agreed that they believe they have as much to offer in expertise as their tutors/lecturers ($n = 6$, 16%).

A.



B.

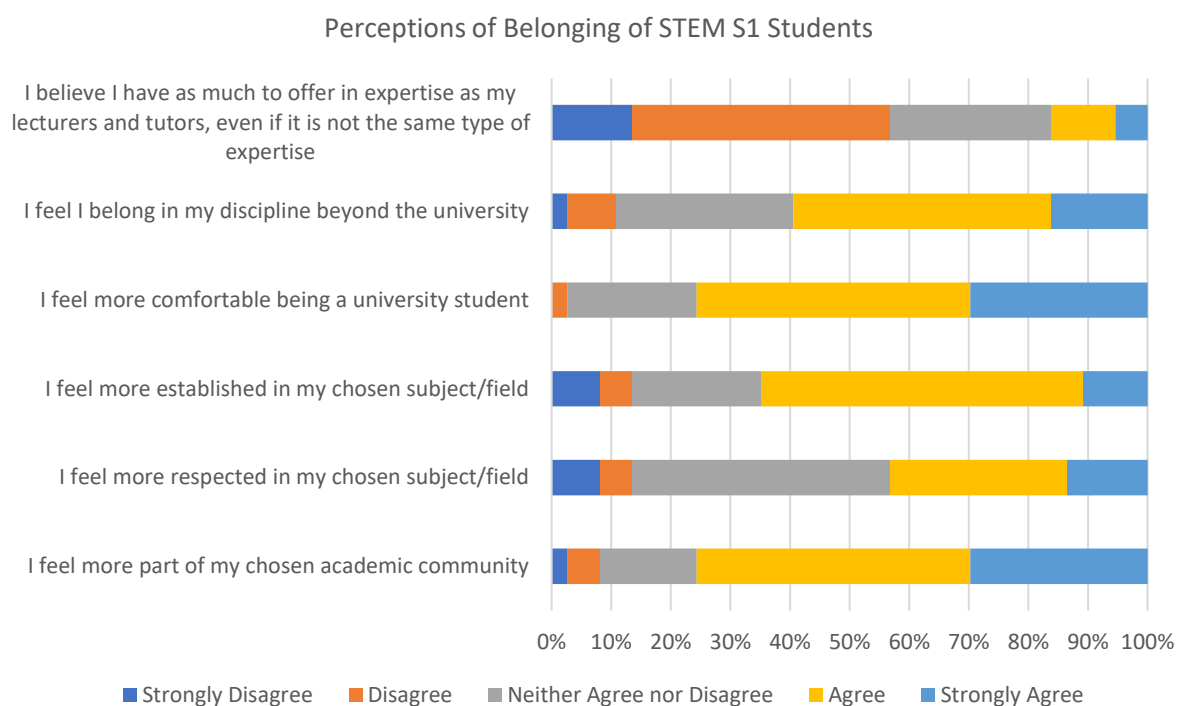


Figure 9. Perceptions of identity and belonging in the STEM S1 Student group. A. Identity perceptions ($n = 37$ for perceptions of student; $n = 34$ for perceptions of researcher, professional; $n = 36$ for field specific perceptions). B. Belonging perceptions ($n = 37$ for all questions).

It is unsurprising to see a sizeable minority of students who reported not feeling comfortable being a university student or being established in their academic field. Despite possessing a student label, a student may not consider themselves to truly have a student identity or to be a member of their discipline due to the often consumerist nature of undergraduate education. Similarly, the COVID19 pandemic may have resulted in study conditions to be significantly reduced for many students, leading to their overall 'comfort' of being a student diminishing, if they chose to interpret the question through that lens. However, without further probing into the reasoning and interpretation of the questions by the participants, it is difficult to postulate the specific reasons behind this discrepancy.

The specific question of *I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise* could also be denoted as exhibiting a SaP mindset (Peseta et al., 2020). Within this dataset, the SaP mindset is lower than expected with only 16% of students agreeing or strongly agreeing with the statement. As 38% of students reported some form of perceived SaP, it would be expected that the percentage of students who agreed or strongly agreed with the SaP mindset would at least be equal to the number reporting SaP. This may be explained by relating back to the free text tables (see Tables 15 to 21 on pages 119 to 122), where students would mention the lecturers as experts and suggest that their own role in the power hierarchy was quite low. As such, even when they completed a perceived SaP experience, the mindset developed there may not necessarily translate across to the entire university experience immediately. Similarly, considering that students have ranked activities such as regular teaching within the curriculum as a SaP experience, the low numbers of students with a SaP Mindset may not be too unexpected. While the concept of equal partnership is often seen as integral to SaP, this is not the case for most of students' perceived SaP experiences within general learning and teaching. This inability to consider learning as a skill in its own right would need to be explicitly addressed and challenged to see a change in this particular perception. The implications of this are discussed further in the following chapters.

Students' high perceptions of their student identity were expected; participants reaffirmed their perceived role as a student throughout the questionnaire, as well as later focus groups and interviews. However, representing the whole dataset together may not be too useful considering the research questions, as the group is not homogeneous. I have previously posited in chapter 2 (starting on page 25) that identity changes and develops throughout a student's university education, meaning that combining results from all years could muddle any possible trends. To

overcome this, the identity data was presented on separate graphs by year (Appendix 14 on page 312). Student identity did not change much across the years, with respondents maintaining a high level of student identity. Interestingly, researcher/academic identity decreased throughout the years. Professional and field specific identities meanwhile appeared to increase as the year groups progressed except for fifth year, which reported low identity across all questions. Given all this, there is tenuous at best support within my quantitative data for the theory that identity differs by year and by researcher, academic, or professional/field types of identity; or that different identities increase as a student progresses through their university studies. However, it is important to remember that these groups are small so any conclusions must necessarily be tentative (in fourth and fifth year, there are only 4 and 3 responses respectively). Furthermore, any changes in identity may simply be occurring at a different time frame to the one observed here or may be more evident if individual students were followed throughout their degree, rather than comparing students from different year groups. Finally, the potential identity change may not have been appropriately captured through the offered identities and Likert scale questions.

Similarly, the perceived experience of completing a SaP initiative may affect a student's perception of their identity and belonging. To examine if there were any differences, a Mann-Whitney U test was performed on the dataset as separated by whether students had a SaP experience or not (Appendix 15 on page 313). Within this separation, no statistical significance was seen within identity. In belonging, students who completed a SaP initiative reported feeling belonging statistically significantly more to their academic community, feeling being more established within their field, and feeling more respected in their field. Interestingly, there was no difference between students' comfort as a student, which may help explain why so little difference in identity was observed. Taken together, this would suggest that exposure to some elements of partnership, such as increased trust, peer to peer interaction etc. might not influence identity change but does improve students' sense of belonging.

4.3 STEM Semester 2 Data Group Quantitative Representations

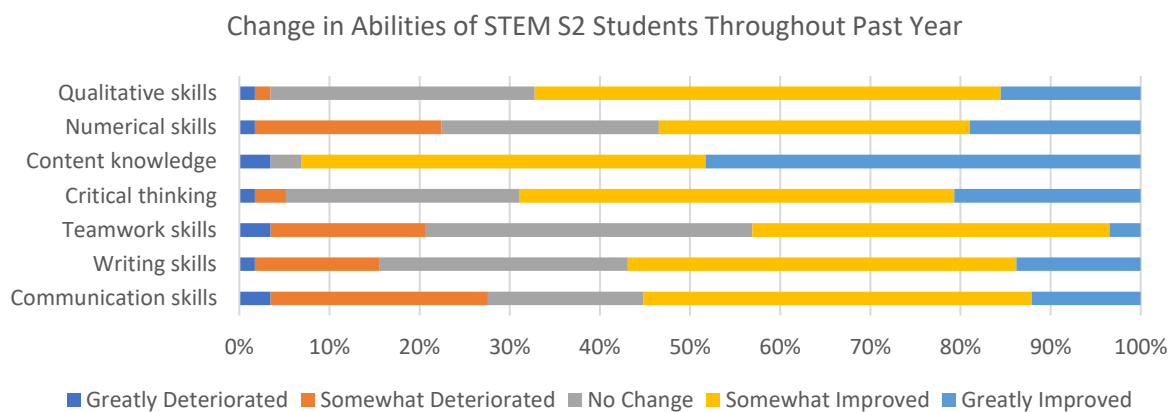
The questionnaire was adapted slightly and then released for the second time in semester 2 of the 2020/2021 academic year (all differences between questionnaires are summarised in section 3.7.1 starting on page 81).

4.3.1 Experiences outside of SaP and SaP initiatives in STEM Semester 2 Group

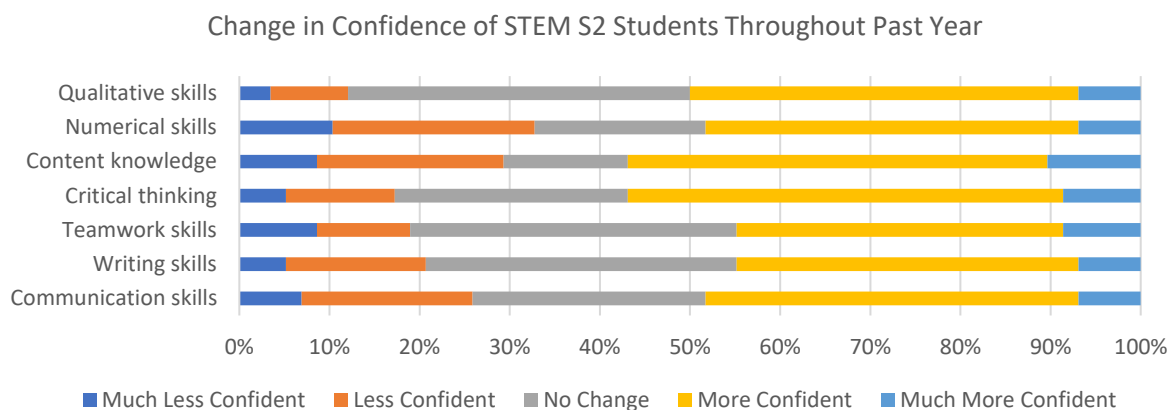
First, students were asked to reflect on their current academic year in general, allowing for the creation of baseline data for how the year has gone (Figure 10 on page 127). The results reported are quite diverse. Across all questions and skills (apart from the opportunity to develop content knowledge), students reported all possible options of the Likert scale. While in general, the majority of students reported improvements in their skills throughout the year, a large minority reported no change or negative progress. Specifically, content knowledge was perceived to be overwhelmingly improved (with 93%, $n = 54$, reporting improving or greatly improving their content knowledge). Conversely, teamwork skills were the least improved, with only 43% ($n = 25$) reporting somewhat improved or greatly improved skill.

Perceptions of confidence were very uniform with similar results across all graduate attributes. Here, at least 40% ($n = 23$) of students across all skills reported either no change in confidence, or some deterioration of confidence. Likewise, the percentage of students who reported becoming much more confident is similar to the percentage of students who reported becoming much less confident. Finally, the opportunity to develop skills was again quite varied. On one side, 83% ($n = 48$) of students report having frequent to constant opportunities to develop content knowledge, on the other, over 35% ($n = 20$) of students reported having rare or no opportunity to develop teamwork and communication.

A.



B.



C.

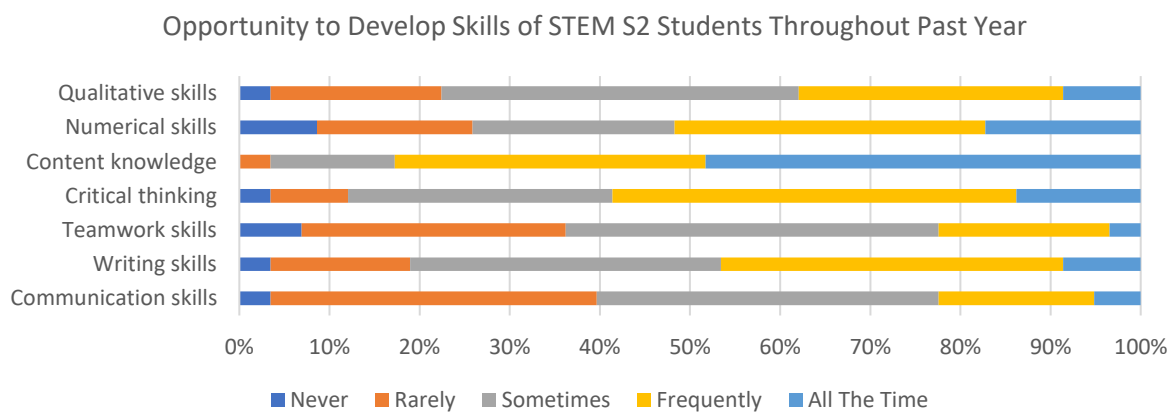


Figure 10. Perceptions of STEM S2 students (n = 58 for all questions) on their abilities throughout the academic year of 2020/2021. A. Change in abilities in each of the graduate attributes. B. Change in confidence in each of the graduate attributes. C. Opportunity to develop each of the graduate attributes.

Improvement in content knowledge and lack of teamwork echoes what has been discussed throughout the focus groups as a side effect of the shift to online learning. Some students have

expressed the sentiment that during hybrid and online learning, there is nothing else to do but to just learn the content, which is possibly reflected in how much more students have rated the opportunity to develop content knowledge compared to other skills students have reported to have. The results are therefore somewhat as expected and mirror what has been seen across other parts of this study.

4.3.2 Experiences of SaP Initiatives in STEM Semester 2 Group

When queried if their described significant learning experience could be denoted as SaP, 20 students responded in the affirmative. Before exploring the graduate attributes of these students, I thematically summarised the experiences students are referring to into seven types of perceived SaP initiatives when considering their graduate attributes in the next section (Table 22 on page 130).

Students denoted activities such as online learning, specific courses, and general coursework as SaP. However, examining the students' comments, the portions of experiences or activities that the students consider significant are not the courses themselves, but rather than the relationships they develop with the staff and other students throughout the course. As one student stated, the online course was significant because they *"made lasting friendships and created memories on top of gaining an education and further growing my interest in my degree field."* This personal connection to the material was not always positive; some students commented on the negative aspects of their SaP experience in coursework, for example stating that it caused *"A lot of sleepless nights :) Perhaps I was too involved and should have been less anxious."*

Beyond classroom work, students also mentioned their involvement within their academic university societies as a type of SaP, which is interesting especially considering that these societies tend to not have any staff members, suggesting that the partnership the students are experiencing is either with other students, or through developing increased autonomy/agency (which is one of the elements of partnership). As students considered their experience to contain an aspect of partnership, they ended up identifying it as such, despite there being no staff members they would consider themselves to be partnering with.

Students also overwhelmingly perceived group work and research as a type of SaP. This may be due to the attributed importance of these sort of projects, with one student stating that *"it is the most important part of the whole degree"*. Students also pointed to the length of the project and the

extent to which they were involved in their research as part of the reason why they considered it so significant. As partnership is often considered important by all involved and takes place over an extended period of time, it was not unexpected that these projects were therefore considered SaP by students, especially considering that research projects lead to students experiencing other significant elements of partnership, such as increased autonomy, increased agency, and ability to structure own learning. Some students also commented on how the pandemic has changed their work, suggesting that the learning experience was made significant due to *“the prolonged period of independent research, added on by the online supervision which has made it all the harder but also a bit more rewarding because of the circumstances.”*

Finally, many students who completed the same or similar academic courses and learning experiences reported that they did not perceive them to be SaP. The full table of all the learning experiences can be seen in Appendix 16 on page 314. When asked, students would usually refer back to the idea that staff were the experts: *“My professors always have had a higher level of expertise than me in all areas of the courses I've taken.”* Similarly, some students would point to a standard power hierarchy within the classroom (*“My opinions and reactions/experiences are valued and respected, but academic staff are always superior”*). Encouragingly however, some of the students seemed to be aware of both issues, presenting a sense of self-value, as this quote from the open ended comments in the questionnaire illustrates: *“Obviously, undergrads are not experts in anything compared to supervisors/lecturers, but I do sometimes feel that we aren't listened to as much as we could be. Expertise doesn't define creativity and new approaches to thinking are fundamental to net academic progression”*

Table 22. Significant learning experiences that STEM S2 students perceived as SaP.

Theme of Experience	Student's Activities	What made it significant?	Length of Involvement
Specific Course Experience (Astrophysics)	Thinking about course material Tutorials	Good class environment (productive and motivating) Good peer interactions	1 semester
Lecture Experiences (lectures, online lectures) (2x)	Answering content knowledge questions Listening to lectures Working through problems with assistance	Communicating with lecturers/tutors Opportunity to ask questions Sense of being back at university	1 semester (2x)
Online Course Experiences (tutorials, workshops) (3x)	Applying theory from lectures Small group discussions	Developing in-depth content knowledge Feeling challenged Gaining a sense of camaraderie Novel activity for the student	1 semester (2x) 1 year (2x)
Coursework and Assessments Throughout and at the End of the Semester (3x)	Answering content knowledge questions Searching for relevant information Working on assignments/reports (3x)	Being tested frequently Developing skills simultaneously (2x) Feeling anxious and overworked Testing and demonstrating understanding of content knowledge	< 1 month (2x) 4 years 1 year (5x) n/a (3x)
Group Work (6x)	Maintaining equal distribution of work (2x) Meeting with group mates Meeting with supervisor Presenting at a conference Programming Working in a team (2x) Writing a report	Gaining insight into field and gaining connections (2x) Going out of one's comfort zone/gaining confidence Having independence in research Interacting with peers/colleagues (2x) Interacting with staff/supervisors Novel experience for the student Working as a group (2x)	< 1 month (2x) 1 year Unspecified 1 semester (2x)
Research and Project Work (5x)	Choosing research direction (2x) Manuscript writing Producing original data Research (3x) Working with a supervisor/mentor (4x)	Most important part of the degree Novel to the student Research for a long period of time Working individually/independently with little support (2x) Working professionally Working with online supervision	1 semester (2x) 1 Years (3x)
University committee work	Organise club structure Participate in training/matches	Spending a lot of time	2 years
None/Not Filled in (1x)	No information	No information given	n/a

This table suggests that students can perceive a great variety of curricular work and research as a type of partnership, provided that the experience allows students to develop interpersonal relationships and allows the student to feel valued by the staff/authority figure. Beyond that, it does not appear to matter how long the experience was or how much the student participated for this particular group of students to define the experience as SaP.

Student perceptions of what constituted partnership is in particular interesting when considering that a number of the reported experiences likely did not contain any staff partners (e.g. University committee work). Similarly, many of the reported experiences were experiences where staff

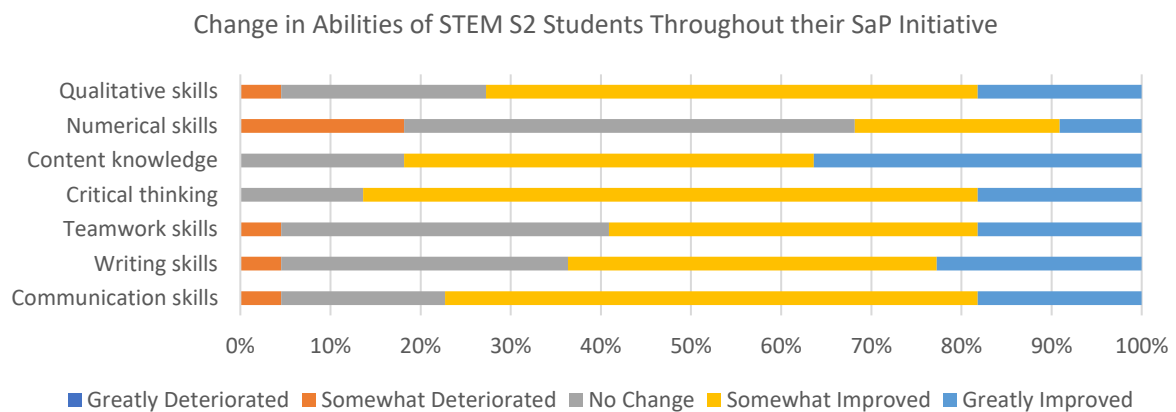
members may not necessarily consider what they were doing as partnership. This would suggest that the students' understanding of SaP and what it entails may differ by person and would benefit from a clear nomenclature and greater awareness of SaP.

With the type of activities students are referring to in mind, the students' perceptions of their graduate attributes were collected through Likert questions (Figure 11 on page 132). Students overall reported improvement in their skills throughout their self-described SaP initiative. Notably, all students reported either no change ($n = 3$, 14%) or positive change ($n = 19$, 86%) in critical thinking, and no change ($n = 4$, 18%) or improvement ($n = 18$, 82%) in content knowledge. No student reported great deterioration in their skill. The least developed skills were students' numerical skills, where only seven students reported any sort of improvement.

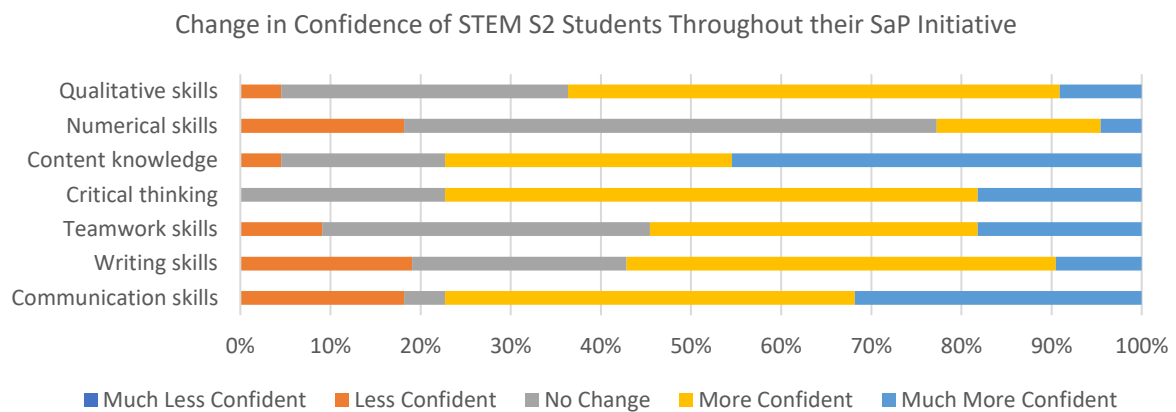
Next, students' change in confidence followed a similar pattern, reporting the highest improvements in confidence in content knowledge ($n = 17$, 77%) and critical thinking ($n = 17$, 77%). A substantial number of students reported becoming more confident in their communication and qualitative skills ($n = 17$, 77%; and $n = 14$, 63%, respectively), with communication confidence improvements even better than confidence boost in critical thinking. Similarly, numerical skills seemed to have suffered the most, with only five (23%) students reporting that they feel more confident. No student reported being much less confident in any of the skills.

Finally, students reported that their opportunity to develop skills follows the same pattern as the other two perception questions, with most students reporting the greatest opportunity to develop their content knowledge and critical thinking, less but still a large amount of time reported for communication and qualitative skills, and the least amount of opportunity for their numerical skills. Compared to the other questions however, students have reported feeling like they never had an opportunity to develop each of the skills.

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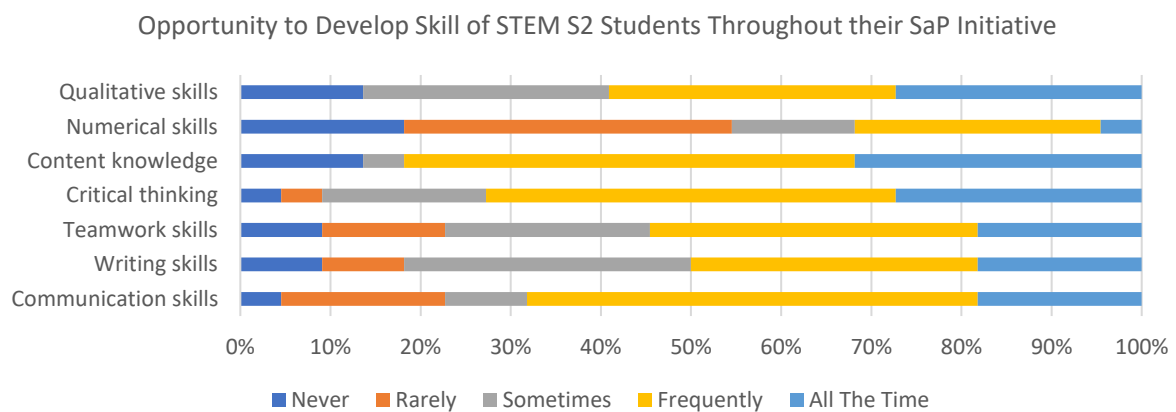


Figure 11. Perceptions of STEM Semester 2 throughout their perceived SaP initiative ($n = 22$ for all questions). A. Change in abilities in each of the graduate attributes. B. Change in confidence in each of the graduate attributes. C. Opportunity to develop each of the graduate attributes.

The pattern emergent in Figure 11 of critical thinking and content knowledge improving for more students than other skills while numerical skills deteriorated, may be due to the type of experiences that students considered to be partnership. Students reported experiences such as in-class experiences, which are traditionally heavy on teaching content knowledge, and group projects or research, which often focus on developing a students' critical skills. Further, with students stressing the interpersonal relationship aspect of their experiences it is understandable that students reported a large amount of progress in communication and qualitative skills.

The students' perceived low progress in numerical skills is concerning but understandable considering the types of initiatives students perceive as SaP. As can be seen in Table 23 on page 136, students report developing their numerical skills through assessments and class work outside of SaP, which have not generally been considered to be part of SaP by this cohort. As such, students reported comparably lower progress in numerical skills.

4.3.3 Graduate Attributes Comparisons in STEM Semester 2 Data

To compare the students' perceptions of SaP and their year in general, percentage agreement was used to graphically represent the differences in the dataset (Figure 12 on page 135), with statistical differences interpreted as according to Mann-Whitney U test (Appendix 17 on page 316).

A number of graduate attributes displayed a pattern of higher progress in SaP experiences than in the general studies. Students reported statistically significant higher progress in SaP experiences compared to throughout the year ($U < 464.5$, $n_{out} = 58$, $n_{in} = 22$, $p < 0.05$ across all three perceptions) for communication skills (Figure 12.A.). A general trend of higher progress in SaP experiences was also seen in writing skills, but this slight trend was not statistically significant (Figure 12.B). A similar trend was seen in teamwork skills (Figure 12.C.); while the difference in confidence between SaP experiences and general studies was not statistically significant, students' reported change in ability and opportunity to develop teamwork skills was statistically significantly higher in SaP compared to the data for throughout the year ($U = 460.5$, $n_{out} = 58$, $n_{in} = 22$, $p = 0.042$ for change in ability; and $U = 437.5$, $n_{out} = 58$, $n_{in} = 22$, $p = 0.025$ for opportunity to develop). Conversely, in critical thinking (Figure 12.D.), only students' increase in confidence was statistically significantly higher ($U = 459.5$, $n_{out} = 58$, $n_{in} = 22$, $p = 0.037$) in SaP compared to throughout the year. Finally, while there were no statistically significant trends seen in qualitative skills, the data still shows overall higher results during SaP compared to throughout the year (Figure 12.G.).

The patterns are not as definite in content knowledge and numerical skills. In content knowledge (Figure 12.E.), only confidence was statistically significantly higher during SaP compared to throughout the year ($U = 361.5$, $n_{out} = 58$, $n_{in} = 22$, $p = 0.002$). Otherwise, there was no statistically significant difference; however, there appears to be a slight trend of change in ability and opportunity to develop being higher throughout the year. Numerical skills likewise differed (Figure 12.F.), with only the opportunity to develop being statistically significantly lower during SaP compared to the rest of the year ($U = 435.5$, $n_{out} = 58$, $n_{in} = 22$, $p = 0.025$).

Considering the previous graphs, these results are not surprising. The strong statistical significance within all aspects of communication skills was expected given the types of SaP projects students were describing earlier, and their focus on group work and interpersonal communication. Furthermore, many students have been particularly reflecting on their communication skills due to the pandemic, as standard ways of communication drastically changed, meaning that they may be more sensitive to perceived progress in this ability. Similarly, progress in numerical skills throughout the year being higher than in SaP was expected considering the trends seen in previous graphs.

These results suggest above all that students have a specific perception of what is a significant learning experience, and many have labelled that experience as SaP in this study, and what skills this experience should develop, which will be expanded upon in later sections.

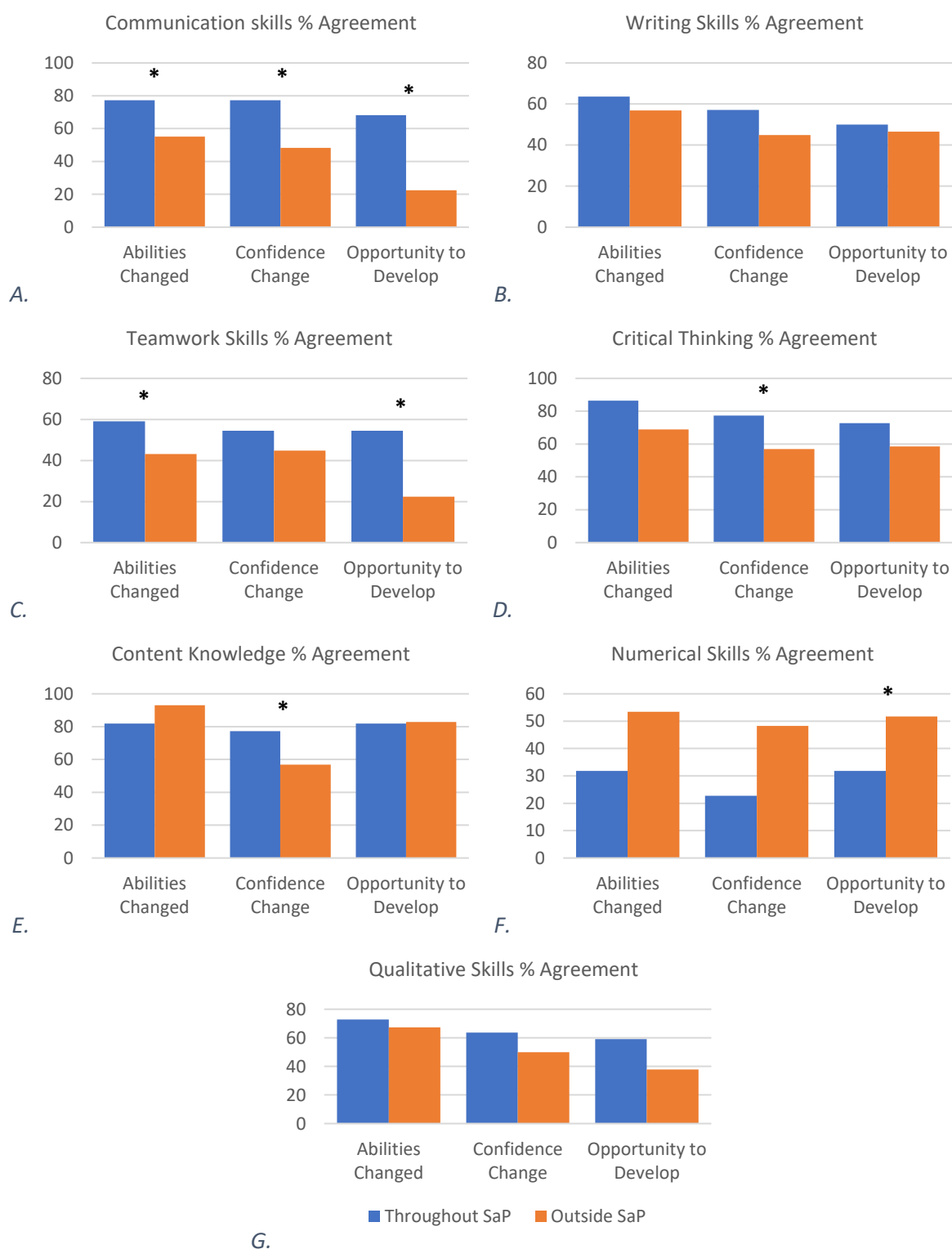


Figure 12. Differences in percentage agreement with improvement in each of the graduate attributes of STEM S2 students ($n = 22$ for Throughout SaP and $n = 58$ for Outside SaP). Asterisks illustrate statistically significantly different groups as calculated in Appendix 17. A.-G. Graphs split percentage agreement for each of the graduate attributes.

4.3.3.1 What helped students develop each of the graduate attributes, in and out of SaP in STEM S2

The disparities in graduate attribute perceptions between during SaP and outside of SaP can be further explained by considering the sort of tasks that students undertook to learn each of the graduate attributes, prepared and analysed as before in STEM S1. As before the total number of students who answered the specific question in the questionnaire is included at the bottom of each table; as many students provided more than one answer, this number does not necessarily match the sum of student answers in any particular column.

Students reported different types of activities as being instrumental in developing their communication skills (Table 23). Throughout the year, students mostly pointed to course assessments, coursework, and working with peers as principal ways they developed communication, whereas during SaP initiatives they stressed their time collaborating with tutors, staff, and other peers as most important. This was echoed in the Outside SaP group, where students especially stressed the concept of vulnerability (*“Explaining what I don’t understand to a tutor in a workshop”*) and how communication has changed for them during the pandemic, saying that communication was *“generally more reliant on emailing/video calling (a very new communication skill)”*. Interestingly, students also mentioned activities not always associated with the curriculum, such as practical work and wider university participation (*“leading activities and workshops as a society president, student representative”*).

Table 23. Significant learning activities in communication skills of STEM S2 students.

Communication skills	During SaP	Outside SaP
In-course assessments: reports, essays, team projects, presentations, workshop collaboration	2	16
In-course work: tutorials, lectures, problem based learning, workshops, PBLs	3	14
Practical work: talking about research, internship	3	4
University participation: academic societies, committees	1	4
Working with tutor/staff member: talking with supervisors/staff, collaborating with other institutions	6	5
Working with peers: group projects, meetings, emails	5	10
None or n/a or not changed	1	3
Total Answered	18	45

Examination of writing skills yielded similar results during and outside of SaP, with a majority of students concluding they mostly progressed through completing in course assessments (Table 24). Students often mentioned they did not have as much guidance as they would have preferred (*“more guidance would have been beneficial”*). Within SaP, students would often reflect on their writing as

well, such as remarking that *“It is difficult to stay on topic when there is a lot of surrounding context”*. Some students also pointed out that there was not much chance to develop writing (*“Not a focus on writing findings”*).

Table 24. Significant learning activities in writing skills of STEM S2 students.

Writing skills	During SaP	Outside SaP
In-course assessments: essays, lab reports, group projects, blog posts	10	38
Other writing: CV, internship application	0	2
Research: communicating complex scientific topics, writing up research, honours projects	2	5
Specific courses: methods course, Rmeth	0	2
Working with tutor/staff member: emails, putting in input, getting feedback	3	2
Writing process: staying on topic, adopting appropriate tone, frequent and small writing	3	0
None or not a focus	2	4
Total Answered	18	48

Perhaps unsurprisingly, students reported gaining teamwork skills through collaboration and group work (Table 25). During their reported SaP experiences, students in particular stressed working with their peers rather than staff, mentioning personal development (*“Working as a team despite disagreements with group members”*) and a sense of a shared goal with their teammates.

Throughout the year, students focussed more on shared group work and curricular work as a source of their teamwork learning, mentioning classes such as practicals and labs. Some mentioned the new teaching approach (such as using breakout rooms). A significant number of students did mention general interactions with their peers as a way they developed teamwork, such as *“working with peers to solve tutorial problems, working with a lab partner, discussing with friends in lectures”*; similarly, students also acknowledged personal development (*“Meeting a lot of different people helped me become a bit more open-minded”*).

Table 25. Significant learning activities in teamwork skills of STEM S2 students.

Teamwork skills	During SaP	Outside SaP
Group assignments: presentations, projects, lab partners	2	21
In-course work: tutorials, group discussions, workshops	2	15
Personal development: overcoming disagreements, part-time job	1	2
University participation: academic societies and committees, student reps	2	2
Working with peers: brainstorming sessions, solving problems, leading team, lab partners	5	7
Working with tutor/staff member: in a research group	1	0
None or n/a (worked alone)	3	4
Total Answered	17	42

Next, students reported a similar pattern in development of critical thinking (Table 26). Students focussed on interpersonal interactions and research when discussing learning opportunities within SaP and focussed on assessment and course participation when discussing opportunities outside of SaP. Within their reported SaP experience, students in particular shared how failure has affected their critical thinking (*“Understanding what was missing and what could have been left out of my work”* and *“there were many examples of failed experiments, and why they were unsuccessful”*). Outside of SaP, students would comment how currently lectures were not conducive to developing critical thinking, suggesting that it is better to develop these skills through more personal interactions (*“Small group tutorials are best for this imo, discussing things with coursemates”*). This corresponds with the above findings that students felt more confident because of their reported SaP experiences compared to general studies.

Table 26. Significant learning activities in critical thinking of STEM S2 students.

Critical thinking	During SaP	Outside SaP
Assessments: ICA, tutorial problem sheets	1	22
Course participation: lectures, group work, brainstorming sessions, working through scenarios	3	14
Independent work: learning content	1	2
Personal development: logistics skills, overcoming challenges, reviewing own work	4	2
Research: planning the report, drawing conclusions, data analysis	4	5
Working with peers: discussion	0	1
Working with tutor/staff member: talking with supervisors/staff, discussing new concepts	3	0
None or n/a	0	1
Improved in general/ every aspect of experience	0	2
Total Answered	17	42

Students reported many activities that allowed them to develop content knowledge (Table 27). Students mainly suggested that participating in research and independent work helped them develop during their SaP initiative. As expected, outside of SaP students pointed to assessments and in-class work as a major source of developing content knowledge. However, some also pointed to independent learning, rather than lectures: *“probably not lectures, working through problem sheets and small group discussion is most efficient way to learn content in my experience.”*

Table 27. Significant learning activities in content knowledge of STEM S2 students.

Content knowledge	During SaP	Outside SaP
Assessments: exams, quizzes	0	13
Extracurricular activities	0	0
In-class work: lectures, tutorials, workshops, PBLs	2	23
Independent work: own studying methods, background reading	3	8
Research: on novel/chosen topic, reading recent papers, literature review	6	0
Working with tutor/staff member: talking with supervisors/staff, asking questions	3	1
None or n/a	0	1
Gaining skill in general across all courses	1	8
Total Answered	16	44

When discussing numerical skills (Table 28), students often expanded on how numerical skills were not part of their SaP experience, with one student stating that *“Research was mostly qualitative than quantitative so rarely any numeracy”* when reporting why they felt they did not improve. Throughout the year in general, students pointed to learning through assessment (*“writing reports and during practicals”*), but also pointing to specific mathematics courses or tasks (*“chemical calculations, ecological data calculations,”* and *“curve fitting”*), which is somewhat expected as all the students belong into STEM schools, which would suggest they would undergo rigorous statistics/mathematics tuition.

Table 28. Significant learning activities in numerical skills of STEM S2 students.

Numerical skills	During SaP	Outside SaP
Assessments: lab report, quizzes, tutorial hand ins	0	27
In class work: workshops, lectures, practicals, tutorials	0	8
Independent work: coding	1	0
Research: data analysis, modelling	2	2
Statistics/maths course or specific tasks	3	7
Improved in general	0	4
None or n/a or not developed	8	4
Total Answered	15	46

Finally, qualitative skills activities showed the same pattern as critical thinking (Table 29). During their SaP experience, students reported learning mainly through working with their tutors/staff member, such as through *“lecturers talking about their research experience openly,”* or through independent study and personal development (*“reflecting on my own experiences and speaking to other students about theirs; empathizing”*). Conversely, throughout the year, students mostly reported course participation and assessment as the main source of qualitative skill learning. However, they would often specifically point to smaller scale tutorial experiences over lectures (*“Small group tutorials and more abstract (new) lab work not experienced before”*).

Table 29. Significant learning activities in qualitative skills of STEM S2 students.

Qualitative skills	During SaP	Outside SaP
Assessments: persuasive presentations, essays, group projects	1	11
Course participations: class, lab work, workshops, practicals	1	15
Working with tutor/staff member: talking with supervisors/staff, discussing concepts, meetings	4	0
Personal development: empathy, camaraderie	1	2
Research: literature review, reports	2	1
Study: gaining deeper understanding of the field	3	1
Improved in general	0	2
None or n/a or Unsure	2	5
Total Answered	15	36

Overall, most students pointed to assessment and in class work as being the most significant learning activities for developing graduate attributes outside of reported SaP experiences, which is consistent with students’ reports from the previous semester. One notable exception is teamwork skills, where most students identified group work as being a significant learning experience outside SaP. Within reported SaP experiences, students noted a large diversity of different learning

experiences across graduate attributes, with many students reporting research and working with peers as being significant across multiple graduate attributes.

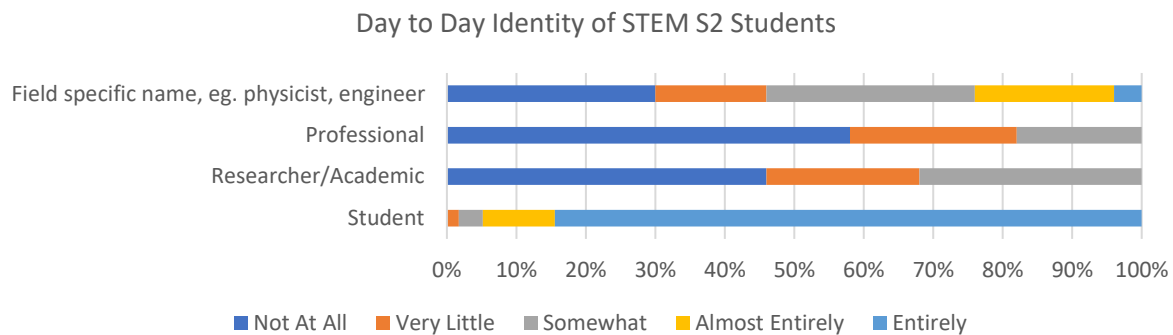
4.3.4 Experiences of Identity and Belonging in STEM Semester 2 Data

At the end of the questionnaire, students were asked to rate their perception of identity and belonging (Figure 13 on page 142). Similarly to what was observed in semester 1, most semester 2 students perceived themselves overwhelmingly to be students ($n = 55$, 95% choosing 'almost entirely' or 'entirely') and identifying themselves with their field ($n = 12$, 24% choosing 'almost entirely' or 'entirely' for field specific name). In fact, participants appear to have felt strongly about their student identity, and while 58 voted on their perception of being students, only 50 responded to any of the other identities.

Next, findings in belonging showcase the participants' student identity, reporting that they felt comfortable being a university student ($n = 33$, 57% choosing 'agree' or 'strongly agree') and felt established in their field ($n = 29$, 50% choosing 'agree' or 'strongly agree'). Interestingly, only around half of participants agreed or strongly agreed that they feel part of their academic community and discipline ($n = 30$, 52%; and $n = 28$, 48% respectively). Finally, almost no students agreed that they believe they have as much to offer in expertise as their tutors/lecturers ($n = 11$, 19% choosing 'agree' or 'strongly agree').

The findings within this data are somewhat expected considering how long students have spent in online learning at this point in the year. While not all students are motivated by on-campus experiences, those students that consider them important have by the point of the survey most likely started feeling the drain of the prolonged lockdown and have in some cases not physically been to university in over a year; as such, their perceptions of belonging within the University may be reduced due to these factors. Similarly, the continued economic instability may have changed some students' outlooks for the future, which might have resulted in them shifting away from their previously chosen careers and the consequent degradation in sense of the sense of belonging in the professional fields they study within. These two ideas have been further expanded upon through the focus groups and interviews, which have echoed a degradation in belonging to the University, but interestingly some students also spoke about increase in School identity (as discussed in section 5.3 starting on page 200).

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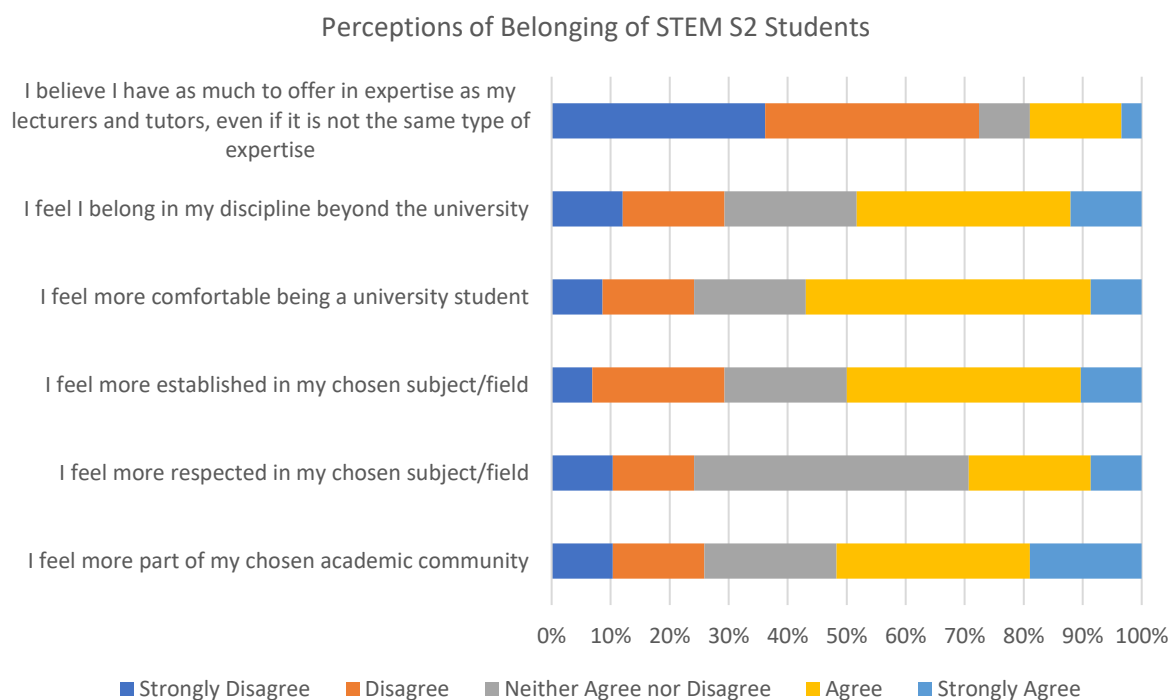


Figure 13. Perceptions of identity and belonging in the STEM S2 student group. A. Identity perceptions (n = 58 for student identity; n = 50 for all other). B. Belonging perceptions (n = 58).

To elucidate further information, the STEM S2 data was split up by year group (Appendix 18 on page 317) and by whether students reported participating in SaP or not (Appendix 19 on page 318). Splitting the dataset by year group does not yield much further insight. Student identity is consistently high across all year groups; researcher and professional identity is likewise consistently low across the groups. Discipline specific identity appears to have some variation; however, this is very probably only due to the low number of participants from specific years, with only five responses from 5th year. This skews the dataset and allows individual responses to appear more significant than they are.

Student identity was unaffected based on whether a student reported completing a SaP experience or not – all students reported similar agreement with their student identity regardless. However, students that completed SaP reported statistically significantly higher agreement with having researcher identity ($p < 0.001$), professional identity ($p = 0.044$), and discipline identity ($p < 0.001$). This suggests that students' identity beyond simply being a student correlates with experiencing some learning experiences with partnership characteristics, such as better relationships with staff and peers. In terms of belonging, students who reported completing a SaP initiative were statistically significantly more likely to report feeling more respected and more established in a chosen field ($p = 0.007$ and $p < 0.001$ respectively). Students that underwent a perceived SaP experience also statistically significantly more often reported feeling part of the community ($p = 0.016$). Interestingly, they also reported significantly higher agreement with the so-called SaP mindset ($p = 0.028$). This is encouraging as it suggests that participating in SaP experiences or experiencing some of the characteristics of partnership could mitigate some of the impact on sense of belonging caused by the pandemic, and the subsequent switch to online and hybrid forms of learning.

4.4 SLICCs Quantitative Representations

The next data group was sourced from students that have in the past undertaken a SLICCs course. These courses allow students the freedom to choose their own project and guides them through reflecting on their learning. It has been suggested that it might be considered as a form of partnership.

4.4.1 Experiences Outside of SLICCs

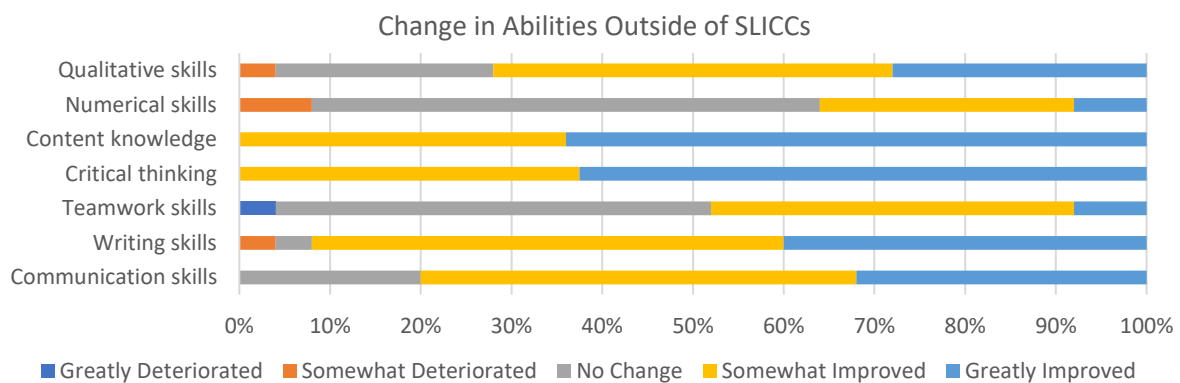
Like previous data groups, the SLICCs data is presented through a series of figures and tables, starting with the students' reported experience throughout the year outside of their SLICCs (Figure 14 on page 145). Overall students reported a large amount of improvement in their graduate attribute development. Notably, all students reported improving or greatly improving in content knowledge and critical thinking. Conversely, students' teamwork skills had the largest variation, with one student (4%) reporting their skill greatly deteriorating, while in contrast two students (8%) reported their skill greatly improved. In general, only 48% ($n = 12$) of students reported some sort of improvement. Similarly, only 36% ($n = 9$) of students reported some or great improvement in numerical skills.

Similar patterns can be seen in changes in confidence. Over 90% of students reported gaining more or much more confidence in content knowledge and critical thinking, with the remaining students noting no change. Similarly, students did overall feel more confident in their writing and communication (n = 20, 83%). Conversely, only eight students (33%) reported any sort of increase in their confidence in numerical skills.

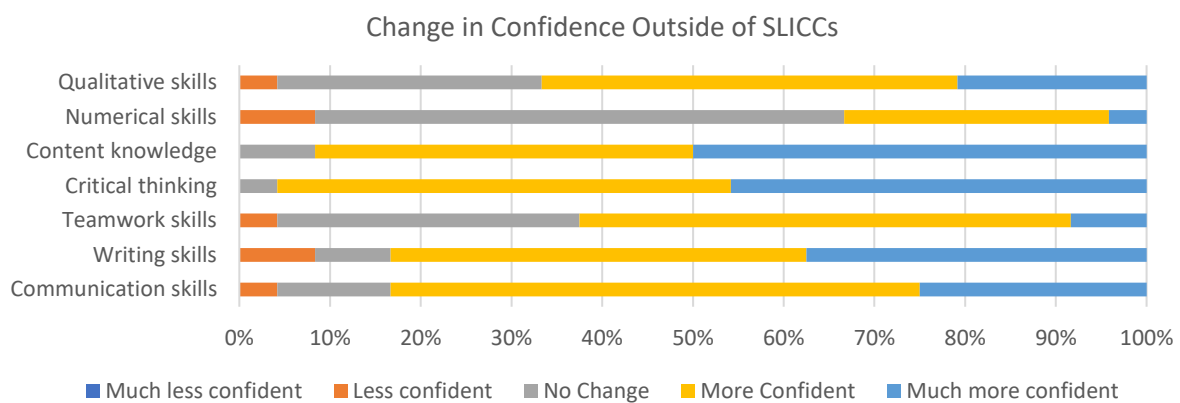
Finally, students reported the opportunity to develop skills mostly matched the above established pattern. Again, most students (n = 24, 96% in both instances) reported that they either had frequent or constant opportunity to develop their content knowledge and critical thinking. Conversely, only three students (12%) reported frequent or constant opportunity to develop numerical skills. All other skills also match the previously established patterns.

Throughout the data, teamwork and numerical skills were consistently the lowest rated developed skills. This could be in part because the isolation of the pandemic has reduced much of possibility to develop teamwork for students in the way they were accustomed to. As explored later in focus groups, some students found it hard to adjust to the new way of teamwork in the pandemic and were thus putting all their effort into learning their new approach to studying rather than further developing their previous methods of learning and studying. Furthermore, as students in this data group are mostly from the College of Arts, Humanities and Social Sciences, they may not have been focussed on improving their numerical skills as much as students in STEM (which is reflected in the low opportunity to develop score). Conversely, students overwhelmingly reported progress in content knowledge and critical thinking. This is understandable as students also reported that they had a lot of opportunity to develop these skills; their confidence and improvement in abilities could be seen as a consequence of the time they spent developing the skill.

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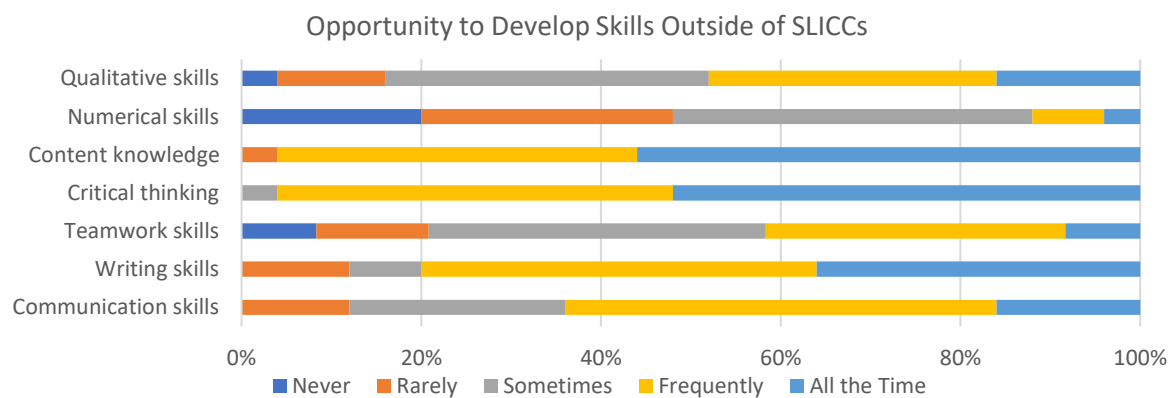


Figure 14. Experiences of SLICCs students throughout the year outside of their SLICCs. A. Changes in student's ability outside of SLICCs (n = 24-25). B. Student's perceptions in their change in confidence in graduate attributes outside of SLICCs (n = 24). C. Students' perceptions of their opportunity to develop their graduate attributes outside of their SLICCs (n = 24-25).

4.4.2 Significant Learning Experiences and SaP

Students were asked about their significant learning experiences with the implication that they were being asked to think beyond SLICCs. Students were also asked whether or not they perceived their significant experiences to be SaP and their responses were thematically tabulated (Table 30 on page 147). The full list of significant learning experience (whether or not they were denoted as SaP) can be found in Appendix 20 on page 319. Not all students had much to say about non-SLICCs experiences: *"I honestly don't think there was any significant university learning experience in the past year other than my SLICC. While I enjoyed my year and have positive memories of it, I don't feel like anything stood out as being a changing experience."* One other student spoke about their SLICC regardless, which was thematically placed with practical experience outside curriculum to highlight it (and account for it being an elective course outside of the required curriculum).

Students considered a myriad of experiences to be SaP, in particular experiences within the classroom, research, or practical experiences within the curriculum. Throughout the students' writing, a theme of reflection emerged, where students focussed on discussing specific skills and attributes they focussed on. For example, when explaining why language speaking classes were the most important experience of the year: *"Speaking is my weakest sub-skill and to prepare each week for this class I would read/listen/breathe Spanish."* Similarly, when explaining the importance of practical experiences: *"It allowed me to realise how much I needed to improve both my communication and team work skills."*

Students also pointed to more practical experiences outside the curriculum and completing their own writing, stressing the benefits of having time to work independently: *"I was given the opportunity to complete independent learning and research tasks about particular topics, prior to learning about them in class. This meant by the time I learned about it in class I already had a great base of knowledge and felt much more confident about these certain topics."*

Interestingly, many of the students within this data group stressed the importance of working by themselves and reflecting on their own work. This is somewhat different from the previously explored data groups, where students predominantly stressed the relationship aspect. This may be because of the way SLICCs are structured as independent projects, (whilst supported by tutors, autonomy and self-agency is encouraged) – at the point of survey, students had just finished their SLICCs and may therefore have been primed to be more perceptive of individual, independent experiences.

Table 30. SLICCs students' significant learning experiences that they perceived to be SaP.

Theme of Experience	Student's Activities	What made it significant?	Length of Involvement
In Class Experiences (lectures, tutorials, workshops) (5x)	Listening and participating in discussions (3x) Attending lectures Attending tutorials Coursework Developing communication skills Essay writing Getting feedback from tutors Independent research and analysis Learning content knowledge	Being encouraged to think critically Gaining confidence Gaining understanding of professional standards of future career Gaining understanding of the practicals Immersing oneself in the course content to prepare for class Improved written communication Learning to communicate ideas better Novel experience for student Overcoming feeling intimidated in class	< 1 month (2x) 1/2 semester 1 year (3x)
Practical Experience in Curriculum (labs, patient interviews, mootings) (2x)	Developing critical thinking skills Developing strategy Engaging in laboratories Participating in mock trials Research (2x)	Gaining confidence in public speaking Gaining understanding of professional standards of future career Having a balance of theoretical and practical work Incorporating multiple aspects of content knowledge	< 1 month All year
Practical Experience Outside Curriculum (SLICCs) (2x)	Participating in university (mooting) society Writing up the SLICCs research	Academic freedom to research whatever student wanted Completing independent research Learning content before being taught it in class Presenting arguments and debating	6 weeks 1 year
Research, Project Work, and Assignments (2x)	Preparing for seminars Presenting Reading provided resources Working in a team Writing out notes	Learning how to learn on their own Providing a quality presentation Splitting up work equally in a team Working well together in a team	< 1 month 3 Years
Writing Practice (3x)	Attending tutorials Developing communication / writing skills Discussing with classmates Independent research Learning how to write essays	Feeling pressure to perform Getting graded Getting practice in an area that has not been used for a while	6 months All degree n/a

4.4.3 Experiences Within SLICCs

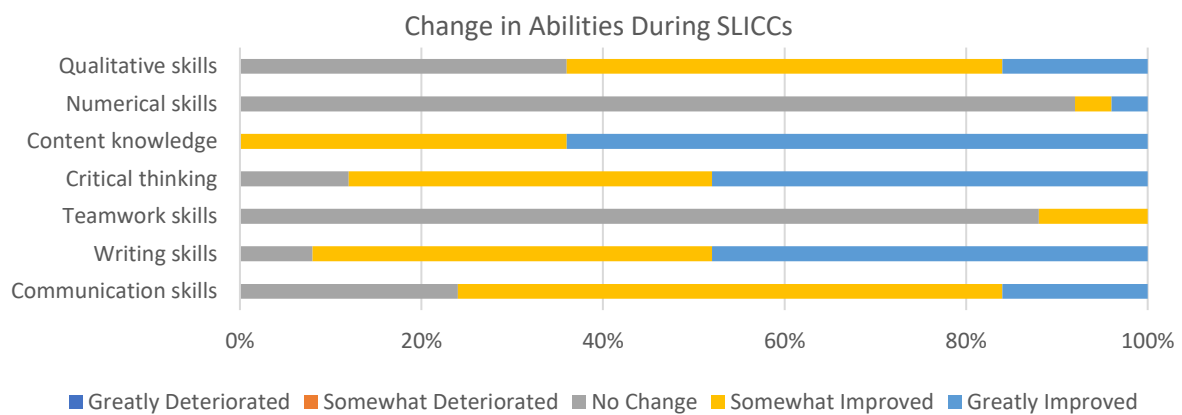
Next, students' experiences within their SLICCs are presented as a series of histograms (Figure 15 on page 149). First, no student reported deterioration in ability in any of their graduate attributes; However, some attributes were reported more developed than others (for example, content knowledge, critical thinking, and writing skills, where over 50% ($n > 11$) of students reported having greatly improved). Notably, all students reported improving their content knowledge throughout out their SLICCs, with 64% of students ($n = 16$) reporting having greatly improved. Conversely, only a few

students reported developing their numerical and teamwork skills (n = 2, 8%; and n = 3, 12% respectively).

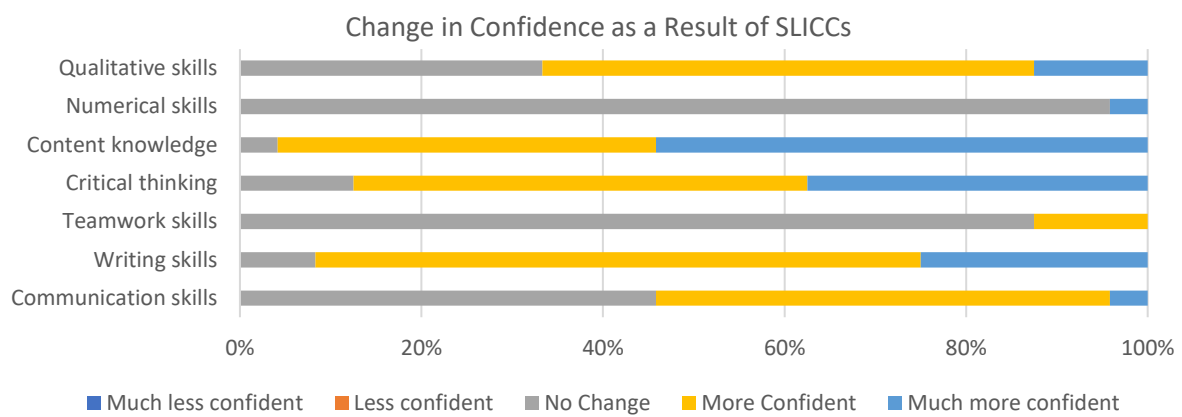
Consequently, similar patterns were observed in students' confidence. No student reported deterioration to their confidence in any of the graduate attributes, but the extent to which they improved in confidence varied. Again, students overall reported feeling more confident in content knowledge, critical thinking, and writing skills where only up to 10% of students reported no change with the rest reporting improvements (n = 23, 96%; n = 21, 88%; and n = 22, 92% respectively); conversely again, over 80% of students reported no change in confidence in their numerical and teamwork skills (n = 23, 96%; and n = 21, 88% respectively). This pattern can be further seen in how much opportunity to develop skills the students reported having. Over 70% of students reported having opportunities all the time to develop their content knowledge, critical thinking, and writing skills (n = 15, 60%; n = 14, 56%; and n = 13, 52% respectively); Conversely, 72% of students reported that they had rare opportunities or never had the opportunity to develop their numerical and teamwork skills (n = 18 and n = 18 respectively). Finally, qualitative skills and communication skills have a much weaker pattern and exhibit much greater dispersal through the Likert categories. While a slight majority of students reported positive progress across both skills for change in abilities and confidence, only 48% and 40% reported having frequent opportunity or having opportunity all the time to develop qualitative skills and communication skills (n = 12 and n = 10 respectively).

Even though some SLICCs students did report not having any opportunity to develop certain skills, at no point did any report any negative progress in their confidence or ability. As such, it can be assumed that participating in a SLICCs did not negatively impact the students' progress in their graduate attributes in any way, which cannot be said about their studies throughout the year.

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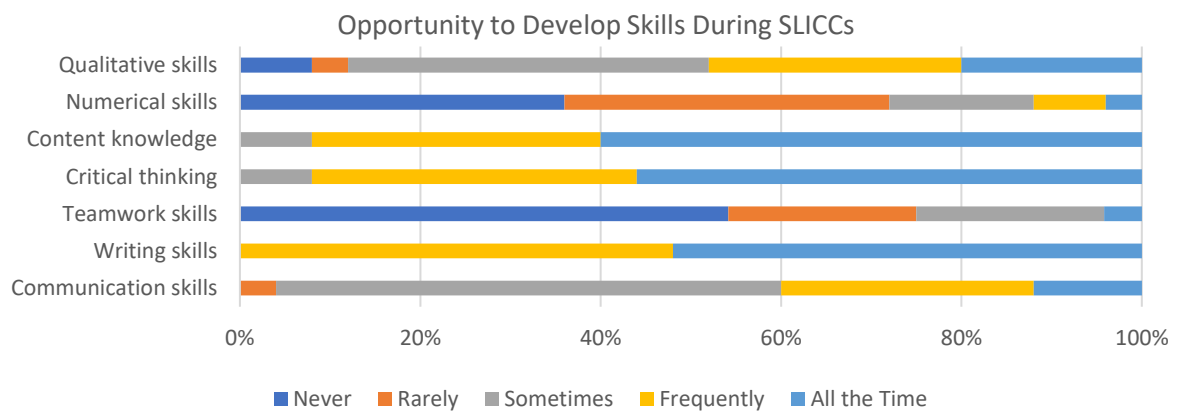


Figure 15. Students' perceptions of graduate attributes during SLICCs. A. Changes in student's ability during SLICCs. B. Student's perceptions in their change in confidence in graduate attributes throughout SLICCs. C. Students' perceptions of their opportunity to develop their graduate attributes during their SLICCs.

4.4.3.1 Perceptions of the SLICCs

The next set of data (Figure 16 on page 151) was sourced from questions added specifically to the SLICCs questionnaire to look at students' specific attributes as encouraged by the SLICCs structure (as elaborated in section 2.4.1 starting on page 50). This perception data specifically explored students' thoughts on the common aspects of their SLICC and gives valuable context.

Most students (n = 23, 92%) reported improving their ability to recognise and receive formative feedback, and almost all (n = 24, 96%) agreed to some extent that they are better able to reflect and use feedback in their work. This is one of the core tenets of SLICCs; much of the course focusses on reflecting on one's learning and then using this learning to improve performance. The evidence that almost all students were in agreement would suggest that the SLICCs were successful in what they set out to do.

Similarly, most students agreed that they have developed a better understanding of learning outcomes and their uses and are able to now use learning outcomes as a tool to enhance their learning (n = 23, 92% for both questions).

The largest disparity in results was present in confidence levels in assessment. While 72% of students (n = 18) agreed that they feel more confident in understanding how they are assessed, a small minority of students disagreed (n = 1, 4%) or strongly disagreed (n = 1, 4%). This disagreement was at times also present in the focus groups, where some students expressed frustration with the assessment process.

This data illustrates why SLICCs students might further develop their graduate attributes and other skills in comparison to other student groups – they may have been accustomed to questions posited here by their SLICCs experience. As all the students have just completed a SLICC a few months or weeks before the questionnaire, all the takeaways on how to reflect on their learning would be relatively fresh in their minds.

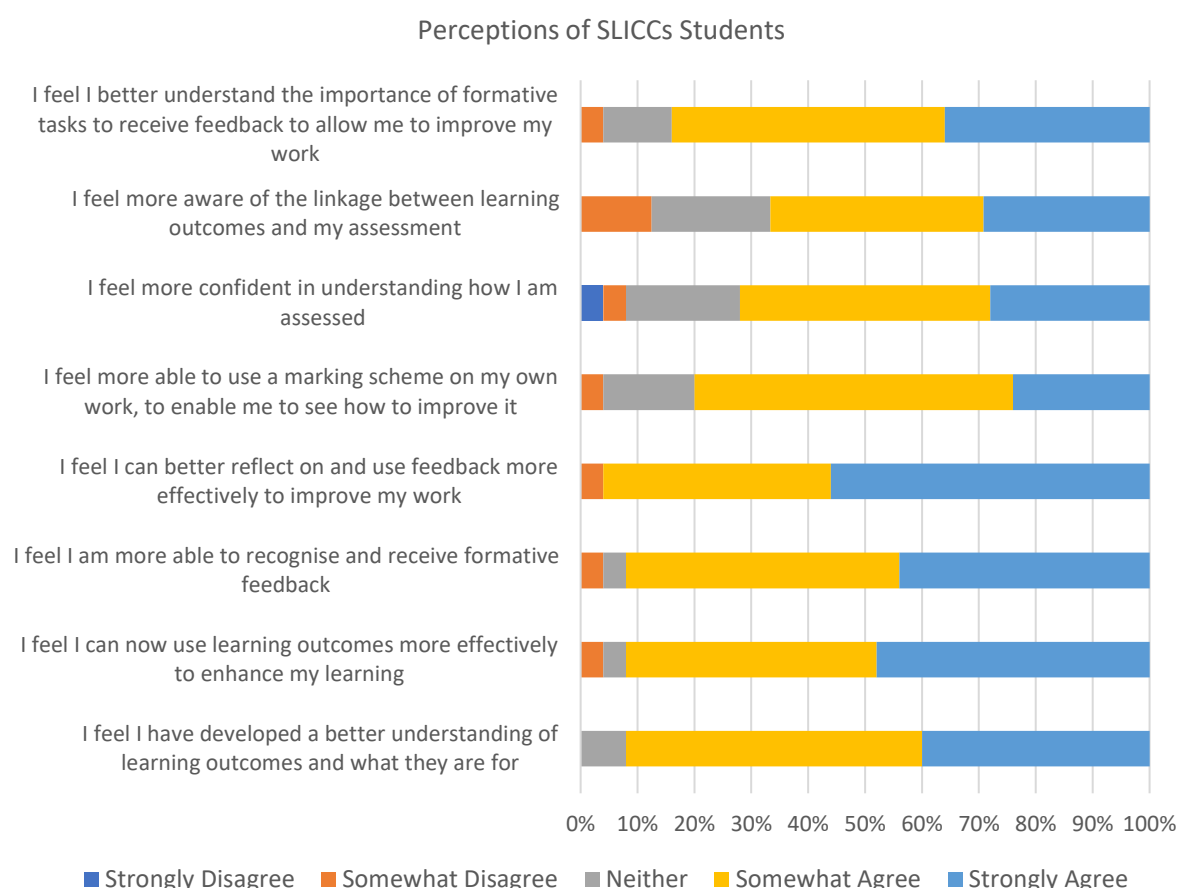


Figure 16. Perceptions of SLICCs students on specific characteristics of SLICCs (n = 24-25).

4.4.4 Graduate Attributes Within and Outside of SLICCs

The students' graduate attribute progress during SLICCs and throughout their year in general was compared using percentage agreement bar graphs (Figure 17 on page 153) and Mann-Whitney U statistical tests (Appendix 21 on page 321).

Interestingly, there were no graduate attributes that were perceived to be more progressed at a higher frequency during SLICCs compared to the general university experience to a statistically significant degree. Conversely, communication skills showed a trend of students progressing more outside of SLICCs than during, but only confidence improvement was statistically significantly higher in general classes ($U = 180.5$, $n_{out} = n_{in} = 24$, $p = 0.014$). Similarly, students reported improving their teamwork skills at a statistically significantly higher rate outside of SLICCs ($U = 208.0$, $n_{out} = n_{in} = 25$, $p = 0.013$ for ability change; $U < 152$, $n_{out} = n_{in} = 24$, $p < 0.001$). Next, while a possible trend of more students progressing their writing skills during SLICCs can be seen from Figure 17, the difference is not statistically significant. Similarly, the trend of critical thinking and numerical skills being more

progressed outside of SLICCs is not statistically significant for any of the perceptions. Finally, progress in content knowledge and qualitative skills is very similar for both groups and has no statistically significant differences.

The results presented here are not entirely unexpected and provide a good snapshot of what SLICCs are and what they are not. Considering that students are comparing their experience to their University studies before lockdown, the difference observed in communication and teamwork in favour of students' general learning and teaching experiences is to be expected. Similarly, SLICCs also emphasise semi-autonomous working with a tutor's support, so it would be unusual for a student to have much opportunity to develop teamwork through a SLICC (unless the individual SLICC project directly involves teamwork, for example when students undertake an internship as a SLICC). Furthermore, one of the differences of this data group compared to the STEM data group is that within this data, it is certain that the SaP experience students are describing definitely happened at a different time to the other studies. This means that there are no interactions between the two sets of perception data, which cannot be said about the other data groups. This may mean that a lot of the confounding factors that could be present in the other data groups due to the SaP experience happening at the same time as other teaching, or even being part of the curriculum, are not present in this data set. However, it is also possible that due to the temporal separation between the two experiences, students were not able to compare the two as accurately as if they were happening at the same time, resulting in very similar data for both experiences. Finally, students here are comparing pre-pandemic in-person university experience with an independent project during the first UK lockdown; and they are completing this comparison six months into the lockdown. It is entirely possible that by this point their recollections of life before lockdown are sufficiently coloured over and swayed by their experiences of the past months. Given all these differences, it may be impossible to fully discuss whether the SLICCs did not have any major impact on students' graduate attributes based on perception of graduate attributes alone – consideration of the focus group data as well as the other perception data is necessary.

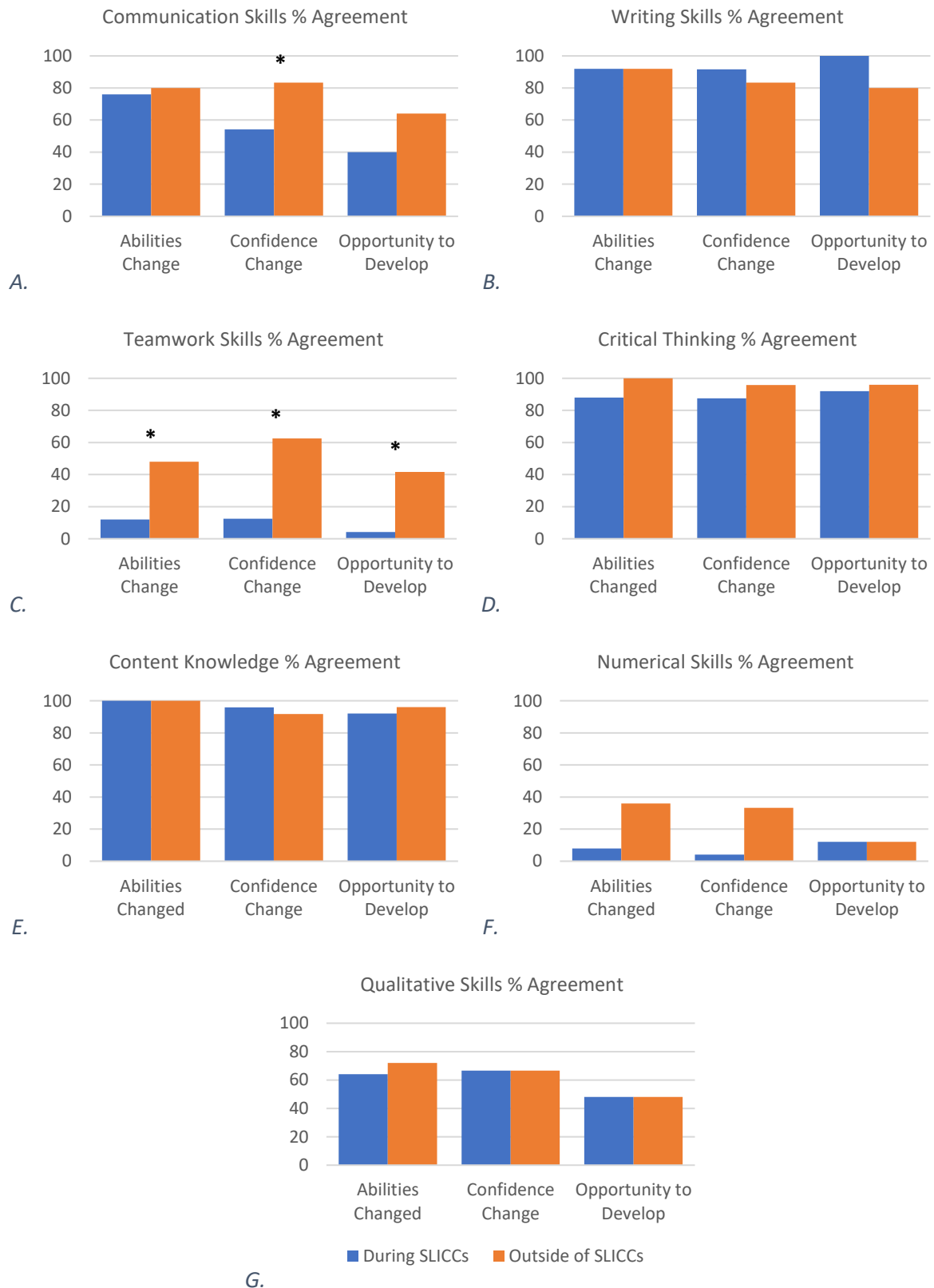


Figure 17. Percentage agreement with Likert scale statements, divided by graduate attribute ($n = 24-25$ for During SLICCs and $n = 24-25$ for Outside SLICCs). Asterisks denote statistically significant difference between groups as found through related statistics in Appendix 21. A. – G. Percentage agreement for each of the graduate attributes.

4.4.4.1 What helped students develop each of the graduate attributes, in and out of SLICCs

To provide further context for the Likert scale perception data, students were asked to elaborate on their experience and asked which aspect of SLICCs and general education helped them the most with each skill. In these tables specifically, a number of theme combinations were applied following first coding. For example, *in-course assessment* and *individual coursework* were judged to be too close together and combined into one code; likewise, the *forum posts* code was concluded to actually be a subset of *in-course work* and so they were combined. Also, reflection was added as a theme (compared to the STEM data groups) as it was mentioned multiple times and is an important component of SLICCs.

When discussing communication skills (Table 31), students emphasised the value of assessments both within and outside of SLICCs. In particular, students talked about the SLICCs rubric and “*The expectation to utilise the rubric to its fullest extent.*” Outside of SLICCs, students also mentioned in-course work (“*The most communication is from tutorials, however this was no more than asking questions*”). Finally, students within SLICCs pointed to the actual experience of the SLICCs and working in the field on their projects, as well as conferring with their tutor as helping their communication skills.

Table 31. Activities that developed communication skills as reported by SLICCs students.

Communication skills	During SLICCs	Outside SLICCs
In-course assessments: blogs, reports, essays, team projects, presentations, using rubrics	5	7
In-course work: tutorials, lectures	0	11
Personal communication: talking research with family, talking about self-development, developing tolerance	3	0
Reflection: guided through blogs, daily self-reflection	3	
University participation: academic societies	0	2
Working in the field: talking to a charity, talking to experts, emails to companies	7	0
Working with peers: in the SLICC setting, or group projects	1	6
Working with tutor/staff member: conveying the intentions of project	7	6
None or n/a or rarely developed	1	1
Total Answered	23	23

When discussing their writing skills (Table 32), the majority of SLICCs students pointed to the writing tasks that made up the structure of the SLICC – the blogs, reports, and final essays. They would also often specifically single out reflection as part of the writing process. During studies that were not

SLICCs, students also pointed to essays and assignments the most, though many expressed displeasure with the level of their learning and general support: *“In philosophy of science I had to write an essay. I don’t feel I developed any skills from that process as I didn’t reflect on the feedback (I don’t think there was much feedback). In chemistry labs we had to do a weekly lab report, however I didn’t find them very interesting. I found it hard to improve my lab report writing skills as the feedback seemed inconsistent.”*

Table 32. Activities that developed writing skills as reported by SLICCs students.

Writing skills	During SLICCs	Outside SLICCs
Assignments and assessment: interim reports, lab reports	5	7
Blogs and reports	14	0
Essays: final evidence essay in SLICC, others in courses	8	16
In course work: note taking, tutorial work, forum posts	0	4
Reflection: e.g. through blogs	6	0
Research: bibliographical review	1	2
Writing process: Using different writing styles, planning writing, seeing how others write	1	3
None	0	1
Total Answered	24	22

Student’s perceptions of significant activities varied greatly for teamwork (Table 33). Within SLICCs, most students reported not having any teamwork activities as the SLICCs project is by design very independent. Conversely, outside of SLICCs, students pointed to group assignments and group work within course work as the main sources of teamwork building.

Table 33. Activities that developed teamwork skills as reported by SLICCs students.

Teamwork skills	During SLICCs	Outside SLICCs
Group assignments: presentations, projects, lab partners	0	12
In course work: tutorials, PBL, workshops	0	12
Personal development: meeting new people, delegating work	0	2
University participation: academic societies	0	1
Working with peers: in the SLICC, on placement	2	1
Working with tutor/staff member: discussions, following advice	2	1
None or n/a (due to it being very independent project)	17	1
Total Answered	20	21

Critical thinking presents a similarly split profile (Table 34). Within SLICCs, students mainly pointed to research, practical work, and assessments as the major ways they developed critical thinking.

Furthermore, many students mentioned one of the principal components of SLICCs, reflection, as being a driving component of developing their critical thinking skills. Outside of SLICCs, students pointed to assessments and course participation, with less emphasis on practical work and research. Several students also pointed out developing this skill in particular due to their degree choice (for example: *“I study Philosophy, which is all about critical thinking”*).

Table 34. Activities that developed critical thinking as reported by SLICCs students.

Critical thinking	During SLICCs	Outside SLICCs
Assessments: essays, blogs, lab report	6	12
Course participation: in lectures, tutorials, workshops, PBL	0	9
In all aspects of project/semester	3	1
Personal development: guiding own learning	3	1
Practical work: coding, reading, preparatory work for seminars	5	3
Reflection: critiquing own study methods, analysing approach	6	1
Research: topic chosen, deciding on own sources, and coming up with arguments	7	3
Other: literature on Brexit	1	0
Total Answered	23	21

Next, when reflecting on activities that developed content knowledge (Table 35), students overwhelmingly mentioned their research during the SLICCs beyond everything else. The activities were more diverse outside of SLICCs with students mainly talking about in class work, practical work, and assessments as main ways they developed content knowledge. Again, some students mentioned their specific degree choice (*“I love chemistry so I always aim to learn as much about the subject as possible”*).

Table 35. Activities that developed content knowledge as reported by SLICCs students.

Content knowledge	During SLICC	Outside SLICCs
All the time	0	2
Assessments: blogs, reports, formulating essay, exams, lab reports	2	7
In Class work: lectures, tutorials, labs	0	11
Personal development: learning about happiness	1	0
Practical work: courses, coursework, independent study reading, revision	3	10
Research: topic chosen, research methods, comprehensive note taking	19	4
University participation: academic societies	0	1
Total Answered	24	21

As alluded to in previous data description (Figure 17.F. on page 153), the majority of SLICCs students reported little progress in their numerical skills. This is mirrored here (Table 36); Almost all students

specifically reported having no activities that developed numerical skills during their SLICCs. Conversely, outside of the SLICCs, students pointed to a multitude of activities such as specific mathematics courses, assessments, or practical work. However, these learning opportunities were not received well by students, perhaps due to the course structure, as detailed by this student: *“We were forced to do maths in first year. This had a large overlap with advanced higher and I found it very unengaging. If anything I feel my maths skills went down compared to the year before. Rather than focusing on how to use the maths, we were given theory and proofs that would only be of interest to a mathematician.”*

Table 36. Activities that developed numerical skills as reported by SLICCs students.

Numerical skills	During SLICCs	Outside SLICCs
Assessments: lab report	0	1
In class work: lectures, tutorials	0	2
Practical work: coding, learning software	1	3
Research: topic chosen, collating survey data	2	1
Statistics/mathematics course	0	4
Not necessary or not developed	3	2
None or n/a	14	4
Total Answered	20	16

Finally, students were queried about their development of their qualitative skills (Table 37). For both tasks, students mentioned completing assessments as a major task. During SLICCs, students also pointed out research as way to develop qualitative skills, focussing specifically on more qualitative tasks such as reflecting on their chosen topic or overcoming mistakes in their work.

Overall, students developed their graduate attributes in very different ways during the semester and during their SLICCs. The disparity may be due to the unique position of the data; in the STEM data sets, students are talking about a multitude of perceived SaP projects, whereas here students are only discussing a single type of experience, making the SLICCs portion much more homogeneous. Conversely, students have come from a multitude of degrees with different teaching approaches, which makes the outside SLICCs section more diverse than what would be seen in the STEM section. This seems to result in a very distinct pattern being created, where most SLICCs’ activities are quite similar while outside of SLICCs activities are often very diverse.

Table 37. Activities that developed qualitative skills as reported by SLICCs students.

Qualitative skills	During SLICCs	Outside SLICCs
Assessments: essays, blogs, reports, lab reports, patient interviews	5	6
Course participations: tutorials, lectures	0	2
Personal development: working independently, self-reflection, planning, time management	3	0
Practical experience: SLICC teaching practice, group discussions	1	1
Research: topic chosen, into self-improvement, tracking papers, checking all work	7	3
University participation: academic societies	0	1
Improved in general	0	2
None or n/a or Unsure	5	3
Total Answered	17	15

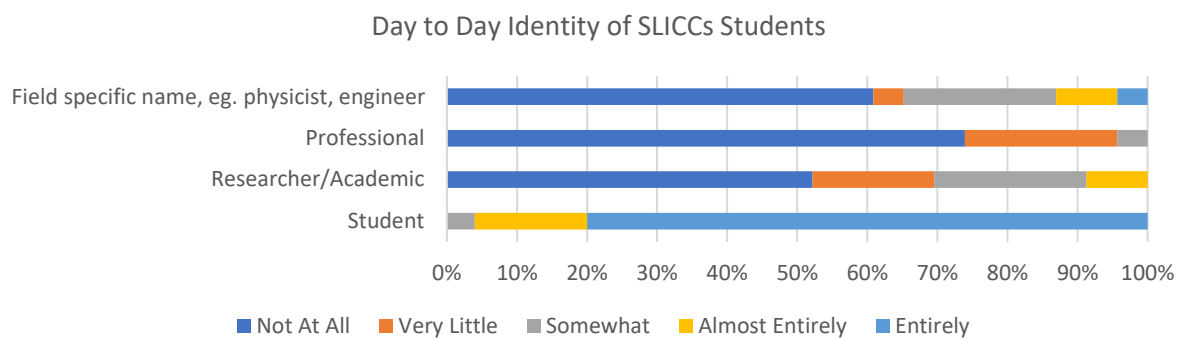
The types of activities displayed here, and the accompanying opinions presented by students are to be expected considering the wider data and match with the Likert scale perception data well.

4.4.5 Experiences of Identity and Belonging in SLICCs Group

Finally, SLICCs students' identity and sense of belonging was examined (Figure 18 on page 159). As expected, almost all responders considered themselves to be almost entirely or entirely as students ($n = 24$, 96%). Other identities were not as strongly represented with most perceiving themselves in no way as a professional, researcher, or within their field specifically. Students overwhelmingly feel more comfortable with their student identity – no students disagreed with this statement and 22 (88%) agreed or strongly agreed with the statement. Next, a similar number of students responded positively to the questions about academic community, discipline, and field ($n = 17$, 68%; $n = 16$, 64%; and $n = 17$, 68% respectively). Despite all this, students' perception of their 'SaP mindset' is quite diverse, with 11 (44%) students disagreeing with the idea that they have as much to offer in expertise as staff members, compared to eight (32%) agreeing with the concept.

Considering that students have at that point just completed their SLICCs, it is somewhat unexpected to see their SaP mindset as low as reported. However, it is necessary to consider that SLICCs are not necessarily typical or overtly labelled as SaP projects (for further discussion of whether they can be considered as SaP in this data set, see section 4.9.1 starting on page 185); students here are not partnering with a specific staff member, but undertaking semi-autonomous projects with some support from a supervisor.

A.



B.

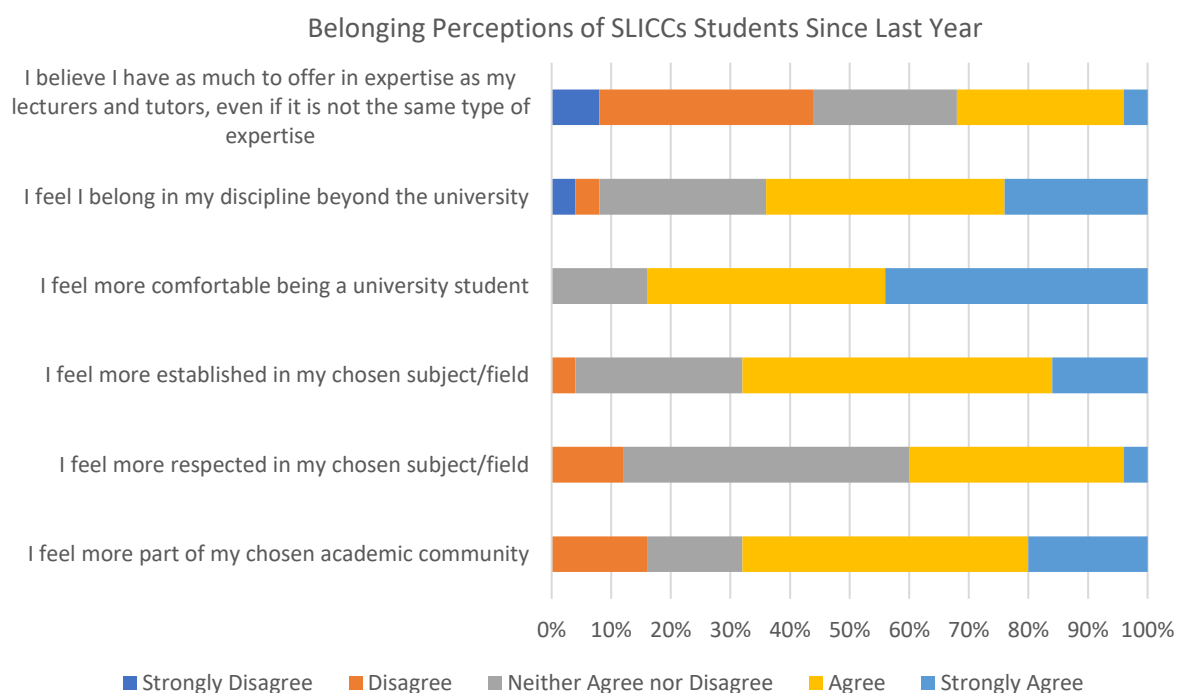


Figure 18. Perceptions of identity and belonging of SLICCs students. A. Identity perceptions ($n = 25$ for student identity; $n = 23$ for all other identities). B. Belonging perceptions ($n = 25$ for all).

As in previous datasets, the data was structured by whether students believed they took part in any SaP activity (regardless or not whether SLICCs are a form of SaP) this year (Appendix 22 on page 322) and by year group (Appendix 23 on page 323). For these statistics, students who were not sure about whether they took part in SaP were omitted. Mann-Whitney U test suggests that students who were part of SaP felt statistically significantly more respected within their subject/field ($U = 13.5$, $n_{no} = 5$, $n_{yes} = 16$, $p = 0.014$), and more comfortable being a university student ($U = 15.5$, $n_{no} = 5$, $n_{yes} = 16$, $p = 0.029$). However, the groups are very unbalanced as most students responded that they

were part of SaP (n = 14 to 16, as some students did not answer all questions, resulting in different n used in statistics) compared to who said they were not (n = 5), so not many conclusions can be drawn from this data. Next, the data was also split by year group (Appendix 23 on page 323). Only 2nd and 3rd year students responded to the survey (with one student reporting being in first year, but as discussed above, that is not possible). Within this data, no trends are visible; both years reported agreement with all identities in similar frequency. From these two appendices, it can be concluded that identity has remained stable across the two year groups and despite SaP experience.

4.4.5.1 Elaboration on Perceptions of Belonging

Within this questionnaire, each belonging question was accompanied with a free text box to allow students to further elaborate on their perceptions (Table 38 on page 162). The data was thematically summarised using the same methods as for previous free text data, and to give further context to each response, the themes were arranged according to the student's reported Likert scale option.

When queried about feeling part of their academic community, those who marked an increase in the feeling, reported it being due to taking part in university life outside of classes, and sometimes due to finding their niche group (*"Having found EUYSRA [undergraduate student research group] and consciously looked for students that are passionate about chemistry, I feel like I am beginning to find my community"*). In fact, the student who had the strongest response to this question admitted that it was due to them changing to their preferred degree. Conversely, students that noted a reduction in community feeling mentioned the pandemic as being one of the main reasons, along with reflecting on their future (*"Being sent emails about career options after fourth year makes me realise i dont [sic] actually want a career associated with my degree"*).

Students who noted an increase in feeling respected within their field pointed to improved relationships with their tutors (and an apparent change in power hierarchy) and having more ownership of their own learning. This progression was seen in students' perceptions of being established in their field; students spoke about progressing in their degree and succeeding in their studies. Additionally, one now third year student spoke about a change in mindset: *"Over summer I had a mindset shift and I now feel like an academic rather than just a student."* The sense of belonging due to personal progress was also evident when students were asked if they felt they belonged in their discipline beyond university, with some referencing the success of their SLICCs specifically: *"The essay for SLICC proved to myself that I can write an extended research paper"* and

“following the SLICC I now feel like chemistry/biochemistry is my destiny.” Again, students that disagreed pointed to changing their perceptions of their future career rather than anything to do with their university experience itself (*“I have been exploring options for myself outside of university and my associated degree”*).

Next, students shared several further details about their perceptions about comfort with their student identity. The previously observed trend is seen again – students who expressed feeling much more comfortable with their student identity pointed to gaining agency (*“online learning, while challenging, has provided the opportunity to establish a strong sense of independence and responsibility for my studies”*) and progressing through overcoming challenges (*“skills learned from SLICC have made me very confident at doing my own learning. I feel confident with my position”*). The student who expanded on their lack of change in student identity pointed to wider issues beyond the university (*“It does not bother me how i am defined, however I do stand out as one of the only coloured students in the HCA lecture halls”*).

Finally, students elaborated on their position on the SaP mindset. As seen above in Figure 18 on page 159, the mindset was scored quite low by students despite their involvement in SLICCs. One student who disagreed with the SaP mindset elaborated that *“while I feel that my tutors respect me, in tutorials and seminars I prefer to rely on the knowledge of my tutors because they are experts in their field and I enjoy learning from them.”* Similarly, students who felt ambivalent about the question did not feel they had the same amount of expertise as staff: *“There are certainly times when a student can bring new perspective but at the moment at my level that is very rare.”* Furthermore, even students who did agree with the SaP premise still pointed to seeing the lecturers as experts: *“Naturally my lecturers have more knowledge than me, but I feel like I can bring something to the table.”* This perception was pervasive and was only somewhat combated through involvement in their SLICCs for some students. Encouragingly, the quote does however showcase that students are gaining more agency in their learning through their SLICC experience, which is a valuable element of partnerships.

Positive results seem to have been caused mostly by outside validation or achieving some sort of progress within their degree, such as completing a difficult task or scoring well in their degree. This may point to the theory of how self-perception and how it is established through feedback from the outside world and the individual’s interpretation of that feedback. Of course, any conclusions made

from this data should be approached with caution and be cross-referenced with what was said in the interviews and focus groups.

Table 38. SLICCs students' comments about their perceptions of belonging, sorted by the strength of agreement or disagreement. Where no text is written, no students commented further within that agreement/disagreement level.

I feel more part of my chosen academic community	
Strongly Disagree	
Disagree	COVID19
	Realising they do not want a career in their degree field
	Reducing contact to emails and discussion boards
Neither Agree nor Disagree	
Agree	Completing the SLICC
	Finding likeminded students
	Taking part in university societies and their events (2x)
	Attending events (e.g. Bitesize research event)
	Feeling a closer relationship with tutors
	Attending a placement in the field
	Getting to know other students and lecturers
	Gaining more confidence in abilities
	Starting honours courses
Strongly Agree	Switching to a preferred degree
I feel more respected in my chosen subject/field	
Strongly Disagree	
Disagree	
Neither Agree nor Disagree	
Agree	Having more responsibility for own learning
Strongly Agree	Feeling respected by tutors
I feel more established in my chosen subject/field	
Strongly Disagree	
Disagree	
Neither Agree nor Disagree	No longer obligated to complete degree due to other options available
Agree	Completing the first year
	Having a solid understanding of the basics
Strongly Agree	Starting honours courses
	Changing mindset from student to academic
I feel more comfortable being a university student	
Strongly Disagree	
Disagree	
Neither Agree nor Disagree	Not bothered by how they are defined
Agree	Having the chance to settle in
	Comfortable despite feeling like they stand out
Strongly Agree	Establishing independence and responsibility for study (2x)
	Overcoming challenges of online learning
	Navigating the University
	Knowing where to access support
	Switching to a preferred course
	Completing the SLICCs
	Taking part in different university events (2x)
I feel I belong in my discipline beyond the university	

Strongly Disagree	Exploring options outside of University and degree
Disagree	
Neither Agree nor Disagree	
Agree	Using field knowledge in casual setting
	Completing the SLICCs
	Proving they can write extended work
	Getting a better understanding of course and degree structure
Strongly Agree	Having passion for discipline
I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise	
Strongly Disagree	
Disagree	Prefer to rely on knowledge of perceived field experts
Neither Agree nor Disagree	Rare opportunity to bring new perspective due to current level
Agree	Completing the SLICCs
	Realisation of having own expertise to offer (2x)
Strongly Agree	

Conversely, students who explained their negative progress in belonging and identity mostly pointed to wider issues, such as plans for career change or wider intersectional issues. Interestingly, one student expressed a disengagement with their university experience as a whole, starting with the question about feeling established within the university – *“I no longer feel obligated to complete [sic] university as i have other options so me feeling 166stablished [sic] is for as long as a i want it to be”* – and observed throughout the rest of the questions. The student’s responses suggest a sense of liminality and reciprocity. The university is a liminal space only inhabited when necessary, and only while it is providing the student with things in return. In this particular student’s case, that functionality is no longer there – the student no longer needs to be a member of the community to progress in their life. The resulting pulling away from their discipline and wider academic community is an understandable consequence of this shift in their circumstances.

Finally, students’ low perception and agreement with the SaP mindset was understandable. The shift from considering staff as experts to considering students and staff as having equal expertise goes against well-established power hierarchies for most students. This holds especially true considering the educational context of undergraduates (and STEM degrees, which many SLICCs students were completing), as most science disciplines are built on foundational discipline knowledge and discipline-based skills that take time for students to learn (National Research Council, 2012). As such, students may not feel truly proficient in content or feel much expertise in their field for most of their undergraduate studies. It may be more difficult for students in disciplines emphasising the importance of foundational knowledge to know how to equate the field-specific expertise of staff

with the type of expertise that they can bring, such as expertise as a student in studying multiple courses. Furthermore, many students may also not feel confident in calling themselves experts in their own learning at the start of their higher education experience, instead gaining a metacognitive understanding of their learning as they progress through their degree. Students' low level of identifying partnership may also be simply an issue with the definition of SaP used, as a sense of equal expertise has been observed in students and staff following longer, established partnership projects (Mercer-Mapstone et al., 2017), but may be less familiar for students completing SLICCs who did not have the benefit of such long projects.

4.5 SPA Case Quantitative Representation

The final data set presented here is more of a data point; only a single student responded to the survey sent out to all students involved in Student Partnership Agreement funded projects.

4.5.1 Graduate Attributes Within and Outside of SPA

As this is a single data point, there is not much reason to represent the perceptions of graduate attributes outside and within SPA separately, so comparisons were done as a start. Similarly, there is no opportunity here to complete any statistical analysis, so the data is only presented within a table (Table 39 on page 165). Similarly, all reported notable activities for each graduate attribute were simply summarised and tabulated (Table 40 on page 165).

This SPA student reported similar changes in abilities for both throughout the year and throughout their SPA project, suggesting greater improvement in their writing skills during SPA, and conversely greater improvement in their qualitative skills outside of SPA. Similar patterns were observed within the student's confidence; the student reported becoming more confident in their communication during SPA compared to their regular studies, but interestingly noted higher progress in gaining confidence in their writing skills during regular studies compared to their SPA project. Finally, there were no differences between the SPA project and the student's regular studies in terms of how much opportunity they had to develop specific skills - the student had the most opportunity to develop their teamwork skills, and the least to develop their numerical skills.

The list of notable activities for each of the skills provides some further context. For example, the student mentioned budgeting as the only activity during which they had the chance to work on their

numerical skills. Considering how little time this activity can take up, it is understandable that they did not gain much progress from just this. Next, it can be inferred from the full list that the student spent a significant portion of their degree working through group projects, which explains why their general studies improved their qualitative skills more than their SPA funded project did.

Table 39. Student's perceptions of their graduate attributes throughout their SPA funded project (labelled as Within SPA) and their last year (labelled as Outside of SPA), showing changes within ability, confidence, and how much opportunity student had to develop each graduate attribute. Answers were highlighted through a heat map (darker the green indicates higher the answer).

	Change in Ability		Opportunity to Develop		Change in Confidence	
	Within SPA	Outside of SPA	Within SPA	Outside of SPA	Within SPA	Outside of SPA
Communication skills	Somewhat Improved	Somewhat Improved	Frequently	Frequently	Much more confident	More Confident
Writing skills	Greatly Improved	Somewhat Improved	Frequently	Frequently	More Confident	Much more confident
Teamwork skills	Somewhat Improved	Somewhat Improved	All the Time	All the Time	Much more confident	Much more confident
Critical thinking	Somewhat Improved	Somewhat Improved	Frequently	Frequently	More Confident	More Confident
Content knowledge	Somewhat Improved	Somewhat Improved	Frequently	Frequently	More Confident	More Confident
Numerical skills	No Change	No Change	Sometimes	Sometimes	No Change	No Change
Qualitative skills	Somewhat Improved	Greatly Improved	Frequently	Frequently	More Confident	More Confident

Table 40. Table of notable activities for each graduate attribute as identified by the SPA student.

	Notable Activities	
	Within SPA	Outside of SPA
Communication skills	Talking with participants	Collaborative projects
Writing skills	Writing funding applications	Writing funding applications
Teamwork skills	Working with staff and collaboration partner	Participatory projects
Critical thinking	Workshop presentation	Implementation of projects
Content knowledge	Practical presentation	Developing projects
Numerical skills	Budgeting	Budgeting
Qualitative skills	Practical presentation	Delivering projects Supporting participants

The patterns observed above make overall sense considering that the student was working on their Master of Fine Arts over the year in question. As such, it would be expected that they would not

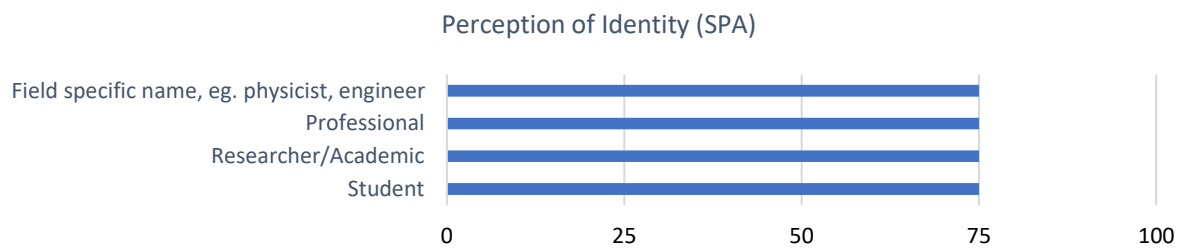
have as much work on their numerical skills as for example STEM students. Similarly, both their degree and the SPA funded project required a large amount of team and group work, resulting in the student's high gains in confidence and ample opportunity to develop the skill. Interestingly, the student suggested that although they improved more in their writing throughout SPA, their confidence in writing grew more during their regular studies. This may be because while the type of writing the student completed during both was the same, they may have received more support and feedback on their funding applications as part of their masters, resulting in a comparatively higher increase in confidence due to the feedback; similarly, this would suggest that writing the funding applications within their SPA projects without much assistance was more of a challenge, resulting in comparatively higher gains in ability. Alternatively, the higher gain in ability could also be explained by the funding application meaning more to the student and therefore being of higher importance, or perhaps the student worked more closely with their student and/or staff partner to complete the application.

4.5.2 Experiences of Identity and Belonging

Again, the data here was formatted uniquely as only one participant responded. Instead of portraying the data in a table, I decided to graphically represent it with a key to the x-axis being in the figure legend (Figure 19 on page 167). The participant responded that they felt almost entirely like a student, researcher, professional, and an artist. This may be due to the student being in postgraduate studies and having a much more nuanced and developed sense of self.

Next, the student was asked about their perception of belonging. Interestingly, the student agreed that they were more part of their chosen academic community, feeling more established in their subject, and feeling more like they belonged in their discipline beyond university; however, they did not report any changes in feeling comfortable as a university student or in feeling more respected in their field. Given that SPA projects take place alongside the student's formal course and can often involve monetary compensation for their time, it is possible that the student viewed their project as something outside the University akin to work experience, so their project did not affect their perceptions of their University experience. This was expanded upon in the student's interview, where they directly linked their project to their employability rather than to their studies and place at the University.

A.



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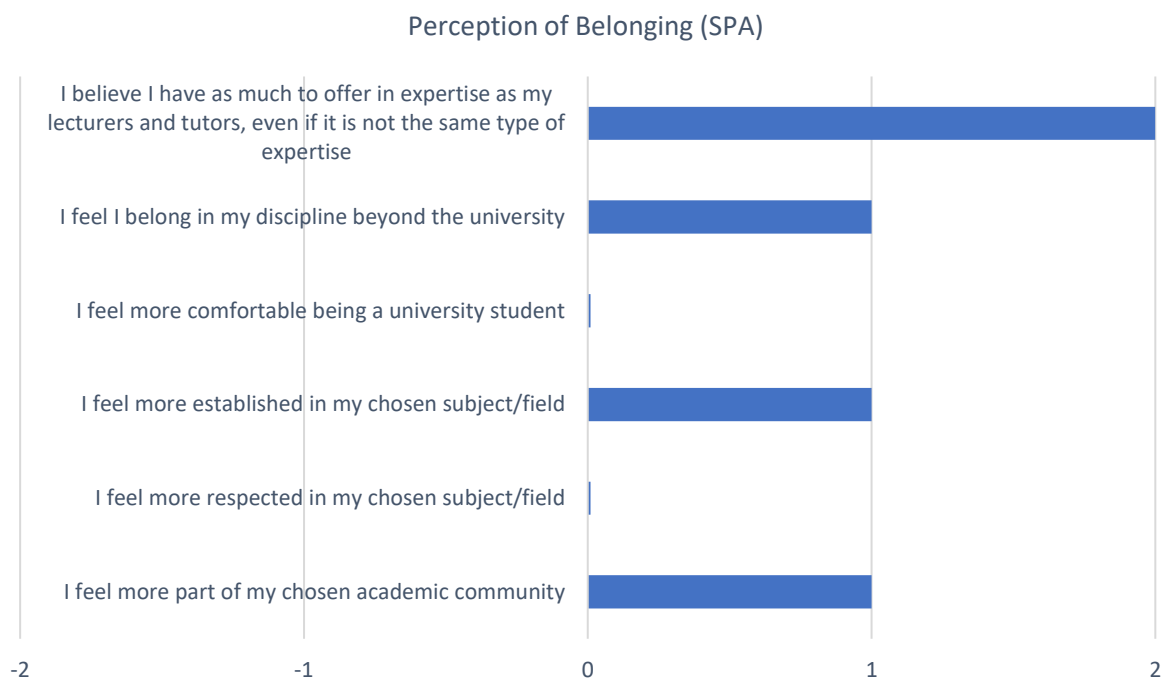


Figure 19. Perceptions of identity and belonging of SPA student. A. Identity perceptions, with a scale of Not at All (0) – Very Little (25) – Somewhat (50) – Almost entirely (75) – Entirely (100). B. Belonging perceptions where Neither Agree nor Disagree is denoted as 0, Agree as 1, and Strongly Agree as 2.

Finally, the student reported that they strongly agreed that they had as much to offer as their lecturers, suggesting that they possess the SaP mindset. This was later observed in the focus group with this student, where they suggested that while both themselves and their staff partner had their own roles to play, they both brought an equal amount to the table. This strong SaP mindset may also be due to the SPA funded project being a strong example of partnership that was always supposed to be partnership and therefore instils in the student the SaP mindset among other outcomes. Similarly, as the student was studying for a postgraduate qualification in a very practical degree, it

may be that they have spent more time working in collaboration with staff than the undergraduate students from other schools surveyed here.

Just like in the SLICCs questionnaire, the student was given the opportunity to expand on their thoughts of their belonging. This student did not take the option.

4.6 STEM Longitudinal Comparisons

This section explores the differences and similarities across the two STEM data groups. As STEM S1 and STEM S2 were sampled from the same population at different times, it is worthwhile comparing them outside any of the other data.

4.6.1 Demographics Changes

There were 22 more questionnaire participants in semester 2 compared to semester 1. Similarly, students from two more schools participated in semester 2 compared to semester 1; however, the general frequency of represented Schools remains similar across the two data groups. The distribution through the year groups was more varied – semester 1 saw comparatively more first year students and semester 2 saw more third years. These differences should be accounted for when comparing the samples.

4.6.2 Comparisons of Experiences Across the Year

First, the students' perceptions of their graduate attributes during their studies (outside of SaP) were contrasted. Again, percentage agreement was used to visualise the dataset (Figure 20 on page 170) and non-parametric statistics were run to judge significance (Appendix 24 on page 324).

The data displays several significant trends. In general, more students participating in semester 1 perceived positive progress in their communication skills, writing skills, critical thinking, and qualitative skills than students participating in semester 2. Significantly more students reported having an opportunity to develop and gaining confidence in their communication skills ($U = 789.5$, $n_{S1} = 37$, $n_{S2} = 58$, $p = 0.023$ and $U = 815.5$, $n_{S1} = 37$, $n_{S2} = 58$, $p = 0.036$ respectively). Similarly,

students reported significantly higher improvement and confidence in writing skills (ability change $U = 760.5$, $n_{S1} = 37$, $n_{S2} = 58$, $p = 0.012$; confidence $U = 717.0$, $n_{S1} = 37$, $n_{S2} = 58$, $p = 0.005$). While there was a trend of positive progress in critical thinking and qualitative skills, no statistical significance was observed. Observed patterns were not as strong in teamwork (ability change $U = 817.0$, $n_{S1} = 37$, $n_{S2} = 58$, $p = 0.036$), content knowledge (no statistical significance), and numerical skills (no statistical significance).

The differences observed across the year may be due to the different year groups represented in the S1 and S2 data groups. STEM S1 had comparatively larger amount of first year students represented. As these students are new to the university, they may perceive greater gains across their graduate attributes as they are facing a novel experience.

Similarly, STEM S2 students have by that survey point spent a year in pandemic mode and may be finding it difficult to adjust to new approaches to learning long-term. This has also been further observed throughout the STEM S2 focus groups, where students expressed a multitude of challenges with their current situation (including one participant saying that their greatest motivation for completing semester 2 is that it will be over soon).

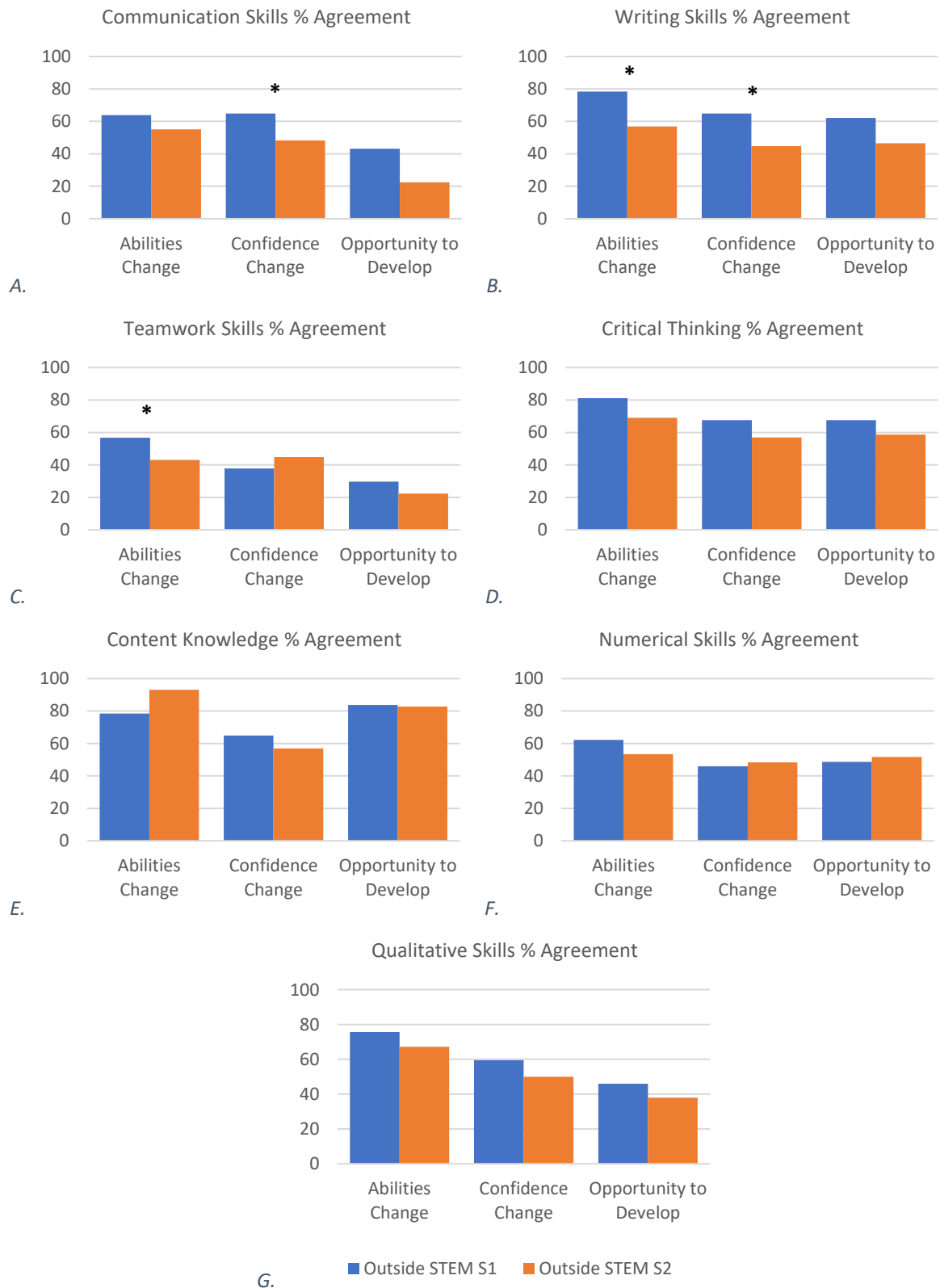


Figure 20. Percentage agreement comparison throughout the year of general studies in STEM groups ($n = 37$ for Outside STEM S1 and $n = 58$ for Outside STEM S2). Asterisks denote statistically significant difference between groups as found through related statistics in Appendix 24. A. – G. Percentage agreement by each of the graduate attributes.

Next, students' perceptions of their student partnership initiatives were compared across the year using percentage agreement (Figure 21 on page 172) and statistical analysis was performed (Appendix 25 on page 325). While there are some patterns of difference within the data, only communication skills and writing skills showed any significant difference where STEM S1 reported statistically significantly higher improvement in ability in communication ($U = 70.5$, $n_{S1} = 14$, $n_{S2} = 22$, $p = 0.003$) in opportunity to develop the skill in communication ($U = 76.5$, $n_{S1} = 14$, $n_{S2} = 22$, $p = 0.008$), and in confidence in writing ($U = 90.5$, $n_{S1} = 14$, $n_{S2} = 22$, $p = 0.043$).

Despite some visible patterns between the two STEM groups, there is little difference between the different perceived partnership projects that STEM students reported undertaking throughout the year. This would suggest that the activities that students perceive as partnership have some fundamental similarities, which will be explored in the following sections and chapters.

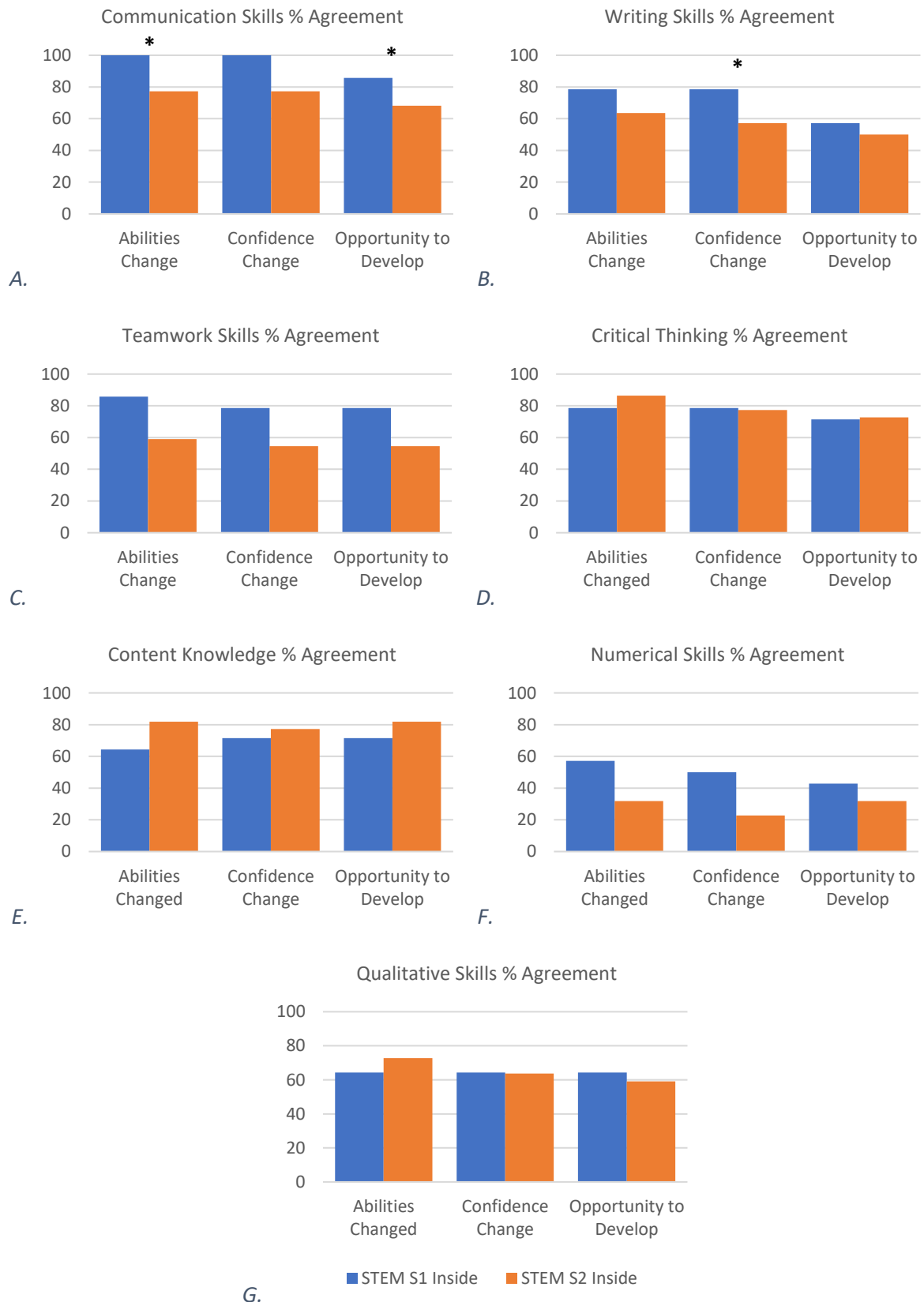


Figure 21. Percentage agreement in SaP projects throughout the year in STEM data groups ($n = 14$ for STEM S1 Inside and $n = 22$ for STEM S2 Inside). Asterisks denote statistically significant difference between groups as found through related statistics in Appendix 25. A. – G. Percentage agreement by each of the graduate attributes.

4.6.3 Comparisons of Experiences of SaP Initiatives to General Experiences across the Year

While there are differences between the two STEM data groups, as outlined above, there is also value in combining the two STEM data groups together into a single dataset. It makes the groups large enough to potentially spot significances that were previously not visible due to the small sample size. Similarly, if any data was previously significant in error simply due to random sampling, the larger data size should mitigate this. Again, percentage agreement graphing was used to visualise data (Figure 22 on page 174) with statistical calculations provided in the appendix (Appendix 26 on page 326).

Students reported multiple graduate attributes as significantly higher during perceived partnership compared to the general year. Across communication and teamwork, students reported statistically significantly higher perceptions across all three perception questions ($U = 1029.5$, $n_{\text{outside}} = 94$, $n_{\text{inside}} = 36$, $p < 0.001$ for ability change in communication skills; $U < 1022$, $n_{\text{outside}} = 95$, $n_{\text{inside}} = 36$, $p < 0.001$ for confidence and opportunity to develop communication skills; and $U < 1247$, $n_{\text{outside}} = 95$, $n_{\text{inside}} = 36$, $p < 0.01$ across all teamwork skills). Next, students perceived statistically higher gain in their confidence in their critical thinking ($U = 1241.0$, $n_{\text{outside}} = 95$, $n_{\text{inside}} = 36$, $p = 0.008$) and content knowledge ($U = 1219.5$, $n_{\text{outside}} = 95$, $n_{\text{inside}} = 36$, $p = 0.008$), as well as perceiving having significantly more opportunity to develop their qualitative skills ($U = 1337.0$, $n_{\text{outside}} = 95$, $n_{\text{inside}} = 36$, $p = 0.044$). No skills were reported significantly higher outside of reported SaP experiences.

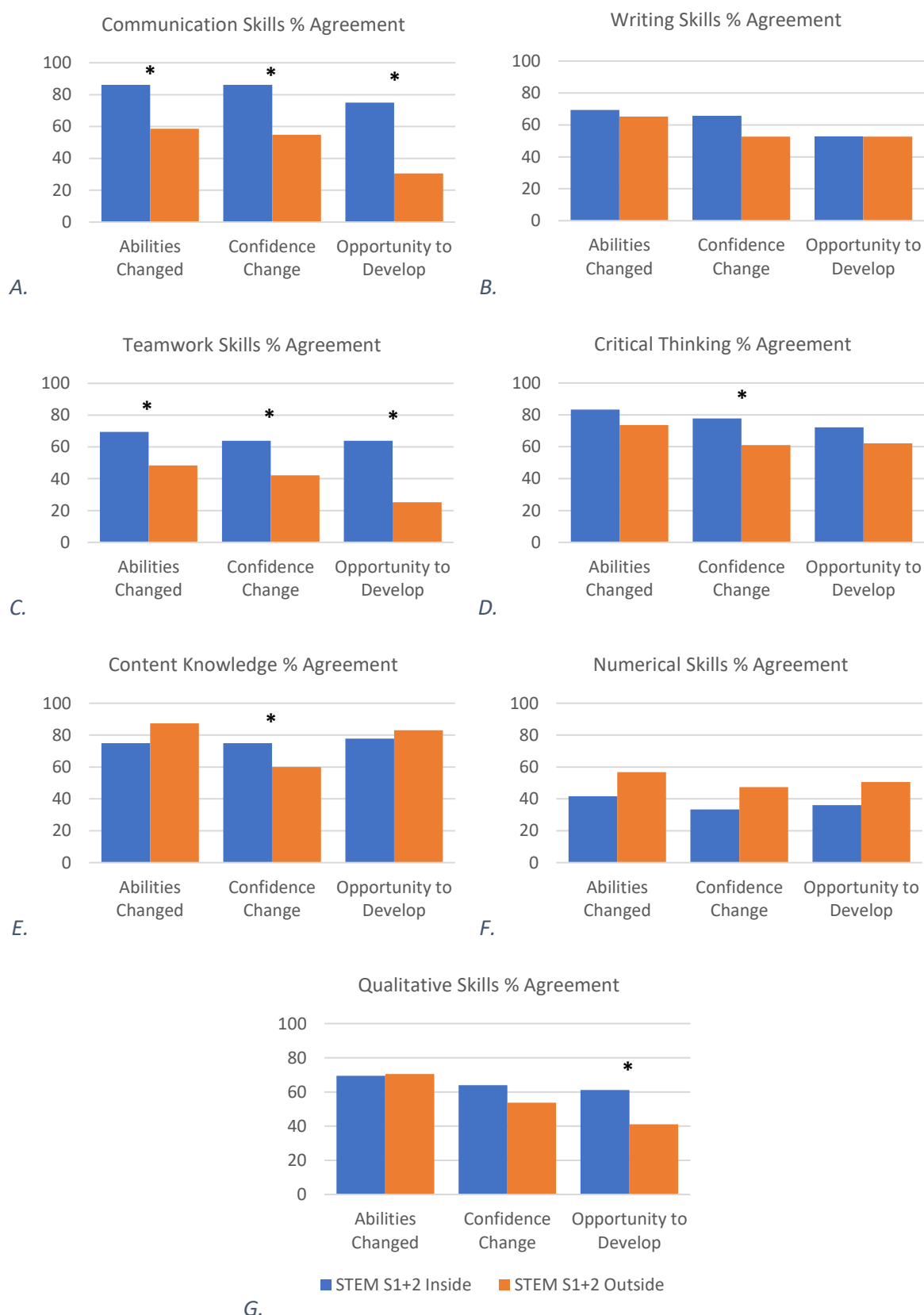


Figure 22. Percentage agreement of combined STEM S1 and S2 data showing differences between perceptions of SaP and general studies ($n = 36$ STEM S1+2 Inside and $n = 95$ STEM S1+2 Outside). Asterisks denote statistically significant difference between groups as found through related statistics in Appendix 26. A. – G. Percentage agreement split by each of the graduate attributes.

Considering these results and the results observed in previous sections, a certain pattern of what a reported SaP experience means to STEM students starts to emerge. Students seem to point to enhanced relationships with their teachers and peers as the main factor in perceived SaP, which is reflected in the heightened scores of progress in communication and teamwork skills observed above. Similarly, the reported SaP experiences tended to be uniquely effective in raising students' confidence (as can be seen from the large amount of significance in confidence gains observed above). All this suggests that for a learning experience to be perceived as SaP by students, it needs to have a set of characteristics, such as authentic relationships or sense of trust. The characteristics of perceived SaP emergent from this whole dataset are discussed in detail in chapter 6 starting on page 224.

4.6.4 Comparisons of Experiences of Identity and Belonging in STEM across the Year

Finally, perceptions of identity and belonging were compared across the two STEM groups. No graphs were created for this section, but statistical significances were calculated (Appendix 27 on page 327). While there were no statistically significant differences in students' identity from one semester to the other, there was a statistically significant decrease in belonging from first semester to the second semester; specifically in the feeling of belonging in a chosen academic community ($U = 778.0$, $n_{s1} = 37$, $n_{s2} = 58$, $p = 0.019$) and in students' feeling of being comfortable being a university student ($U = 707.0$, $n_{s1} = 37$, $n_{s2} = 58$, $p = 0.003$). Finally, students in the second semester questionnaire reported a statistically significant decrease in their SaP mindset ($U = 824.5$, $n_{s1} = 37$, $n_{s2} = 58$, $p = 0.047$), suggesting not as many agree they have expertise to share.

The differences observed here could also be caused by the effects of the pandemic on the individuals. By the second semester, students have been studying online for over a year, resulting in the students' sense of belonging shifting. University is no longer a concrete, physical place, and interactions with other university members no longer occurs within purpose built physical spaces and the spaces in between. The focus group data explores the different ways students have redefined their perceptions of belonging to their university and field in chapter 5 starting on page 187.

4.7 Comparisons of Quantitative Data across Groups

Within this section, the data groups will be further combined to elucidate any potential patterns. Treating all the surveys as a single group yields a large enough data sample to see potential differences between SaP and non-SaP activities.

4.7.1 Comparison of Students Perceptions in STEM S1 to SLICCs

Before comparing the dataset as a whole, it is worthwhile to first compare the STEM S1 and SLICCs groups. These data groups were collected at a similar point in time and with a potential overlap in the sample population (SLICCs are available to STEM students as well, although the demographics data shows that not many STEM students took part), making the SLICCs group a potential extension of the STEM S1 group. As the SLICCs participants were also more from humanities, the comparison serves as a brief contrast between the Schools. The comparison was statistically analysed and can be found in Appendix 29 on page 329. There were many statistically significant differences between these two groups. The SLICCs students group reported statistically significantly higher progress across all three questions for their writing skills ($U = 271.5$, $n_{S1} = 36$, $n_{SLICCs} = 25$, $p = 0.004$ for ability change; $U = 303.0$, $n_{S1} = 37$, $n_{SLICCs} = 24$, $p = 0.024$ for confidence; $U = 270.5$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p = 0.004$ for opportunity to develop), critical thinking ($U < 155.0$, $n_{S1} = 37$, $n_{SLICCs} = 24$, $p < 0.001$ for ability change and confidence; $U = 113.5$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p < 0.001$ for opportunity to develop), and content knowledge ($U = 297.5$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p = 0.009$ for ability change; $U = 229.0$, $n_{S1} = 37$, $n_{SLICCs} = 24$, $p = 0.001$ for confidence; $U = 312.5$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p = 0.021$ for opportunity to develop). Additionally, they also reported a higher perception of improvement in their abilities in communication skills ($U < 1.0$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p < 0.001$). Conversely, STEM S1 students reported statistically significantly higher perception across all three perception questions for numerical skills ($U < 252.5$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p < 0.003$ for ability change and opportunity to develop; $U = 304.0$, $n_{S1} = 37$, $n_{SLICCs} = 24$, $p = 0.03$ for confidence) and a higher perception of improvement in their teamwork skills ($U = 293.0$, $n_{S1} = 37$, $n_{SLICCs} = 25$, $p = 0.01$).

These differences clearly show how diverse the groups are, which is important to account for when discussing the overarching conclusions emergent from the dataset.

4.7.2 Comparisons of Students' Perceptions Throughout the Year and Through SaP

Next, I contrasted the differences in perceptions of students' general year outside of perceived SaP initiatives (Figure 23 on page 178) and throughout perceived SaP (Figure 24 on page 180). These graphs are illustrative only to provide context before merging the data; as the data groups are of very different sizes and fail assumptions necessary for Mann-Whitney U testing, no statistical testing was conducted.

Firstly, SPA consisted of a single datapoint, and therefore any percentage agreement value presents in binary form (either as fully 100% agreement or 0% agreement). As such, comparing those values to the rest of the groups will not yield much information; the values were regardless included to showcase the data and illustrate the need to approach this dataset with care as a whole. Beyond that, most of the graduate attributes present a clear trend; most SLICCs students agreed that they positively progressed in their skills of all the groups (except for in numerical skills), followed by STEM S1 students and then by STEM S2.

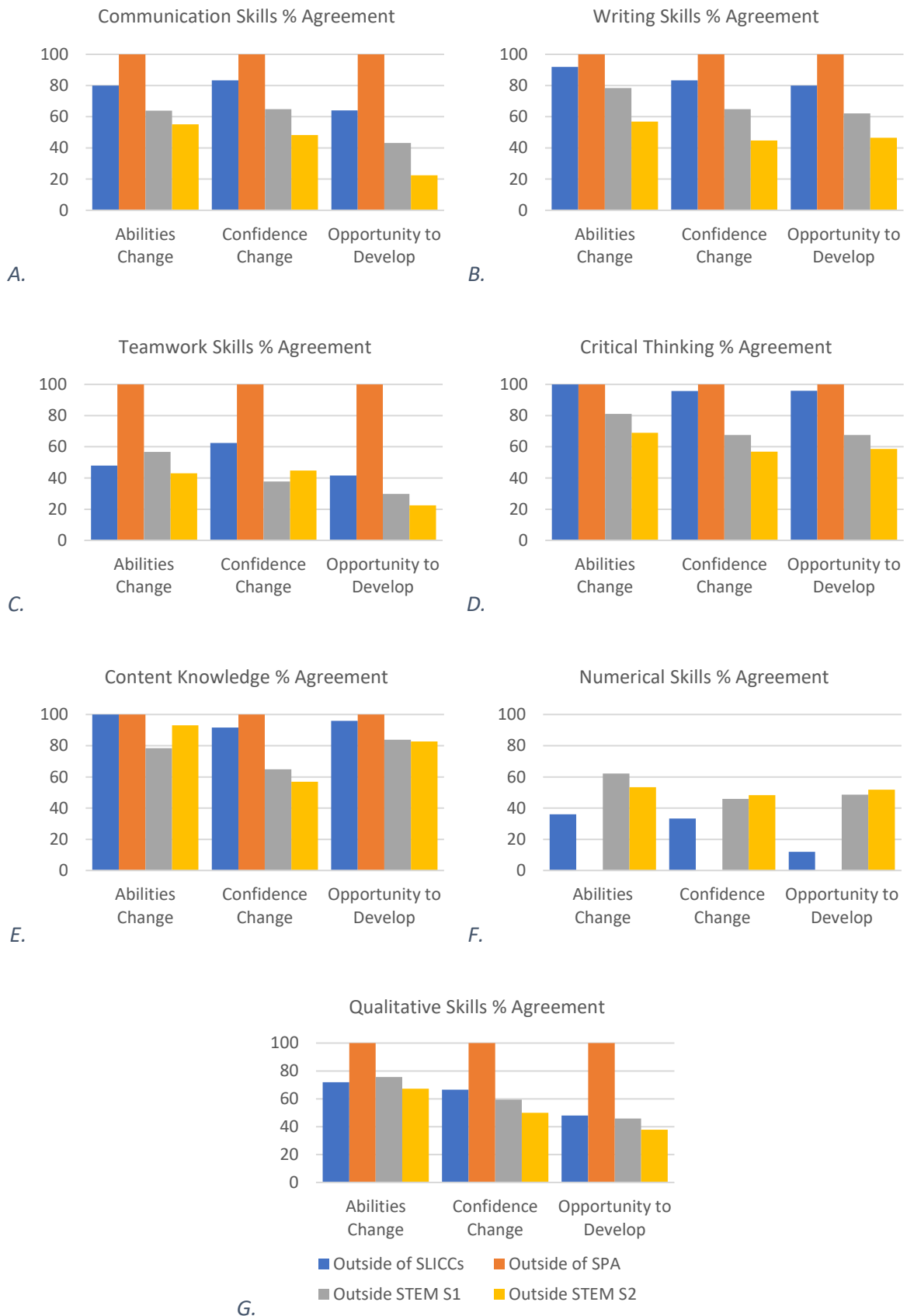


Figure 23. Comparison of percentage agreement of perceptions of graduate attributes throughout the year ($n = 24$ -25 Outside of SLICCs, $n = 1$ Outside of SPA, $n = 37$ Outside STEM S1, and $n = 58$ Outside STEM S2). A. – G. Percentage agreement by each of the graduate attributes.

These trends are understandable given all the previous discussion. As the SLICCs group is mostly comprised of humanities students, this is expected that they would not have as much of a chance to develop and progress in numerical skills. However, the group achieved better in other graduate attributes possibly due to selection bias – only the more achieving and engaged students complete a SLICC, so the SLICCs data group is already comprised of highly engaged students who may naturally perceive their progress in graduate attributes to be higher than other students. The patterns surrounding STEM S1 and S2 have already been explained above.

The graduate attribute progress from the perceived SaP initiatives was also compared across the groups (Figure 24 on page 180). Here, a dichotomy has emerged – students across STEM S1 and S2 have reported similar percentage agreement across most graduate attributes, however the SLICCs' attributes do not hold the same pattern.

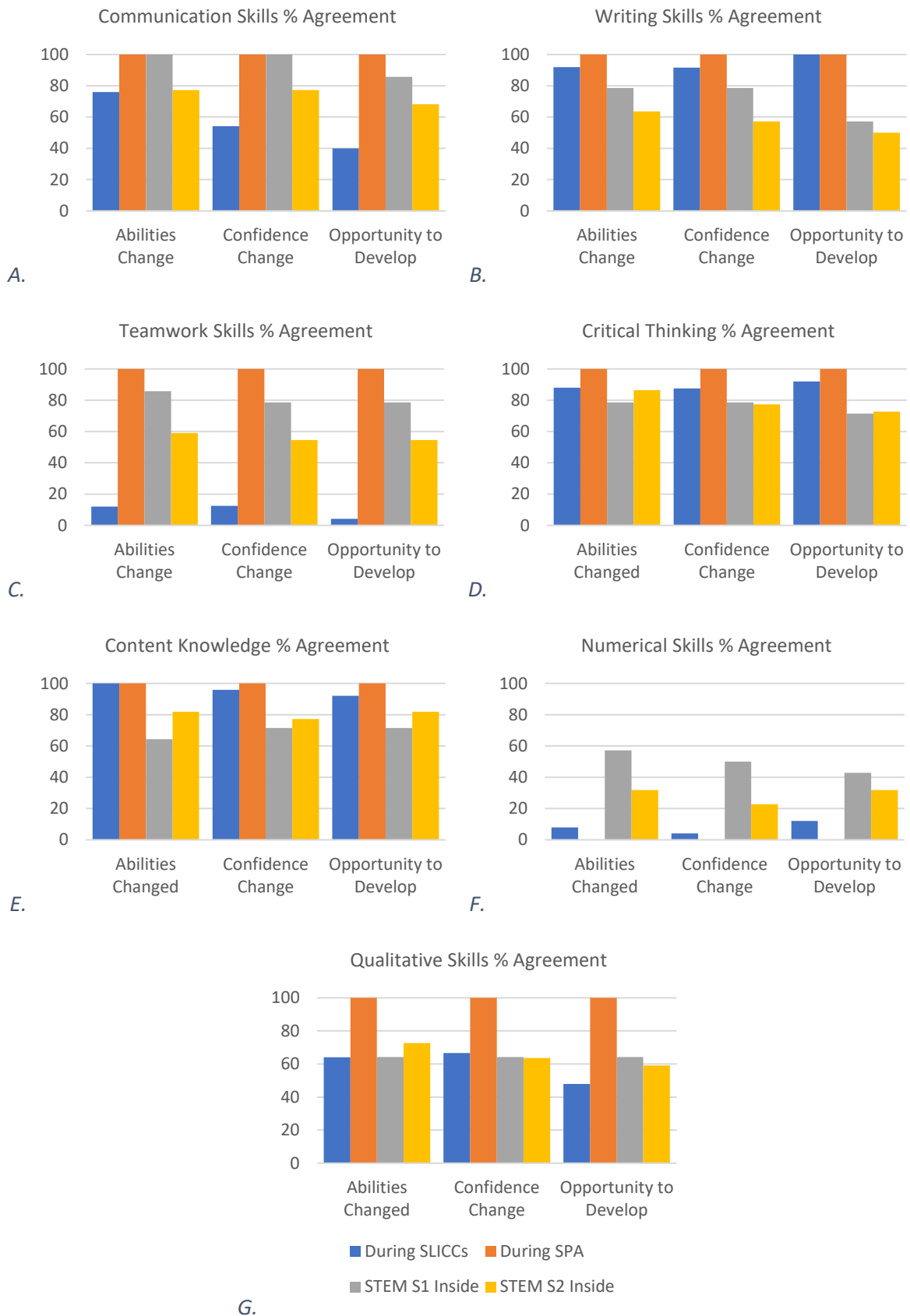


Figure 24. Comparison of percentage agreement of perceptions of graduate attributes within SaP initiatives throughout the year ($n = 24\text{--}25$ During SLICCs, $n = 1$ During SPA, $n = 14$ During STEM S1, $n = 22$ During STEM S2). A. – G. Percentage agreement by each of the graduate attributes.

These differences may be due to the structure of the surveys. Students in the SLICCs survey were specifically directed to respond with their perceptions about SLICCs, whereas students in the STEM surveys were able to choose the SaP initiative they wanted to respond about. As such, the data presented above are not exactly comparable as the comparison is of perceived SaP (STEM S1 and S2) to SLICCs (where only some students consider their SLICC a partnership experience). As such, it is unsurprising that the SLICCs group's results differ. For a more thorough discussion of whether SLICCs should be considered a form of student partnership, see section 4.9.1 starting on page 185 and the following chapters.

4.8 Comparisons of Whole Data Set

Finally, all data groups were combined into one dataset for comparison between SaP initiatives and outside SaP. The percentage agreement differences are shown in Figure 25 on page 182 and the accompanying statistics are in Appendix 30 on page 330. Across all three questions, students reported statistically significantly higher perceptions of communication skills during SaP ($U = 10067.5$, $n_{Gp1} = 120$, $n_{Gp2} = 62$, $p = 0.004$ for ability change; $U = 2932.5$, $n_{Gp1} = 120$, $n_{Gp2} = 61$, $p = 0.019$ for confidence; $U = 2574.0$, $n_{Gp1} = 121$, $n_{Gp2} = 62$, $p < 0.001$ for opportunity to develop). Students also generally reported greater opportunity to develop skills during their perceived SaP projects, with statistically significant differences in writing skills ($U = 2934.5$, $n_{Gp1} = 121$, $n_{Gp2} = 62$, $p = 0.012$), critical thinking ($U = 3064.5$, $n_{Gp1} = 121$, $n_{Gp2} = 62$, $p = 0.032$), and qualitative skills ($U = 3141.0$, $n_{Gp1} = 121$, $n_{Gp2} = 62$, $p = 0.060$). Notably, students reported having statistically significantly less opportunity to develop their numerical skills ($U = 2718.0$, $n_{Gp1} = 121$, $n_{Gp2} = 62$, $p = 0.002$). Next, students reported significantly higher perceptions of their progress in their confidence in critical thinking ($U = 2857.0$, $n_{Gp1} = 120$, $n_{Gp2} = 62$, $p = 0.009$) and content knowledge ($U = 2615.0$, $n_{Gp1} = 120$, $n_{Gp2} = 62$, $p = 0.001$). There were no discernible trends across teamwork skills.

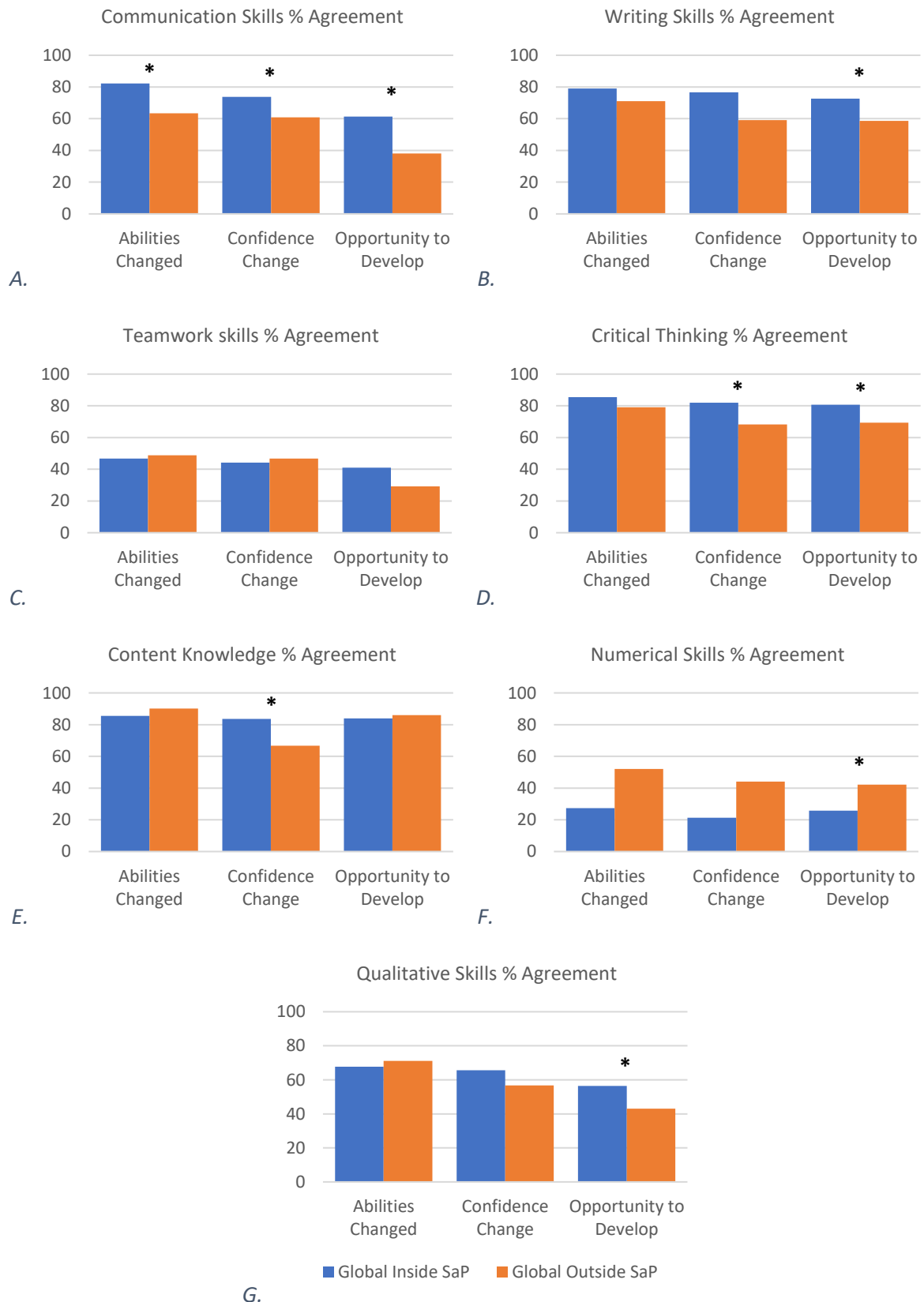


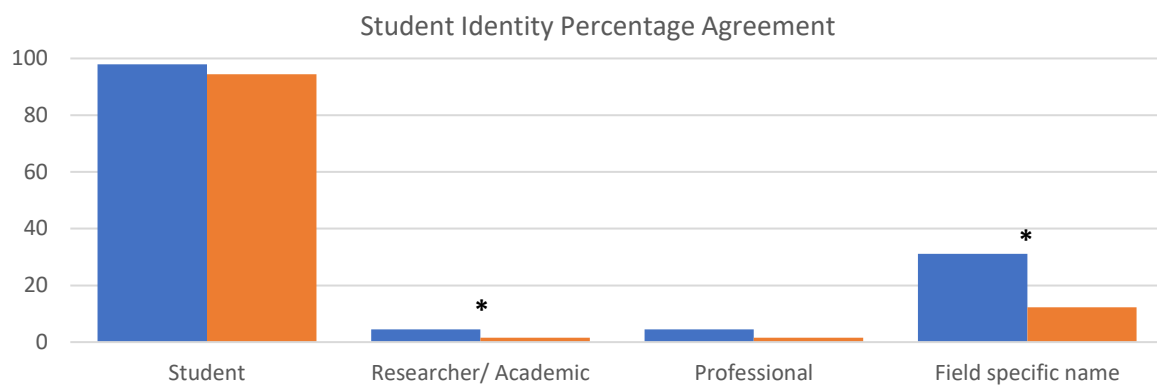
Figure 25. All percentage agreement values across all data groups ($n = 61-62$ for Global Inside SaP and $n = 120-121$ Global Outside SaP). Asterisks represent statistically significant difference as found through related statistics in Appendix 30. A. – G. Percentage agreement by each of the graduate attributes.

In general, SaP initiatives and characteristics have led to higher ratings for graduate attributes, suggesting that students who experience SaP initiatives or characteristics have beneficial outcomes in terms of their graduate attributes. These findings provide evidence towards answering the second research question posed by this study - *What are the immediate and persistent effects of students as partners initiatives on students' perception of their confidence, improvement, and development of their graduate attributes?* – insofar that it showcases that student partnership does affect students' perceptions of their graduate attributes. However, to fully explore the details of these effects, the data collected in the focus groups and interviews (and presented in the next chapter) must also be considered.

Next, students' perceptions of their identity and belonging were statistically analysed based on whether the student reported perceiving engaging in partnership initiatives or not (Appendix 31 on page 331). To illustrate the data, percentage agreement graphs were drawn up (Figure 26 on page 184). For this data, students who answered 'not sure' to whether they completed SaP were excluded.

Students who responded that they participated in SaP reported higher agreement with all the statements surrounding identity and belonging, with multiple statistically significant differences. Within identity, students who experienced SaP reported a significantly higher researcher identity ($U = 703.5$, $n_{\text{YesSaP}} = 44$, $n_{\text{NoSaP}} = 53$, $p < 0.001$) and field specific identity ($U = 861.5$, $n_{\text{YesSaP}} = 45$, $n_{\text{NoSaP}} = 55$, $p = 0.007$). Within belonging, students who completed SaP reported significantly higher belonging in their chosen academic community ($U = 1037.5$, $n_{\text{YesSaP}} = 49$, $n_{\text{NoSaP}} = 62$, $p = 0.003$), as well as feeling more respected ($U = 847.0$, $n_{\text{YesSaP}} = 49$, $n_{\text{NoSaP}} = 62$, $p < 0.001$) and established ($U = 714.0$, $n_{\text{YesSaP}} = 49$, $n_{\text{NoSaP}} = 62$, $p < 0.001$) in their chosen subject/field. Finally, students who reported completing a SaP experience reported a significantly higher perception of their SaP mindset ($U = 970.5$, $n_{\text{YesSaP}} = 49$, $n_{\text{NoSaP}} = 62$, $p = 0.001$).

A.



B.

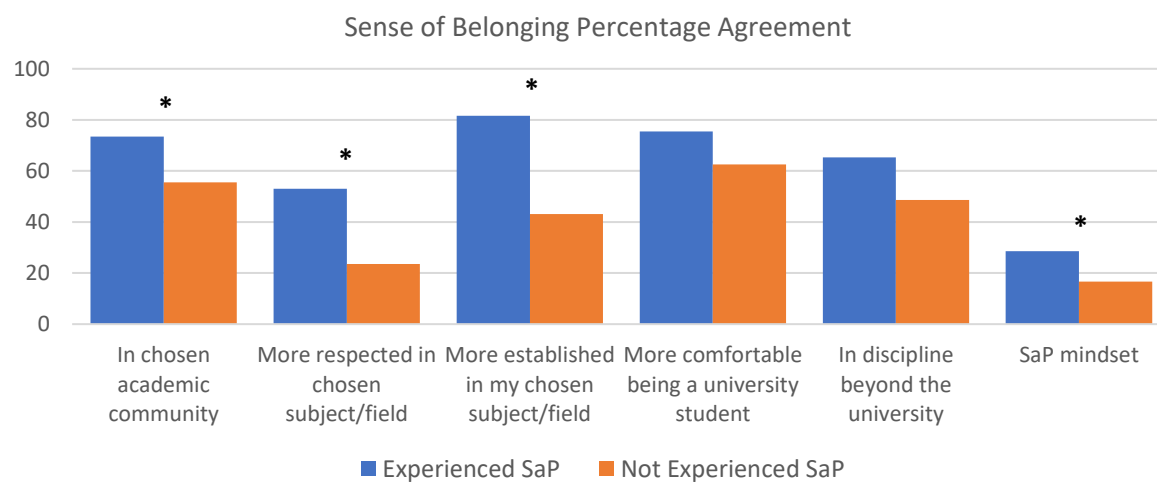


Figure 26. Percentage agreement differences between identity and belonging in the global dataset ($n = 45-49$ for Experienced SaP and $n = 53-62$ for Not Experienced SaP). Asterisks represent statistically significant difference as found through related statistics in Appendix 31. A. Identity. B. Belonging.

The results above would suggest that participation in activities that students consider partnership correlates with a more diverse identity and increased belonging within the student's field. This is understandable considering that many students' perceived partnership projects take the form of some sort of research, or of classes where the student has the chance to develop their relationships with staff or peers more closely. Within these projects, students are either directly positioned within a new community (for instance, in research) or are closely interacting with someone with a different identity (for example, a tutor in their field). Students could then be exploring this new identity through their partnership, leading to them either accepting the new identity as their own or

rejecting the identity. This concept was further explored in the focus groups and interviews with students and is presented in the next chapter.

4.9 Closing Thoughts on the Quantitative Data

Within this chapter I will refrain from making any definite conclusions as the description of the data is only half complete with the other half being the focus groups and interviews discussed in the following chapter. However, one point requires some further examination before moving on to the next chapter. Throughout the exploration of the data in this chapter, one question that has not yet been answered is whether it is accurate to consider the SLICCs and SPA funded projects a type of student partnership. The analysis presented above has been written with this question yet unanswered. I would like to take a moment to delve into this concept further before moving on with the rest of the dataset.

4.9.1 Are SLICCs and SPA a form of Partnership?

Student partnerships are not just about gaining progress in graduate attributes; when comparing students' perceptions of their graduate attributes, it can be seen that students scored their experiences outside of SLICCs similarly or comparatively better than they scored their SLICCs experiences (refer to section 4.4.4 starting on page 151 for some possible explanations of this observed trend).

Instead of just judging how much students improved in their graduate attributes, it is important to also consider the other possible benefits of partnership, such as the relational value students gain, changes in mindset, or whether they themselves consider their experience to be SaP. As seen in the SLICCs data, students' identity and SaP mindset did not necessarily improve; however, several students did demonstrate and report a SaP Mindset and credited their experiences within SLICCs as the catalyst for these perceptions.

Unfortunately, the questionnaire did not query the students as to whether they thought their SLICCs experience was SaP. However, questions to that end were asked within the focus groups and interviews, which will be further elaborated on in the following chapter.

The question whether SLICCs are a form of partnership may not be the right one to ask regardless. As has been seen within the STEM data, students do not have to participate in traditional students as partners initiatives as they are defined in the literature to gain some benefits – it appears that a student may benefit if the student believed they were part of a SaP project or if the student is experiencing some characteristics of SaP such as more meaningful student-staff relationships. Of course, the relationship between perceived SaP and improved graduate attributes may not be causal and is most likely much more nuanced. For instance, students may be simply labelling different positive characteristics as SaP due to misunderstanding the definition of SaP provided or being uncertain what SaP is (it is possible the only time the students interacted with the definition of SaP was throughout the questionnaire). Furthermore, due to this lack of familiarity with the concept of SaP, students may thus be forming their own definition of what SaP may be through defining specific underlying attributes perceived to be associated with SaP, or they may have simply made attempts to mention their learning and teaching experiences they have found most meaningful in order to answer the survey questions.

Within the SLICCs data, it is evident that some students absolutely consider their experiences as partnership and develop a SaP Mindset, while others do not see SLICCs in that way. It is further seen that students that do consider their experiences in this way have seen demonstrable improvements across many of the metrics used in this study. The implications and nuances of this are further discussed in the following chapters.

Chapter 5 Results: Qualitative Data

The aim of this chapter, the second chapter containing the study's results and associated discussion, is to draw on the twelve conducted focus groups and interviews to present and discuss the qualitative data. The questions asked in the focus groups and interviews were designed in part based on initial explorations of the questionnaire data, and so they provide deeper context to the quantitative data, just as the previous chapter provides context for the qualitative data (see Appendices 6-9 for questions). Because of the free-flowing nature of the focus groups and interviews, no two interactions with students were the same, with diverse themes discussed in each. However, each group was asked questions pertaining to a set of similar themes, as detailed earlier in Table 9 on page 86. The chapter first presents each of the data groups before following through the main themes observed across the groups (with emphasis on the context such as the differences observed due to SaP, student's year of study, and the pandemic). This is also why while the data is anonymised, each quote is denoted with the data group the student was part of and what study year they were in at the time of the focus group. Where appropriate, links to the quantitative representations of data have been made. All themes discussed within this study were discussed by multiple students, with most themes being mentioned by most students spoken to, unless specifically noted as a more unique opinion held by only one or two students. Finally, each of the concepts is discussed and critiqued within the context of the literature.

5.1 Defining Partnership and Significant Learning Experiences

This section introduces students' motivations and reasons for taking part in the learning experiences or perceived partnership they considered significant, in SLICCs, and in the SPA funded project. Next, further to the discussion in chapter 4 about what partnership actually is, this section will also explore what students defined as partnership and what partnership looks like.

Students had quite different perceptions of partnership across the focus groups and interviews; what some students considered partnership was an average class experience to others, making the experience and the resulting classifications deeply personal. This distinction was observed repeatedly across all groups as students mentioned similar instances but had a vastly different response to those learning experiences. This thesis is focused on investigating students' perceptions; as such, if a student identifies an initiative as an example of partnership, that initiative is identified as partnership here too. The issue of whether some examples of teaching and learning constitute partnership or not is taken up further in the discussion chapter.

5.1.1 About SLICCs Experiences

Four SLICCs students across one focus group and two interviews were spoken to during data collection. Primarily, students reported that SLICCs offered a unique space for self-expression and self-discovery for them. Students' response to SLICCs were overwhelmingly positive, to the point of often proselytising about their experience. Indeed, one of the SLICC focus group participants acknowledged this: *"honestly, I can't express enough how great this experience was, and that's why I was so excited to do this focus group"* (SLICCs, Yr3). While students overall were overwhelmingly positive about their SLICCs, some of their frustrations, as well as the way they reframed them in a positive light, deserve a closer look.

The SLICCs function as an extra credit-bearing course that students can undertake, but regardless of the similarities to other courses, most students echoed that they were not sure what to expect out of the experience; in their view, both the point of the course and the course itself was not explained adequately at the start. It is unclear whether this was an intentional part of the SLICCs structure or whether the pandemic reduced opportunities for interaction between students and staff to such a point that necessary information was never conveyed to the students (for example through needing to reduce the number of workshops and seminars run at the beginning of the course). Students reported not actually understanding what they were meant to do during their SLICCs and how to employ self-reflection in an appropriate manner. One student spoke about writing weekly essays of thousands of words before figuring out they were not necessary for progression in the course. Another student recounts trying to understand their issues with the reflection component of SLICCs: *"I feel like I didn't understand what I was getting myself into, and I had no idea what it meant to – cos the whole experience is about learning how to learn ... and analysing your ability of that. I had no idea what that really meant until, a while in, ... so I felt like I was going in a bit blind"* (SLICCs, Yr3).

Similarly, another student expected a more structured course and more supervision: *"I signed up on a whim, basically, and then, I kind of been floundering, I wasn't really sure, I was expecting a more structured course, I was expecting slightly more tutor feedback"* (SLICCs, Yr3). With this lack of structure came further frustration about course items such as marking schemes that seemed arbitrary, as represented by this student: *"I get that a lot of academia is jumping through the hoops on the mark schemes that they want you to jump through, but it doesn't make having to do that any less frustrating"* (SLICCs, Yr3). It is important to note that students' perception of a lack of supervision may not have matched staff perceptions of the adequacy of supervision. The perceived lack of supervision and structure may have simply been due to students comparing what they experienced during their SLICC with their expectations or even with previous experiences of more structured courses or more intensively supervised experiences.

There was an overall sense of frustration with the perceived lack of support from the University; interestingly however, most students would then go on to acknowledge that this lack of support was beneficial to them and their learning: *"It's a good system it just... it was very intense, and I was kind of angry at it being as intense as it was and it was ultimately a good thing"* (SLICCs, Yr3). This may have been because they felt they were being trusted to pick their own topic. Most students were motivated to explore a niche topic of personal interest during their SLICCs, but also felt that they had something to prove to themselves and others. Once they achieved their goal, they reported positive gains in confidence and self-image. This could be evidence of a growth mindset where students may be motivated to achieve more by overcoming the controlled adversity experienced in the SLICCs (Yeager & Dweck, 2012).

5.1.2 About SPA Funded Project

Only one student from the SPA funded projects participated in the interview. Their project stretched over three years, starting in their undergraduate and concluding when they graduated from their master's degree. Mainly, the student spoke about the chance to approach their own studies from a different angle, to improve existing skills, and to expand their knowledge. The student also acknowledged the personal growth they experienced during the project: *"I think that it was a really good project, ... I think there was like some changes and that helped me be more professional, emm, mature, like I definitely matured because I was accepted for this"* (SPA, Yr5). This is to be expected considering that this student spent over three years working on their SPA project. Considering this, the maturity attained by the student may have also been due to the passage of time and not entirely

due to the project, which has also been observed with the students in the STEM data group where year 1 students demonstrated less confidence in their graduate attributes and were less reflective than students in later years. Regardless, the SPA student demonstrated positive outcomes due to their involvement in the project, as expanded further below.

5.1.3 Nature of Partnership in SLICCs and SPA

The Student Partnership Agreement funded projects, having partnership in the name, are good examples of SaP on an institutional level. It was considered as SaP by the interviewed student in particular due to the fact that every member of the project team had a defined strength and purpose in making the project successful. Within this project, the titles of student and staff were mainly irrelevant. As the project was completely extracurricular, it is hard to judge how much of its benefits could be recreated by initiatives within the curriculum.

As previously discussed in chapter 4 starting on page 100, not all students who participated in SLICCs would consider them to be partnership in the way that staff-student partnership is often defined in academic literature. However, many mentioned working in a form of partnership with the university instead. This manifested in several ways – being given the legitimacy of credits for their work, feeling emboldened by the freedom to explore niche topics within a familiar university structure, and getting academic recognition for their work.

To students, being awarded credits represents a seal of approval and quality. This is not unexpected considering progression through their entire university degree is measured as such. This made the SLICCs attractive and legitimate to the students. Achieving these credits also signals academic achievement and progression within the degree. This legitimacy is also present in the SPA which offers modest funding for their projects.

Next, SLICCs students were attracted by the freedom to explore niche topics of interest: *“I want to study really in-depth elite treatises of like really nit-picky details, and like comparing the bible to Aristotle’s, like, oh wow, and is like, really getting me excited, and I’m like, but nobody else is excited about this elite culture, it’s just me!”* (SLICCs, Yr3). They again remarked that having the university and course structure to help them construct their learning was advantageous: *“one of the main reasons I wanted to do this as part of like a formal SLICC project rather than just doing my own thing over the summer was because I wanted the structure, because it provides sort of the sense of accountability”* (SLICCs, Yr3). Most students saw their identity shift through their experience,

suggesting that the freedom to pursue own projects has a strong effect on student's perceived belonging and academic identity (explained further in the next few sections).

5.1.4 About STEM S1 and S2 Experiences

Throughout the STEM focus groups and interviews, students discussed the circumstances of their year more than they detailed specific experiences; this was not unexpected as this year presented significant barriers to many meaningful experiences. However, some commonalities emerged pertaining to what students identified as significant.

In general, building interpersonal relationships and displaying vulnerability were one of the most important parts in students identifying something as a significant learning experience. Consequently, students' significant learning experiences took the form of small groups and engaged tutorials, where personal relationships could be built more easily. Students reported especially appreciating instances where participation was expected and that had lively discussions, as one student expands on: *"There's one particular class that sort of stood out where there were probably like 8 of us in the class and the lecturer.... and the lectures led them, so they read all the papers ... and they would ask really difficult questions, and it wasn't enough to just accept it as it was, we were almost forced to participate and that actually really helped, because ... it meant I engaged a lot more, because ..., I found I really struggle with live lectures. I like speeding them up and pausing them when I need to, and going back, and I really struggled to focus, especially when you're not there in person, so that kind of forced participation, asking difficult questions ..., that was when I really found that I enjoyed those the most, because they were challenging, and you had to be really switched on but I definitely enjoyed them the most"* (STEM S2, Yr4). Considering the observed effects of the pandemic on relationships, this desire for connection is to be expected by the students.

Students across the two semesters generally mentioned different experiences. STEM S1 students did not describe many experiences and those they did talk about were not actively chosen by the students – students were expected to participate (such as in high school SAT classes). STEM S2 talked about small group experiences from elective courses rather than compulsory courses. However, nearly all interviewed STEM S2 students had reduced goals and motivations for completing the year compared to the rest of the data groups – mainly to cope with the workload just enough to make it to the end of the year: *"to be honest, it's like, the thing that motivates me the most is just worry, which is sad and scary, but that's just the way things are"* (STEM S2, Yr3). As the

students in the second semester have by the point of the survey experienced over a year of the pandemic, this deterioration in motivation and possible poor mental health was expected and observed across all other students; this is discussed further in section 5.6 starting on page 218.

The experiences considered SaP were usually standard classes where lecturers or tutors showed their personality and humanity, allowing for a personal connection to be built despite the online format: *“I feel like some lecturers are very good in making me stay connected, in the sense that in the like, they'll maybe open up with something about how they are, so like you know things about, they'll be like oh because we are now in a pandemic I can show you this from my kitchen, and I feel like those tiny points, relating it to the pandemic as well helped me engage with, feel like I'm also part of the university, because I'm, the lecturers are on the same page, as me”* (STEM S2, Yr3). Another student also expanded on the sense of community they felt throughout their significant learning experiences: *“ [In tutorials, the tutor] generates sort of a, community feel, he really sort of like, talks to us, ... he's just so exciting, ... every time he welcomes us, how he welcomes us he, takes the time to pronounce our names, like, my name is Slavic and he's like, oh yeah, how do you pronounce that, you know is it this or that? and it just makes me feel like he really, really cares, and two, he is a really good teacher, like, he will go slowly, he will take the core concepts, he will illustrate what he has to illustrate, and then before he erases the board to go to the next thing, he goes, did you guys understand this?”* (STEM S2, Yr3). However, even when reporting significant experiences and genuine connections with their lecturers or tutors, many students were acutely aware of the hierarchy between them and staff and would therefore often fail to develop the partnership mindset. This was also observed throughout in the questionnaire data where students would often elaborate on the divide between students and staff.

5.1.5 Nature of Partnership in STEM

When STEM students did report experiences that they considered significant, they had very different opinions about whether it constituted partnership. One type of experience that was significant, but not often considered partnership were classes that were significant due to being of personal interest to the students, for example due to being considered important for their future careers, as one student demonstrates: *“I'm on an astrophysics degree, so I think observational astronomy was also really sort of significant, like you know it's gearing me towards what I want to do in life”* (STEM S2, Yr3). What made students perceive the same experience in such different light may be down to the individual's experience, mindset, and perceptions of details such as relationship or engagement. This

works well within the social constructionist framework, showing that each student constructs their own meaning and perception of whether an experience constitutes as SaP or not. The details and implications of this are further discussed in the next chapter.

Several differences between STEM S1 and STEM S2 became evident through the focus groups and interviews. STEM S1 students were all in their first year of university and thus had vastly different opinions to the students in later years in their interviews in STEM S2. This may be because the novelty of the university experience meant that everything was significant and their focus was on other aspects of their experience, such as settling into a new routine. Interestingly, one student reported their high school preparatory classes as a significant learning experience and perceived partnership experience: *“Because SATs the only time when we had real interaction with the teachers, in school, ... my SATs were amazing! So we had this, the discussion, especially my English classes, umm, we had like small classes, like 20 students, 25 students, and then we used to sit together, and then everybody got the chance to read something, and then, there were discussions and debates”* (STEM S1, Yr1). This showcases how what students consider partnership can often be different from the definitions used in this study and in the literature and provides a good indication of what elements of partnership students might consider or understand as important when considering partnerships themselves.

STEM S2 students were more focussed on a sense of community and on their own changes in behaviour following perceived partnership. For example, one student talked about how their perceived partnership experience affected their relationship with other classes and changed their behaviour in other lectures: *“yeah I think [it did change the way that I look at other classes, because I had to concentrate so much in this specific one] and honestly I really reflected on my other years at uni to be honest, ... [in the] early years you get away with doing the bare minimum, I definitely did, I didn't focus on my uni as much, ... but I did what I need to do when it counted, ... and this year I was really like, I want to engage as much as possible, this needs to be my priority, and I thought about the things in other years that I enjoyed the most and it was things like tutorials where we had to prepare before we got there and then talk about it instead of being taught there? and it's been the thing that I've enjoyed the most, because you're forced to engage, because you've already have to have done the work before you go so you can actually actively engage”* (STEM S2, Yr4). This experience where the student prepared the basic knowledge beforehand and used classroom time to discuss and expand their understanding is similar to the flipped classroom approach (Bishop & Verleger, 2013; Reidsema et al., 2017), which has established links to partnership (Bryson, 2016). This quote can also

be said to effectively showcase the long lasting effects of learning experiences similar to partnerships and just how much such an experience may permeate the rest of the students' classes and university experience that follows. This is discussed further in section 5.4.3 starting on page 210.

Furthermore, what students in semester 2 perceived as partnership was often predicated almost exclusively on the type of relationships they built with the staff and other students throughout the SaP experience. In this way, many students perceived occurrences such as tutorials and lectures as partnership simply due to the way the staff member interacted with them, as this third year student demonstrated: *"I chose the astronomy example [as SaP] before because the TA we had for that kept asking us, so we were 4 in the group and he kept asking us all 4 of us individually, like, different question and ... he would ask for suggestions and ideas and even if we said something completely bs, he would be very nice about it, he'd be like, oh, that's good but not what I'm looking for, like a very positive response, instead of, so that was good, ... so, I feel like he really wanted us to engage, I don't know if he, the way he did it kept the four of us engaged. and like, in most cases like that, even if it's not such a guy, a tutorial, I think it's very nice to be in such a nice, such a non-judging, you can go asking questions ... although it is a bit harder, if it's a larger group, asking questions"* (STEM S2, Yr3). Relationships with staff and peers were repeatedly observed as a major source of positivity and perceived SaP experiences for the students.

5.2 Developing Graduate Attributes

Students' perceptions of their graduate attributes were explored in detail in the previous chapter. Here, the context is built up further, focussing specifically on what differences students noted as part of their perceived SaP experience compared to their other general studies and how the perceptions changed with the pandemic and across different year groups.

5.2.1 Graduate Attributes Within and Outside of Partnership

Students mentioned developing graduate attributes regardless of whether they perceived taking part in partnership or not, making it fundamentally difficult to distinguish between development of attributes during routine learning and enhancement of attributes by partnership. Many referred to the steady progress they were making in skills and considered it as almost a checklist to complete before graduation: *"I'm using uni to collect all of the tools, like sort of professional and academic*

tools that I need" (SLICCs, Yr3). Similarly, due to learning being shifted to mostly online, time management was a significant skill learned by all students throughout the year regardless of whether they took part in SaP. Most students no longer had scheduled lectures and had more control over their time, which resulted in significant learning, added flexibility but also challenges (described further below in section 5.2.3.1 starting on page 199).

Within their partnership initiatives, this sentiment of progress was repeated, often referring back to the sentiment of freedom students had to explore their own paths. As one student noted: *"I was able to improve a little bit in my SLICC, not in terms of organisation, but at least in terms of getting better at knowing what wouldn't work"* (SLICCs, Yr3). This chance to experiment and discover personal ways of working through tasks was often connected with the sense that their perceived partnership experiences allowed them to develop their skills and attributes faster than other learning experiences.

Similarly, many students noted an increase in self-confidence in their skills. This was also correlated with the freedom and autonomy to make choices, leading to maintaining more focus and enthusiasm for the project at hand. One student explained this freedom and enthusiasm within their project: *"we're doing engineering design, and we can kind of like investigate like whatever engineering topic we want in history, so it's whatever we want, and then we can like do a, like a report, on whatever field we want, so it is, it's a lot more broad and specific to what interest we have, so it, I find that, I am like just doing research in my spare time, rather than just thinking oh this is boring I don't wanna do this and putting it off"* (STEM S2, Yr1). This freedom also gave students the time to develop confidence in adjacent skills, rather than just targeting the learning outcomes explicitly defined within the course. Consequently, many students felt they were developing solid skills for employment through their partnership initiative. This was demonstrated well by the SPA funded project student: *"the one thing about this project, is..., something I can use when applying for jobs, because they can see that I've worked with students, I've worked with tutors, I've worked with other artists, so like in that sense, like, completely pragmatically, like for job applications, I'm kind of like using it to enhance my CV like in the future if I wanted to come and tutor and I could say yeah, I've organised workshops, I got funding for workshops"* (SPA, Yr5). This has often been echoed in literature as an advantage of partnership (S. Taylor & Govender, 2017).

Another way partnership helped develop skills for employment was through simulating real world scenarios for students. This already became evident in chapter 4 (starting on page 100) where

students identified different perceived SaP initiatives such as the Mooting society as providing real world experience. Students likewise felt that their perceived SaP experiences would ensure their success later in life, as one explained: *“I remember hearing somewhere and you probably know this but isn’t a big marker for success like doing a project in undergraduate, I heard that somewhere, so maybe we’re set up like to be successful in our future”* (SLICCs, Yr3). Again, partnership has often been suggested as an effective way to develop employability (Dickerson et al., 2016; S. Taylor & Govender, 2017). Crucially however, students who reaped these benefits were not involved in well-defined partnership programmes and initiatives; instead, they were involved in experiences, projects, and engaging classes they perceived to be partnership. This would once again suggest that students can achieve some of the same outcomes in classes where they perceive they are experiencing partnership or characteristics of partnership without experiencing what might be deemed fully fledged partnership as defined in the literature. The theme of experiences that students considered partnership is further elaborated upon below and in the following chapters.

5.2.2 Graduate Attributes Across Different Year Groups

Students across nearly all year groups were interviewed during data collection, which allowed me to examine whether there were any observable differences in perceptions of graduate attributes between and across the year groups.

Students are usually introduced to the concepts of graduate attributes early on in their studies. It can therefore be assumed that most students know what they are and use them to some level to gauge their progress from first year onwards, as this first year student demonstrated: *“I felt this, this university is very big on reflecting, umm, being aware of your skillsets, developing, graduate attributes, that’s the kind of name that they used”* (STEM S1, Yr1). When queried about what skills and attributes they were developing the most, most of the first year students identified content knowledge as the most important and most developed skill throughout their year. Furthermore, when discussing their learning, many pointed to the sense of getting settled into the university and getting accustomed to the way the content was taught in the first place: *“I think... umm, that that would be theory in fact. I mean, from like my past experience, we do not focus on the concepts umm, word by word very much, but this year, it was completely different because, umm, in India it’s like there’s this exam, you have to get that exam, you have to get good marks, that’s the aim!”* (STEM S1, Yr1). Similarly, when they perceived having trouble with their time at university, students would fall back on focussing on content learning above all other skills or would express desire to work on their

content learning as the first skill once they felt ready to engage more with university: *“Because this phase I took it kind of like, a transition phase, like, ok, go to class, and like stay afloat. So, I would like to focus more on that [content learning]. Yeah. The learning side of it. Learning the things better with them online”* (STEM S1, Yr1). Beyond content knowledge, many first years would also remark on focusing on developing personal skills such as independence and skills that allowed them to transition from high school to university specifically. Other skills appeared to be side-lined by this year group.

Content knowledge can often be the most tangible graduate attribute that the students encounter in their first year, as well as during their previous studies. In a time of flux, students are unlikely to look beyond what is known and familiar to them to assess their progress. Furthermore, progress in content knowledge may be easier to track for students as they are often examined on their level of knowledge and understanding. This perceived concrete measure of progress is seldom available to students for other skills; furthermore, while assessments will usually involve tasks that measure content knowledge through other graduate attributes, such as writing out an answer to questions or solving mathematical problems as part of an answer, students may not perceive these associated graduate attributes as separate from content knowledge, thus keeping their focus on the graduate attribute.

Other year groups also focussed on skills beyond content knowledge. For example, while 3rd years noted a lot of content learning as well, they also talked about communication and writing skills: *“sort of a, softer skill I would say, is, umm, we have a course called research methods in physics, and a lot of it is about like writing for specific audiences, and like doing annotated bibliographies, like writing for members of parliament, doing presentations, things like that, umm, and I think sort of my, science communication has improved quite a lot”* (STEM S2, Yr3). Similarly, beyond content knowledge, the interviewed 4th year student specified critical thinking and presentation skills (i.e. communication) as the skills they mainly learned this year: *“we've had lots of opportunity to present things, ... and I don't know if this is because it's fourth year and this is the way they've always structured the course or it's because of the way it's had to change but I've done a lot of presenting, and, we're talking making PowerPoints, and discussing and answering questions on a paper that you've read and explaining it to people and condensing that into 15 minutes and analysing it, I think I've got much better critically thinking about that”* (STEM S2, Yr4).

It was evident that what skills students focussed on changed drastically due to the pandemic, however it would appear that there was also a difference in what skills students perceived as developing across different years. This could indicate that there is a hierarchy to how graduate attributes are taught and developed, or at least to how they are perceived to develop by students. Content knowledge seems to be taught first in STEM, perhaps because STEM subjects tend to emphasise the importance of developing foundational knowledge before teaching critical thinking, or perhaps because students themselves can recognise it as an attribute they are being taught more easily than others. Consequently, students may intentionally focus on other skills only in later years as they transition to applying different approaches to their learning and their field.

5.2.3 Graduate Attributes Throughout the Pandemic

Throughout and due to the pandemic and the subsequent switch to hybrid and online learning, students reported having to focus on different skills and develop different graduate attributes to what they were used to. In particular, students spent much more time developing time management skills due to the increased flexibility of online learning, as well as communication skills due to the changes in how communication is conducted online within the learning space. Consequently, due to this change in focus, students perceived a high decrease in other graduate attributes and skills, such as teamwork skills. This shift is expected; students have trained and optimised their study strategies to a specific study mode, specifically a face to face model with some online work. This model carried with its specific minimal skill requirements that the students met without much thought (especially as they had previous training throughout past years and high school etc.). Having switched to a new study model with different minimal skill requirements, they had to adjust which skills they needed daily and quickly improve skills they may have lacked to get up to the required level. With this change being so sudden, students were a lot more aware of the changes they had to accommodate to be able to perform their studies.

This perceived decrease in skills may also be due to deteriorating mental health and the stress students have been under throughout the pandemic (for more discussion of mental health during the pandemic, see for example Czeisler et al., 2020; Li et al., 2021; Wieczorek et al., 2021; Xiong et al., 2020). Students may simply not have the mental space to focus on improving their skills and attributes. As one student explained: *"I just don't think I've worked on very much in the last year, ... online university just doesn't agree with me and ... I'm trying to get myself more motivated to try and get things done and not like fail exams, but that's not necessarily the easiest thing to do"* (STEM S2,

Yr3). Interestingly, at no point did students mention being taught any techniques or strategies to succeed in online or hybrid learning; many students seemed to have been left to figure out this new medium on their own. This would suggest that students were expected to transfer their knowledge and adapt it without assistance or advice; from this perspective, the difference in achievement between students may simply be due to a difference in their metacognition ability (Livingston, 1997; Scharff et al., 2017).

5.2.3.1 Time Management in a Pandemic

Students would often remark on their time management skills in the focus groups and interviews: *“That is by far the biggest takeaway, in terms of this year, is being able to plan my own time, and make my own goals as well”* (SLICCs, Yr3). As the quote demonstrates, time management was one of the most mentioned unprompted skills by the students, often associated with both the positives and negatives of flexible working. Due to the shift to online learning, students reported having more time and having the flexibility to set their own schedule: *“since I was mostly in my house all the time, I had a lot of, flexibility, like, I could go to the class, and then work out, or go on a walk outside, ... but it was all, pretty flexible, like, up to me to decide when to do each thing. Like again, this feeds back into time management skill, but I think, umm, I had more free time, than if the lectures would have been in person obviously, because you have to get to the lectures, come back to your apartment, etcetera”* (STEM S1, Yr1). On the negative side, with no set schedule it was easy for students to fall behind on classes and lose out on learning to their full potential.

While many students spoke derogatively about falling behind on their studies, a number used the relative flexibility of their days to work for them: *“I realise that this sounds like I’m really behind which I kind of am, but ... if I’m more inspired to do another course at that moment, ... I want to kind of, use that to my advantage, like, right now I’m in the mood for this, for some, so I’m gonna do this, because I was inspired, and this other thing I’m gonna do it later, ... so, that’s what I meant, apart from being at the motivation”* (STEM S2, Yr3). These issues point to how much students would normally take cues from their environment to trigger certain activities, and how social education really is for some students. When many of the standard social components and cues were removed or modified, students had to be much more intrinsically led. As many students are used to studying with their course mates in a social setting, not having access to traditional meeting and study places resulted in a less satisfactory learning experience. This was especially expressed by first year students who perhaps had higher expectations of their social life at university; for example, one student details how they were able to study more than they would have otherwise, but did not get

any social interaction: *“in university everything is online, so you can manage your time according to everything, so teaching wise, umm, I think I really ... had like a broader learning area, than I would usually have with a constrained timetable, in normal circumstances because then you are, but then, the bad part was I miss a lot of interaction with my classmates, and umm, there was no lab, and I was very like looking forward to the research group and everything here!”* (STEM S1, Yr1). Similarly, another student remarked that *“there were no study groups, so things ... that would have been easier together, they became more difficult”* (STEM S1, Yr1).

This may be because in-person teaching does not just offer a rigid structure for the student to work and self-realise in, but also provides a shared liminal space the students can co-exist in and work towards shared goals in. Students had remarkably diverse outcomes in their leaning under online learning; what outcome they achieved had in part to do with their decision on how to engage with their course mates and teachers (explained further in section 5.5 starting on page 212). Students who had positive outcomes when switching to online learning often remarked that they were provided the liminal spaces and created explicit structure for spaces and instances that used to be implicit. This conclusion is not unexpected and has been previously observed in literature, for example by Kaufmann & Vallade (2020).

5.3 Changes in Community, Identity and Belonging

Identity was another theme that was explored in detail beyond the analysis completed through questionnaires as many students' initial thoughts need to be explained to truly make sense of their ideas within the context. Belonging was also included in this section as it was rarely distinguished from identity in conversation and discussed almost interchangeably in the interviews and focus groups. Community was also discussed in this section as it has been observed to be a possible precursor to identity building.

Throughout the focus groups and interviews, students were asked how they considered themselves in terms of being students, researchers, field specific, and/or professionals, and how this changed through their SaP experience. Identity is immensely personal and self-identification is tricky, with different identities meaning different things to different people; for example, individuals had different reactions to being identified as a student, as seen in this first year's case: *“I don't have this concept of myself as a student because I'm not just there to study this time, because I'm learning a*

lot more than is required actually, so I'm not so, yeah, so, that, and I actually? ... I never wanted to be a student in University too, because I'm paying so much, and if I just have to be a student, then I mean, I can learn that stuff from anywhere online, everything's there, right? But, ..., to learn extra, to go beyond your courses, and to have people who push you to do that" (STEM S1, Yr1). Here, their identity as an engaged member of the University was directly at odds with identification as a student, due to their perceptions of what being a student meant, specifically doing the bare minimum. As this individual did not agree with this specific form of student identity, they did not wish to self-identify as a student. Without seeking further context, their apparent low student identity could have been misconstrued. A similar reasoning to what the above student expressed may be considered as a type of relational-interdependency where students construct their identity through relationships and interactions with others (Cross et al., 2000). Individuals often define their identity in contrast to what they perceive around them; if an individual perceives a certain group to have characteristics that they do not consider desirable, they will in turn not want to belong to this group.

A precursor to building an individual identity may also be an individual's sense and membership in a community, in this case the University community. As previously discussed in chapter 2 (starting on page 25), a community is defined as a social group that follows a social structure within a wider society (Tonnies, 2002). When students join a university, they also gain a membership within the university community and get to observe the social roles and identities present within that community. Before truly identifying with any one identity, they first (whether consciously or unconsciously) judge themselves against others that they perceive as having that identity. Within the focus groups and interviews, a sense of community thus appeared as a precursor to identity. Further, before students could judge their identities, they first needed to build relationships with others within the community and feel a sense of belonging to it. This became difficult throughout the year of online learning and lockdown as students' community migrated online. Online communities are cultural aggregations of people that interact with each other within cyberspace (Preece & Maloney-Krichmar, 2003). Unlike in 'off-line' communities centred around specific places where interaction can be much more passive (for example simply observing how others interact and behave within a university building or lecture hall), communication online must be much more intentional. Students are less likely to forge relationships by simply cohabitating the same space, as online this space is much less defined; instead, they need to actively search out interactions and intentionally build relationships and community with other students and staff.

Students that have had the benefit of previously having experiences with and physical access to the University before the lockdown and subsequent move to online learning may have already established their communities and the subsequent move online did not change their interactions in any drastic way. However, first year students that have never experienced the university before and had no previous connections experienced issues connecting to others and therefore did not feel part of the university: *“yes and no [to feeling properly part of the university], because, umm, there, there, recently I’ve like joined some group chats, so like having that interaction kind of makes you feel more a part of the university, but then also I don’t, I don’t really feel like, I am a part of the university at all!”* (STEM S2, Yr1). As such, it was often observed that first year students had an either simplistic/reductive view of their own identity (‘I study so I am a student’) or were hesitant to allow themselves any labels and identities (as seen in the quote in second paragraph of this section).

A new theme of links to community emerged through many focus groups and interviews; however, students’ reflections on community were often not followed up sufficiently at the time to make any comprehensive claims. Regardless, this link provides an interesting new theme to consider within the data.

5.3.1 Identity and Community Changes Within and Outside of Perceived SaP

Individuals across all the student data groups responded positively to the concept of student identity (despite some qualifiers, particularly from first year students, as seen in previous section). This correlates to what was seen earlier in quantitative data, where most students reported high student identity.

There were some definite changes in perception of identity observed between those who had completed perceived SaP and those who had not. Interestingly, these changes in identity were not universal across all SaP experiences, but highly dependent on what type of experience the students had. In general, students gained identity in and from whatever activity they completed within their SaP project. For instance, students that completed a research project gained a researcher identity (which was mirrored in the quantitative data as well as students that reported completing a SaP research project also reported a higher researcher identity compared to the rest of the students). As one student stated: *“I’m more focussed on doing research including some programming now [after completing my internship]”* (SLICCs, Yr3). Similarly, within courses and tutorials that were considered SaP by the student, identity gains were reported in professional identities within the field. For

example, one student that self-reported as having no academic identity prior to their research project not only identified themselves as an academic after completing the project, but also reflected how the interactions with his lab mates facilitated this development: *“I have to say being in these lab meetings, with, people that are way more experienced and way more knowledgeable than I am, has really ... helped me to develop as an academic, ... just because you're benefiting off, years of experience, ... standing on the shoulders of giants, ... if you want to call it that!”* (STEM S2, Yr3). This reiterates the use of SaP experiences as a way to develop skills for employment and personal insight into what future careers may be like for students.

While the gains and changes in identity were quite varied and personal, the SaP initiatives however did have some universal factors that helped individuals develop their student identity. The main way that SaP helped drive a student identity was through often giving students creative freedom to pursue their own interests. For students who already felt some membership within the university community, this freedom and the implicit acknowledgement from the staff drove students' perception of themselves as members of the University community and reaffirmed their place within the university for them.

Finally, students also reported identity changes that revolved more around their perception of themselves as a person and perception of their interactions with those around them. Students often reported an increased sense of understanding of their own self and their own abilities following SaP, as the SPA student explained: *“before then [starting SPA project], maybe I was like maybe more experimenting, like focussed on me what I want to do, but then, definitely I think it creates like more empathy, more compassion, you want to help people more”* (SPA, Yr5).

As such, there is a definite connection between students' changes in perceptions of their identity and involvement in student partnership initiatives, even perceived ones. However, it is necessary to consider other possible reasons for this shift in identity, such as the global situation.

5.3.2 Identity Changes Across Different Year Groups

Students' identity changes over time as students mature and move closer to graduation. The reasons for this change are not always due to university factors but also due to external factors, such as the pandemic, or through gaining other opportunities such as employment. As such, it is difficult to conclusively identify the full reasons behind students' changes in identity; this section instead aims

to showcase the differences in thought patterns and perceptions observed across the year groups and why these may be due to the stage of education students are in.

Some change is to be expected from students as they progress through the University, as evident in how this fourth year student describes their specific place within the university: *“this is the first year that I really felt I really got to know my department, I feel like place in the University is here, I would know who to go to and who I could just chat to, I’m less intimidated, I think, at the beginning of University I very much felt like a very ... small fish, in a gigantic pond, and, you, I very much remember saying oh, university is so different to school, you’re just chucked in and they actually don’t care, whether you do the work or not, umm, nobody’s really checking up on you”* (STEM S2, Yr4). This is different from the apparent affiliation to discipline discussed above in that the student still feels part of the wider University and is only more aware of their belonging into specific communities within the University due to their relationships and interactions. Above, students often felt no belonging within the University itself, only within their specialised communities.

A major change was seen within sense of belonging. Across the years, students’ sense of belonging develops from general belonging to a community to a more specific belonging to a particular group. First year students had a vague sense of the community they were entering but did not yet have the language to describe it, as one first year demonstrates: *“I feel more part of the scientific community. Maybe not in my branch yet, but, as a whole, just kind of like seeing that tip of the iceberg, there’s much more underneath, but at least I kind of see it there, in the, in the distance”* (STEM S1, Yr1). Students in higher years were able to explore the community more and were able to be more specific in describing their identity and belonging: *“in first year had quite like, I really had that like identity of the University of Edinburgh student, and you know in 2nd and 3rd year it sort of drifted towards just, oh, I’m a school of Physics and Astronomy student”* (STEM S2, Yr3). This shift from general to specific may just be a natural consequence of gaining more information about their communities – as students learn the details of what communities are encompassed in the general larger University community, they will seek to identify themselves more accurately with the groups that they feel connected to. As this takes time and exploration, later year groups will naturally have established more defined and specific communities. This shift was also mentioned as a consequence of the pandemic, suggesting that students’ desire to be part of a specific and smaller community may have complex drivers.

Alternatively, the shift from general to specific identity could also simply reflect students becoming more embedded within their School. First year courses at the University of Edinburgh are generally very large, contain students from other degrees, and are not taught within the buildings or even campus the student's School is located in. This shifts to smaller courses with only peers from the same discipline taught within the right campus/building as students progress through the years. As such, the change in identity and sense of belonging could also be a consequence of the increased interaction students will have with staff and peers within their discipline, as well as access to community spaces.

Next, across the year groups, students developed identity by reflecting on their successes, and on their gaining of graduate attributes. When talking about their successes, students also often compared their identity growth to others in their community and to what they intrinsically expected from an experience, using these comparisons as a way to reaffirm or reject an identity. One first year who decided to switch majors after completing an elective detailed: *"in a way it was like exactly what I sort of imagined a university experience would be. Cos I was always told stories of people going to university, and then switching their majors entirely, and then, yeah I feel like that's pretty much what I want to do too"* (STEM S1, Yr1). Conversely, this comparison to the community can also lead to rejection of a specific identity and career path, as a fourth year student demonstrated when they concluded that their identity is not similar enough to potential PhD students in their community: *"some people in my course are applying for PhDs and things, and I've really noticed we interact with the course and we ask different questions, they, say a lot more technical and they approach the problem differently and they think about things differently, ... so, I just think that my priorities are different, and I'm, it doesn't get me going, so I think that's why I'm not really interested in academia?"* (STEM S2, Yr4). This rejection of a specific potential identity was also seen when students were considering whether they identified with professionals in their field: *"if I am to graduate with like the similar amount of that I have now, I'd be quite embarrassed to call myself one [a chemist] so, I don't know, I am here to get a qualification that says I am one, umm, so in that respect, that is what I want to be, but I'm not there yet"* (STEM S2, Yr3).

Finally, it is worth to once again revisit the interesting case of first years who have never physically attended the University due to electing to stay in their home countries. These students have had their entire educational experience and therefore also identity building happen through online channels and forms. In conversations with these students, it was apparent that their student identity developed strongly before starting to study at university through other activities and expectations of

what the experience will be like. As one first year commented, they felt more like a student due to *“doing well in my tutorials and being able to explain to other students how to do certain exercises, on like the WhatsApp group, and that felt really nice”* (STEM S1, Yr1).

While student identity seemed to already be strong in individuals before they started studying at the University and continued increasing in strength throughout students’ studies, perception of membership and belonging in a field seemed to develop differently for these students and was particularly affected by studying remotely. Students seemed to have gained a boost to their perception of membership in their academic field upon entering the University but did not experience an equivalent boost to an identity within that field, as this student demonstrates: *“I wouldn’t consider myself biochemist yet, of course, but in terms of the science community, I do feel like I’m more of a part of it than I was before. Like, I know I can access most of the journals, most of the scientific journals through the university access”* (STEM S1, Yr1).

The development of identity presented here posits the question of how exactly identity is developed. Some students speak about a slow drift, while others pinpoint specific instances of growth, with the reality of student experiences likely to be somewhere in the middle, and possibly dependant on the specific identity being developed, such as the difference between student and field identity explored above. It is possible that while some identities develop slowly and steadily, for others there is no steady development throughout the years. With these identities, development mostly depends on reflection on specific experiences that advances the identity.

5.3.3 Identity and Belonging Changes Throughout the Pandemic

Throughout the pandemic, students’ identity and sense of belonging changed drastically. Beyond the changes inherent with the switch to hybrid teaching in semester 1 to existing solely within online communities in semester 2 (as discussed above), many students experienced a specialisation in their sense of belonging, where their identity and belonging became more clearly aligned with specific sub-groups of the University rather than the University as a whole. This sense of closeness to their discipline, where students identified as part of their School but not as part of the University was exemplified by a third-year student: *“you know how we have student callers, who like ring you up and ask for money ... if you’re a graduate? I wouldn’t really consider donating to the university. The School of Physics and Astronomy? yes, because like ... I’ve had great things here, there’s some really good people here, but not the University”* (STEM S2, Yr3).

Interestingly, many students reported having a sense of belonging to the University before the pandemic, but following the shift online, students often no longer saw themselves as part of the University, corresponding with the University becoming more physically distant to students. Of course, this may not be fully due to the pandemic as some students also expressed that it is simply easier to belong to a sub-section of the University than to the University as a whole because of the vast size of the University of Edinburgh. At University of Edinburgh, STEM students generally attend courses at a campus about 1.7 miles away from the central campus and the city, with only first year courses taking place in the central campus; GeoSciences and Informatics are the only schools within the College of Science and Engineering that are based in the central campus and execute their teaching there. Consequently, many students develop a sense of their campus as separate from the central campus and from the rest of the university, as this student detailed: *"I feel like it is easier to feel part of your school than part of the university as a whole, just cos the university I'm sure has buildings that I don't even know about, are part of the university, so, the, umm, I feel the STEM subjects are kind of all in the, in Kings [campus], and now we're not physically going there but it's still like the same. So I feel like it's, maybe I feel like more of the science and engineering student, just because we're all there, in the King's buildings, and it's so far away, it's kind of like a different, not university, but a different. I feel like there's a separation, ... but yeah, I do feel part of the school"* (STEM S2, Yr3). A similar shift in perception of belonging was observed as students progressed through the year groups, further suggesting that this shift may be more complex than just the effect of the pandemic.

As previously discussed, the pandemic has severely affected some students' mental health, which in turn may have affected professional identity development. This was well demonstrated by the fourth year STEM student who gave up on career searching in order to look after their wellbeing: *"one of the things I was stressed with was I was trying really hard to apply for jobs and I'm not really sure what I want to do, I want to do science but not do academia, but I did go home and said, this year is too overwhelming, there's too much going on, I don't have that release, in the sense I can't go sit for dinner with friends, and, it's very, it's quite stressful not being able to ever switch off, you're always in your room, you're always in the same environment, you're always around your screen, so I've actually said, right, you're definitely just gonna go home at the end of this year, focus on your degree"* (STEM S2, Yr4). Along with the stronger affiliations to discipline mentioned above, this may be part of a trend to feel greater connection to perceivably safer identities. Students are facing a large amount of pressure due to the global situation on top of their studies; they may therefore retreat to what is familiar, resulting in a more strictly defined sense of belonging, and lack of

opportunity to grow identity in new ways unless challenged through novel and exciting opportunities.

5.4 Mindset and Outlook on the Future

While originally heavily emphasised in the focus group questions, students had quite different perspectives about mindset and outlook in the future, with some volunteering little information on the topic. The year preceding data collection has changed many people's images of their future. Students were heavily affected by the pandemic and in many cases adjusted their perceptions and expectations of the future. While many expressed hopes for the future, many students expressed anxiety over thinking far into the future due to the pandemic. As seen in previous sections, many students' mental health has deteriorated and reflecting on the future or searching for future career opportunities caused undue stress. Many therefore instead chose to actively focus only on the present. This refusal to consider future possibilities in light of the pandemic is not at all unexpected; reduced long-term thinking when an individual feels they are in the middle of a crisis is a well-documented phenomenon of the human psyche (Arnsten et al., 2017; J. R. Gray, 1999). As the effects of the pandemic are thoroughly described in other sections in this thesis, they were not emphasised here further.

The trends that presented across the years were not solely due to differences between year groups but due to pandemic. Even outside of the pandemic, the trend of higher year students thinking more about their future career is well documented in literature (and somewhat supported by my data), so I have not overly emphasised those findings here.

5.4.1 Changes in Future Mindset and Outlook Through SaP

Students would often have a chance to explore new skills and avenues during their SaP experience, or have a chance to truly evaluate their interest in a specific topic. As such, it is no wonder that involvement in a partnership initiative would often result in restructuring their ideas for the future and changing their outlook. One way this change manifested was through students changing their study trajectory, as one of the SLICCs students details: *"So originally I just thought, I would do pure chemistry, which, I love chemistry don't get me wrong, but because of coffee [the SLICCs project] I'm now doing biological chemistry, molecular biology, and I might even change my course to be*

medicinal and biological chemistry, which is a very different path that I would never have gone down if it wasn't for the SLICC" (SLICCs, Yr3).

Similarly, students would often reaffirm their choices to pursue particular degrees or a particular career path through their SaP experiences, and in this way showed excitement about their future. As one student mentioned, doing a SLICC allowed them to reflect on their previous work and get genuinely excited about their current and future plans: *"So that was like a pretty crazy experience, a rollercoaster, starting from a SLICC and now doing, like, proper analysis that we hope to find interesting results"* (SLICCs, Yr3). This self-discovery and excitement was at the forefront of many students' SaP experiences; students gained confidence in their own decisions to pursue a certain path which increased the excitement they felt for their future. This may be because many SaP experiences provide students with a focused chance to explore their interests and test out how far those interests go. If students find that they are not as interested in the tasks associated with a particular project, they may change their career goals (as seen through the student in the first paragraph of this section); but if they feel reaffirmed in their choice, they may respond with more excitement and confidence in their decisions and future.

5.4.2 Developing Reflection Skills through Partnership

The opportunity to evaluate one's abilities that SaP offers to students often results in a change in their mindset and outlook; however, how long these changes last or how important they appear to be to the student often depends more on how the student interacts with their new knowledge and skills, and how they reflect on their experience. SLICCs provides a good example of the power of reflection. During the SLICCs experience, students were supported to undertake regular reflection through blogs and other assessments. This resulted in long-term changes, as one student mentions: *"I'm like so mindful of my own learning, trying to think how it's going, and that is a direct consequence of SLICC"* (SLICCs, Yr3). These changes, brought about by reflection, were also observed within the questionnaire data, where students pointed to reflection as one of the reasons why they experienced positive progress across many graduate attributes during SLICCs.

Students who experienced what they perceived to be partnership, such as during SLICCs, reflected mainly on their skills and abilities, including becoming self-aware of gaps in their abilities and showing greater knowledge of themselves. Uniquely for the SLICCs student group, students showed they became aware of how personal learning can be and how useful reflection as a concept was to

them, as one student demonstrated: *“I would probably do more trying to find more opportunities for reflection? And try to, you know, probe more into, you know, what can I exploit for a learning experience, because I, had to, at some, like I had to make mountain out of a molehill for, for some of the reflective entries in my second SLICC, because I just didn’t know what to write about”* (SLICCs, Yr3). This suggests that reflection is particularly useful in partnership initiatives that are very hands-off or even fully student-led, as students will be able to self-assess and self-correct rather than relying on staff intervention.

Other student groups rarely volunteered reflections by themselves and had to be asked directly during the focus groups and interviews. When queried, students would often talk about hoping to be more reflective in the future and using this skill to understand their own learning better; as one first year student demonstrated: *“I want to design a way that I can take notes, study them effectively, and be able to recall them, later on, and you know, remember them, like, for life”* (STEM S1, Yr1). This could indicate that reflection is an established part of students’ consciousness and students consider it a valuable technique to expand and improve learning. However, without explicit encouragement and instruction, it is seen as too difficult to initiate individually or perhaps as something superfluous that falls by the wayside within day to day work. Fostering reflection intentionally throughout the degree may be an effective way to enable students to experience a sense of partnership and is worthy of further examination.

5.4.3 Partnership Mindset

Many SLICCs students have reported a change in their mindset within the questionnaire, which was then explored with by the SLICCs students that took part in the focus groups and interviews. While students were referring to changes in their mindset they experienced directly as a result of their perceived partnership experience, it may not necessarily be accurate to label these changes as gaining a partnership mindset; the changes may also be explained in terms of gaining more responsibility for one’s own learning or greater understanding of how they learn. However, some students demonstrated a change in mindset through showcasing higher awareness of their position at the university, which included consciously changing the way they interacted with the staff. As one student said: *“after doing the SLICC I realised I actually know, it’s not about being given the information, it’s about getting it yourself. So now rather than treating my lecturers as just like teachers, they’re sort of, they’re like we’re all on the same level, I feel like I can go and talk to them, and actually learn from them so if I want information I’ll actually go and ask them about it!”* (SLICCs,

Yr3). The relational aspect of this change and the move towards a flatter power hierarchy would suggest some level of partnership mindset. This change in mindset permeated other classes the students took after completing their SLICCs and was not contained to just the project students did. This was sometimes seen as increase in confidence, as one student said: *"I now have the confidence to do my own reading"* (SLICCs, Yr3).

Gaining a different mindset (akin to a partnership mindset) was also demonstrated by students gaining greater understanding of teaching and greater empathy for their teachers. Students changed their perceptions of the staff and how they were allowed to interact with them: *"what I can see now, teaching is, that it's more accessible, and is ease- more readily available"* (SLICCs, Yr3). Similarly, SLICCs students noted that through their SLICCs, they gained a better understanding of the role staff have and what teaching entails, thus achieving a greater empathy for staff: *"I thought teaching was just, oh you're really smart and you're trying to pass that smartness onto other people, whereas there's actual craft and actual skill and actual methodology in, in teaching"* (SLICCs, Yr3). This effect of partnership is well documented in SaP literature where both parties often complete a partnership initiative with greater understanding of the other's role and struggles. Interestingly here, however, students that reported these mindsets have achieved these mindset changes without being directly and actively involved with a staff member that they would consider their partner during their project. Instead, they achieved this mindset through self-reflection and involvement in their projects that evolved around them being the teacher (either teaching themselves or others).

Conversely, it may also be possible that students developed these changes in their understanding of the role of staff in their learning as part of their maturation into self-directed learners. As students develop into self-directed learners, they learn to monitor and change how they approach their learning (Ambrose et al., 2010, pp. 163-166); part of this development also includes developing an understanding of the staff's role in that learning, leading to greater, metacognitive understanding of learning and teaching as a whole. As such, the suggestion that SLICCs resulted in this type of metacognitive shift in mindset and understanding of learning is not exclusive to partnership and should not necessarily be taken to imply that SLICCs are a form of partnership. However, its presence does not exclude the possibility of partnership, as this type of shift in mindset and partnership often correlate together.

Mindset changes to a partnership mindset were not as explicitly discussed in many other student groups outside of the SLICCs focus groups and interviews. Instead, the concept was often framed by

students as a perception of equality between them and the staff. One student in particular used this framing, alongside discussing the differences between themselves and the staff member in a tutorial: “[The tutor] *he’s like, umm, you know he’s, there’s not that separation between teacher and student, he, he makes me feel like he’s my equal and that like, you know*” (STEM S2, Yr3). This directly leads back to the issue defining student partnership outside of academic research and development. With no formal instruction on partnership, students create their own definitions that they use to understand these concepts. The idea of a student led definition of partnership is further explored in the following chapter.

5.5 Students’ Relationships

Within online learning and pandemic, many students reported that it was not possible to build relationships in the same way as in face-to-face learning – consequently, many students spoke about the relational aspects and realities of their experience. For instance, students often commented on the ‘black screen’ phenomenon in their contact hours, where everyone’s camera was turned off and there was little interaction between students and staff, or in between student peers. As one student explained: “*I suppose a lot of my lecturers will agree, that uh, not being able to see someone’s faces is a bit distracting especially when you feel as if you’re speaking to a, a black void basically, and sometimes people don’t respond, that’s not fun either*” (STEM S2, Yr3). This was not a negative for all students however, with some students mentioning that it allowed them to focus more and facilitated their learning: “*maybe the flip side of not seeing anybody [when presenting], in blackboard collaborate, is that you feel less intimidated, you’re not standing in front of the group and feeling really nervous, but you’re just focusing on developing that idea, and trying to articulate yourself, so maybe it’s actually helped take away these nerves a little bit to help get into the process of presenting more*” (STEM S2, Yr4).

Many students had issues developing relationships and engaging with both other students and staff online, as one detailed: “*we have like a worksheet, and then umm, we’ll do the worksheet, and then the tutor will go through the, the answers, so it’s not really much interaction with other people*” (STEM S2, Yr1). This was however not a common perception; students who were able to build and maintain solid connections and relationships online would often attribute it to scaffolding their interactions differently and ensuring they used available technology to their benefit. For example, one student would take part in long study video calls with their friends: “*I feel like maybe the one*

good thing about this year is that it's easier to work with friends, maybe for longer, like you can all connect on a video call, and maybe work through a tutorial together, so that's nice when we manage to coincide, yeah, more happy thoughts" (STEM S2, Yr3). A perceived lack of sense of community online is a well-established phenomenon in online learning literature (Song et al., 2004) and may be one of the reasons why students perceived classes with high community interactions (i.e. instances of high peer and staff involvement) as more likely to be partnership.

5.5.1 Building Student-Staff Relationships Online

Students had diverse opinions about the benefits and drawbacks of building relationships with staff online as opposed to in person. Many perceived there to not be as much engagement from and with the staff during online learning compared to in person learning. Similarly, for some students, engaging with the classes was made more difficult due to the online structure of the classes; for many, the new medium simply amplified insecurities they felt before. The impersonal nature of the online classes resulted in some students struggling to make a personal connection and to feel reassured about their right to engage with the classes. As one student put it: *"I struggle to ask questions, because like, they know so much more than me, so I'm scared of how much, like I know they won't judge me, because that's their job, that's the job, but like, I always think that they will, ... that is like my issue, and ... because there's nothing in person, I don't really like sending emails, because I don't know how to like phrase a question either, ... because like, a lot of like lecturers and tutors, they like to make you answer your own question, and I don't like that, like in case I get it wrong, I'd rather they just give me workings and then I'll like see through their workings how to do it and apply it to a new question, so I just don't ask questions, I'm just too scared"* (STEM S2, Yr1).

Conversely, online technology gave some students the confidence to engage more as some of the social pressures caused by in-person teaching had disappeared: *"I feel ..., more self-confident, like, to ask questions, I don't really get that nervous as I used to. ..., through hybrid learning was easier than being in a lecture hall, intimidated by everyone staring at you, so yeah! *laughs*"* (STEM S1, Yr1). Similarly, sometimes students did not feel as personally connected to the others in the class and to their lecturers, which allowed them to feel less vulnerable within the class setting, which in turn allowed them to be bolder in their communication. One first year student demonstrated this well: *"what online has done is that it's made it easier to, really, to actually contact the teachers because the distance has increased and so people are sort of, less nervous, right, because you're not real then"* (STEM S1, Yr1).

Many students also noted that there was a sense of humanity and openness on part of the lecturers, brought on by them being at home and sharing more of their personal life with the students. Students often reported feeling emboldened by the technology and by the insight they gained into their lecturer's and tutor's lives. This points to a distinct change in the pre-existing power hierarchy – online, the power hierarchy seems to have somewhat flattened and relationships between staff and students became equalised in many cases. Of course, this was not the case for all classes and all students. The pandemic also necessitated a rise in pre-recorded lectures and tutorials for some courses where no synchronous interaction between staff and student was required. In order for the flatter hierarchy to be experienced, students also had to put in an effort to actually engage with staff, just like with their peers when building community. Consequently, when students did engage and cultivate more equitable and genuine relationships with staff, many students ended up considering those interactions partnership.

5.5.2 Student-Staff Relationships as Part of SaP

Relationships proved to be integral for partnership; in fact, one of the greatest markers of whether a student would perceive an experience as SaP had to do with whether or not students perceived developing meaningful relationships during the experience.

Building relationships between students and staff was especially difficult during this year, as one student commented: *“when you have that conversation, with somebody personally, you start to see that person I think bit more different than a stranger, because for me the person who was teaching me, is a stranger, he’s my professor, but he’s a stranger too because I’ve never had a chance to see him in person, talk to him in person or anything like that, so he is just a stranger who’s there, to give me knowledge, that’s all. I, I do not, it’s difficult to specifically call him a professor! Because, there’s no discussion, there’s no topics, there’s no real interaction, there’s no teacher student relation actually”* (STEM S1, Yr1). Interestingly, students became even more aware of when the interactions they were having resulted in meaningful relationships with their tutors and lecturers. This may be because those interactions became rarer for some students due to the change in medium, or perhaps due to a heightened desire to experience such interactions due to the global situation, or some combination thereof.

When staff and students built relationships as described above, students not only perceived the activity they were taking part in as SaP, but they also experienced their perceptions of their abilities

and confidence increase sharply. Additionally, building these relationships and confidence may result in students developing a SaP mindset, as one fourth year student demonstrated: *“I got to know my lecturers a lot more, I felt more confident the more I spoke, ... I felt more confident to ask questions and have a go, instead of before, it was very much you're a lecturer, you know what you're talking about! I'm an undergrad, I don't know what I'm talking about, I don't feel like I have anything to bring to this conversation, I think that's very much how I felt, especially in lectures, in person or at the end, they asked us oh does anyone have any questions, and, I always felt like you would have to ask a really smart question, which is silly if you think about it because you're there to learn, umm, whereas I really felt much more what I was getting out of engaging, and less intimidated almost”* (STEM S2, Yr4).

Of course, not all student-staff relationships necessarily lead to partnership and not all partnership requires a close relationship to be established, such as for example in whole class partnerships (Bovill, 2020b). SLICCs can be considered as one example of partnership-like activities where staff had limited interactions with students – instead supporting and legitimising the students’ semi-autonomous project by rewarding them with course credit. This relationship would often develop into a partnership with the University as a construct for the students, as students felt trusted and valued enough by the systems put in place to work independently on subjects of interest. Students working through group projects that were supervised by tutors had similar experiences of feeling that the authority inherently provided by the presence of the tutor in turn supplied legitimacy to the students’ work: *“having ... a non-student there, or at least like someone not in your year, like formalises it a little bit, it means people, umm, like much more ready, like I don't know about the psychology but there's definitely something that will change, umm. yeah, and I think also, because it's just a bunch of confused undergrads together, you can end up agreeing on something but that just not being the truth, which is very counterproductive. Like you can have that discussion, and then at the end you're like, three undergrads here have reached this conclusion but absolutely somebody who knows the actual answer can say yes or no”* (STEM S2, Yr3). This relates to the concept of perceived partnerships centred around developing agency through semi-autonomous work, which could also be considered a type of student-led learning with some elements of partnership. The staff involved in the experience simply provide structure or opportunities for students to fully self-realise their project. The concept is further detailed in the following chapters.

5.5.3 Building Peer-Peer Relationships Online

As discussed in earlier sections, a community is built among others through personal interactions, shared goals, and liminal space. During the pandemic, communities had to move online, resulting in differences in the possibilities and practicalities of how a community can be built. The first years, who have not had a chance to ever meet their peers in person (due to choosing not to travel to Edinburgh in semester 1 and then fully online learning in semester 2) and only ever experienced the university online demonstrated quite well how it felt different: *“there was like a sense of us being together, once also somebody from the WhatsApp group. So while yes it was different, because like I didn’t know their names, like over time, it did feel like we were sort of together, but loosely together”* (STEM S1, Yr1).

Building this new online community was by no means easy for students; they often mentioned that building connections with their peers was particularly hard to achieve and if possible, they would often fall back into established friend groups, rather than building new relationships: *“it has been challenging, with the, the friends part, especially since I have friends that are from, ... where I’m also from and that go to the university, and I was sort of seeing them, and I guess I did not really find easy this year ... making friends with people online. ‘Cause like everyone’s online, are they even real? [Once we get to class in person] I’m expecting it to be a lot more social, and umm, I’m predicting there could be a lot more like, a feeling of community, especially when you go like, you know lecture halls, even though we don’t know each other, we will all be sitting there, like at the same time, yeah. And I’m expecting to ... have more friends?”* (STEM S1, Yr1).

This lack of building new connections for students that already had established friend groups was seen much more in students in later years; students who have previously met their course mates completely abandoned building any new relationships online and instead focused on trying to maintain their standing relationships, as one student demonstrates: *“I can’t really see my friends as much as I used to, ... I’m really starting to miss just walking back from uni, you know just talking about anything and nothing ... and I feel like that’s, ... it’s harder to sit yourself down and go, ... I am following along with the course when you got like nobody to relate to”* (STEM S2, Yr3). Furthermore, students in later year groups experienced this closed off situation within classes originally designed with student communication in mind; students would not speak to each other as much in the later years, as one student details: *“people that go to the tutorials tend to participate, because that’s what you’re there for, but we don’t really sort of talk to one another, it’s always directed at the person leading the tutorial”* (STEM S2, Yr3). This attitude was not seen as much with first year

students, perhaps because most first year students were all in the same situation regarding their contact with the University, whereas in later year groups had more varied experiences. The quote above of a student who had friends already in the city shows this difference well; similarly, one of the other students who did direct entry into university (where suitably qualified students entered straight into second year of a degree) also remarked how it was harder to connect with other students as they already had their own set social groups.

Students that had no friends from previous studies (such as some first years) and especially students that spent the academic year away from the University in their hometowns or home countries reported finding it particularly hard to make connections with others. Encouragingly, while students would often point to this lack of connection affecting their mental state, whether it had any effects on their studies or ability to complete their course work was entirely dependent on the individual and the circumstances of their course. As some students previously mentioned (in this section and others), the lack of in-person contact resulted in them losing opportunities for learning and studying. Conversely, in the case of a medical student working through their intercalated year in science where they were completing a research project, the isolation was not harmful to their results: *"I'm, probably 6-7 months now into my degree and I haven't met any of my classmates yet, I've never met like, umm, my supervisor, my course organiser, not even my PT [Personal Tutor], at this stage, uhm, it's an utterly different experience from what I've had, over the past umm, 21 years or so of existence, so it's, uhm, quite a new experience for me, but I, I have to say I do feel that it's different, but it's not necessarily harmful to my education? umm, or at least I don't take it as at the moment"* (STEM S2, Yr1). Another reason for why this student was not as affected may be due to the small group size of their research group providing a sense of community for them. In the above discussions about significant learning experiences, students often talked about small group tasks, which could imply that interactions in small groups make it easier to build community. Revealingly, the response of another student to the question of community building to quantify that in large courses with hundreds of students, it was not possible to create community: *"sometimes we could be like, two hundred on a single call and then it would get really impersonal"* (STEM S1 Yr1).

Students readily use technology to build relationships, often choosing specific platforms to facilitate relationship building with different members of their community. While students usually maintained online communication in addition to physical spaces pre-pandemic, as all learning shifted to hybrid and then online modes, students diversified and increased the amount of their online spaces to account for the loss of physical meeting space. These places are often created by the students

themselves with no input from the staff. One student explains their new community space: *“junior honours, senior honours and the MPhys students have created a Discord server, and like just going like, ah, quantum mechanics is so hard and like third years, no 4th years and 5th years going ah yeah, it was really hard, like just get through the pain, it gets better, that's been really - really helpful, just sort of starting to get a sense like I am a part of the community, I'm not just like, a lone face behind a screen, typing away”* (STEM S2, Yr3). The use of specialised online areas for different communication builds a sense of community. Students interact differently on different websites and reported using a range of services such as WhatsApp, Microsoft Teams, GatherTown, or Discord. Even though most of these spaces have a messenger function, students usually contain different types of communication to different services; for example, one student reported communicating with other students about their course work on Microsoft Teams, and with other students about social or personal issues on WhatsApp, similar to being in a lecture hall as opposed to a common room. In fact, many students explicitly noted a desire for a further stratification and increase in spaces available to them, as one student demonstrates: *“if I were designing the course, I would probably have created more opportunities for students to talk without, umm, teacher intervention, just like, leaving different rooms open, in case people want to join and talk about emm, topic or a quiz, or something like that”* (STEM S1, Yr1).

Throughout the semesters and across year groups, students demonstrated many diverse ways they engaged with their peers and overcame the barriers of isolation. With each School seemingly adopting different strategies to assist students in building a community, no best practices became apparent. However, the students reiterated how overwhelmingly important it was for them to be situated within a community of their peers, as well as how important it was for them to cultivate and maintain relationships with staff.

5.6 Experiences of the COVID19 Pandemic, Hybrid Learning, and Online Learning

The focus groups took place across nearly six months in the COVID19 pandemic and lockdown, during which the situation often changed from week to week. As crucial context to the rest of the study and context that significantly shaped students' perceptions of their experiences, it is necessary to spend some time exploring this topic. Throughout the focus groups and interviews, topics of COVID19 would emerge organically, and while some questions were planned on the topic to ensure

the context was captured, they were often not necessary – the pandemic was brought up unprompted.

The SLICCs students were interviewed first at the beginning of semester 1, 2020, and asked to reflect on the time of their SLICCs, which coincided with about two months into the pandemic, as well as on their current semester, at about 6 months into the pandemic. At this point in the year, students still reflected on the novelty of the situation: *“being trapped in this environment where all you had was coffee and reading, it was quite a unique experience”* (SLICCs, Yr3). As SLICCs are already individually led courses with little personal interactions, not all students felt like they had to adapt their SLICC to the pandemic beyond some minor changes. Furthermore, when discussing COVID19 and the changes to their current learning, the experience students gained from SLICCs (for example in structuring their own learning) proved to be good preparation (or as one SLICCs student called it, *“a preview”*) for hybrid and online learning: *“I figured ... that back in April, I knew that the year wouldn’t be back to normal by the time the semester started, I knew that everything would be online ... and that was sort of the preparation for the virtual semester, and, cos I realised that it’d be completely different and be a lot harder so that was sort of a trial run for what semester would be like”* (SLICCs, Yr3). This sense of preparation was only possible because students felt they had the freedom and space to experiment with their learning. Similarly, some students noted repurposing the reflection component of the SLICCs to help them check in with themselves and combat the negative mental health effects of the lockdown: *“I basically just completely isolated myself ... So being able to sort of, self-analyse and go, ok I’m not feeling great, why am I not feeling great, why do I have, why am I like, what’s going on. And sort of being able to sort of make a mental health check just for myself and then basically making sort of academic checklist and so may being able to be in a good enough place to force myself to work is, has been sort of my takeaway from both the, that terrible experience, and the, the SLICC itself”* (SLICCs, Yr3). The SPA student did not report any information related specifically to the COVID19 pandemic.

Next, the STEM S1 group was interviewed at the end of semester 1, 2020, and reflected on the last nine months of the pandemic. Many remarked that the experience was not what they were expecting or hoping for: *“I think I had this more of a grandiose vision of you know like going to lecture halls and, going to tutorials, and it being very awesome, and umm, well that, obviously couldn’t happen? Umm, so, to me I guess it was mostly the imagined vision of it all that was kind a destroyed!”* (STEM S1, Yr1). As these students were all in their first year and therefore had no experience of what a typical year at university looks like, their perceptions were particularly diverse.

Students would often remark on an experience and then immediately qualify that they were not sure if their experiences were due to the pandemic or if that was how the course or experience played out normally. However, one way the first year students in semester 1 agreed with the semester 2 data group was in remarking on the reduced social opportunities during the pandemic: *“I don’t think that my learning has been impacted because of covid, but I do think that the social aspect of being in university like has been harder”* (STEM S1, Yr1).

Finally, STEM S2 students were interviewed throughout semester 2, 2021, just over a year since the pandemic was announced, with students experiencing and adapting to multiple changes in their learning approach by then. As one third year student detailed, the changes from in-person to hybrid to fully online learning meant they needed to change learning strategies multiple times, which some of them have not been able to do appropriately: *“hybrid learning ... could be more manageable, like I’m gonna be able to go into labs and stuff and see some people, then the restrictions coming in the beginning of September I think ..., ah it’s alright, we just need to wait until things get better and then I’ll be able to manage things better, but actually looking back now and knowing that everything is online for this whole year, I definitely should have thought out a strategy, in August or September, and like figured out the best way to work, cos like, I still haven’t, because, I always think it’s fine, I can always put it off and wait till things are better and like in March and April I can just have a great time in the library”* (STEM S2, Yr3). As this student demonstrates, many students were blindsided with the sudden and frequent change in study circumstances and were not able to adapt. This may be one of the reasons why all students were particularly conscious of their community and relationships with others, as it was one of the aspects of their education most changed by the global situation.

Encouragingly, one concept that also emerged specifically when speaking with STEM S2 students was the idea of being kinder to oneself. Students often referred to allowing themselves the space to process the situation rather than forcing themselves to perform at their previous level: *“so you’re giving yourself more room, more slack, allowing yourself to work at your own pace”* (STEM S2, Yr3).

Like the STEM S1 group, STEM S2 students reiterated often losing the social component of their learning as being particularly hard: *“my relationship with my course mates and stuff definitely hasn’t improved. Which is a shame, like, I, you say [addressing other student in focus group] that you’re organising to go through tutorials online and stuff, but, but my experience with my course mates is more just like you see everyone as competition”* (STEM S2, Yr3). The pandemic meant that students lost opportunities outside of the University as well as within the University. As seen in the quote above, many students felt that certain learning experiences could not be appropriately replicated

online. Many felt that the loss of extra-curricular activities resulted in a reduction of their quality of life and made their studies harder. Students often mentioned the feeling of having their life confined to one room with nothing but university work to keep them occupied, which resulted in mental health issues. However, this reduction in other activities was not considered bad by all students; one student pointed out that they had more opportunity to focus on their studies with less outside distractions: *"I do lots of stuff that isn't my degree and I get very caught up in it and I love it, ... so I'm very good at getting distracted, ..., but I found that I haven't been going out late, ... so I've had a much better routine, so I've really been able to focus more, and spend more time on uni, I don't know whether I would have just like done that anyway because it's fourth year, but it's definitely unique in the sense that yeah I focus the most but also gotten the most out of it. ... I think I've gotten the most out of my degree this year"* (STEM S2, Yr4). This difference in perception to the same experience is of particular interest and may point to different mindsets students develop as well as the different ways they construct meaning from their experiences. In particular, some students who exhibited a growth mindset were more likely to perceive the positives of the situation and work towards achieving their goals. It is however important to note that the situation students found themselves in was unprecedented and their reaction to it may not be indicative of what their reaction would have been otherwise.

Conversely, the two STEM groups reported different strategies for coping with the pandemic. The STEM S1 group spoke mainly about keeping busy as a coping mechanism, but as STEM S2 subsequently showed, this was a short term solution, with STEM S2 group speaking about how the long-term situation created enough monotony that students often felt they were expected to perform like before, but this was not possible for all of them. As one student explained: *"with things as they are, the thing that you spend most of the time doing is just coping with it as it is. It's not, it's not conducive to like, making yourself better, it's just keeping up in my experience"* (STEM S2, Yr3). Faced with a perception of suddenly having drastically increasing expectations placed upon them both from the outside and themselves, many students reported worse outcomes in their second semester. The monotony expressed by many students also led to anxiety. Anxiety in light of the pandemic was somewhat expected and observed in the general population (Xiong et al., 2020) as well as other student populations (Rakhmanov & Dane, 2020). Consequently, the main motivation many students expressed was simply tough it out and finish the university year: *"this is going to sound really pessimistic but my goal is like third year ends, like completely, cos I'm always stressed out whether, if I pass the exams and go on the fourth year, and I don't know, and sometimes I kind of*

get lost and think, oh it should be like this, and I should be on exchange, and nothing happened, so, my most motivating goal is that, in a few months, third year is going to be over” (STEM S2, Yr3).

Another important factor to consider is the effect of the shift to online or hybrid learning. Students identified several positives to the situation. Students developed diverse and inventive strategies to improve their outcomes in online learning, from working on their floors (to separate their space out) to knitting throughout the lectures. Students also had the opportunity to study according to what worked best for them; as one student detailed: *“the flexibility to take lectures, and umm, like watch them again and again and again. Like take them when I want to, because you sometimes cannot wake early in the morning and you still have to go to the class, you cannot understand everything, your heads aching, just sitting in, so everything. So, I found that was really helpful, the part, that was helpful really” (STEMS1, Yr1).* Next, students who disclosed neurodivergence or mental health conditions during their interviews mentioned that online learning in the way it was structured, particularly having ready access to pre-recorded lectures, or having the extra barrier of the computer screen, improved accessibility for them. For example one student explained: *“I don't think I would attend as many classes if it was in person, because of my anxiety? so I do think, that, that is a positive for me” (STEM S2, Yr1).* This freedom and flexibility to tailor their learning was one of the positives of the switch to online classes.

Students with negative outcomes reported on how much more difficult it was to study in this new format and how difficult it was to form relationships with other students. As incoming students, first years usually did not have existing relationships with their classmates that they could simply move to online spaces, so even when space was provided for relationship building, they often reported not having a strong enough structure to forge new relationships online, sometimes resulting in negative outcomes: *“there was this project ... So the professor said that you could collaborate with people, but it was an optional course, so because you don't know people, you don't go to the classes, you don't know anybody, you don't have anybody to collaborate with. So everybody was doing it alone...when you could just collaborate and do it way better. So I think that was way bad, because we lost a lot of points and a lot of learning chance there” (STEM S1, Yr1).* Similarly, the medium seemed to amplify some student's underlying insecurities: *“having things online, ... I just struggle to join meetings, and then, like I can't ask questions, and like if it's a tutorial with like one other person, it's like, really, that's intense, and I'm really unlikely to join that, because it's like, especially if like I miss the first week, ... I'm probably not gonna join that tutorial ever again” (STEM S2, Yr1).*

Poor mental health outcomes due to the pandemic and its associated effects were expected from the start; however, just how much the pandemic affected students' perceptions of their experience, as well as the openness with which students volunteered their perceptions of that experience, was unexpected. As such, it is important to discuss these effects as the results presented within this study may show what students consider as important above anything else. However, the unprecedented situation may also reduce the translatability of this data, as the responses students have could simply be unexpected responses to the situation. The sense of shared trauma and decreased mental health reported by the students in this study are therefore important quantifiers that must be considered when evaluating the data. Due to the differences between traditional face-to-face learning and online or hybrid learning, students also had to focus on developing different skills, reflected on what skills they perceived as being of particular importance throughout the year.

Chapter 6 Overall Discussion and Implications

In this chapter the findings are related explicitly back to the three research questions guiding this study and in addition, the results are considered holistically beyond the research questions to elucidate the most salient themes and findings. I further embed these findings within the literature and offer a thorough discussion of the dataset as a whole. In this chapter, I also connect the key topics of graduate attributes, identity, and partnership, and suggest how each influences the other based on trends observed in the data. Further, I explore the implications and limitations of the conclusions on the future of student partnership.

6.1 Research Question 1: Changes in Perceptions Throughout the Degree

The first research question was: **How do students' perceptions of their graduate attribute development change and differ throughout their degree (e.g. confidence or improvement)?**

Through this question, I sought to understand the ways, if any, that students' perceptions of their graduate attributes changed throughout their studies. While a longitudinal study was ultimately not possible, students from all year groups were involved in this study.

There were definite differences between the perceptions of graduate attributes across the different year groups. This difference was not seen in the questionnaire data due to the number of student respondents being too small for statistical analysis; but the data from the focus groups and interviews provides evidence of differences across year groups. The differences in perceptions of graduate attributes between the year groups may have been driven by two factors in particular, among other external drivers – either by the students themselves or by staff's approaches to teaching. Students demonstrated an awareness of their graduate attributes and a conscious shift in focus from attributes grounded in the discipline, such as content knowledge, which students may consider more tangible and foundational, to attributes that are not as discipline-specific, such as

communication or teamwork, as they progressed through their studies. Content knowledge was mentioned overwhelmingly by first year students as their most important and most worked-on skill, with higher year students emphasising progressively more diverse and less discipline-specific skills, such as communication.

This emphasis on different attributes may be due to students becoming more aware of their future career and employability, resulting in them possibly intentionally working towards particular skills and attributes. However, awareness of graduate attributes may not come intrinsically from students, suggesting institutions have potential for significant power in shaping these perceptions (Yorke & Harvey, 2005). Indeed, students reflected on being influenced by staff to focus on more diverse graduate skills throughout their courses. Conversely, previous studies have shown that the development of graduate attributes can also be inhibited by staff, for example due to inadequate training or lack of staff's belief in the importance of graduate attributes (J. Jones & Saram, 2005; Radloff et al., 2008), further highlighting the influence of the educator on which graduate attributes students focus on. Students perceived that the staff would often teach certain skills before teaching other skills as a way to ensure every student has a specific base to start from, which may explain why students reported developing certain graduate attributes before others.

Students' perceptions and attitudes about content knowledge warrant a closer look. Firstly, while the definition provided to the students in the questionnaires hinged on acquisition of knowledge and using this knowledge for problem solving, within focus groups and interviews students often referred to content knowledge in just terms of acquisition and comprehension of field-specific knowledge. In this way, the study's definition and the students' definition did not entirely line up. The disparity between the two could easily be described through where each definition lies on Bloom's taxonomy (L. W. Anderson & Sosniak, 1994), with students considering the acquisition of content knowledge skills in the lower levels of the taxonomy and the study positioning the acquisition of content knowledge as requiring higher levels in the taxonomy to be considered as achieved. This discrepancy may explain why at certain points when students shared their perceptions about content knowledge, they did not seem to be drawing on the same definition as the study. Secondly, the observation that acquiring content knowledge was always considered as important and necessary before other skills by students is worthy of further exploration. It is possible that content knowledge is considered the default important skill by the students (and staff) because it is most easily recognisable and familiar to them. By the time they join the University, students will have had a wealth of experience in learning for examinations and learning discipline-

specific content in different subjects, making content learning familiar and easily understandable. Similarly, it may be considered a foundational skill by staff, and a prerequisite for deeper learning and other attributes such as critical thinking. Similarly, students may more likely already be proficient in learning content knowledge. The observed focus on content knowledge (or assessing applied content knowledge) may also be STEM specific, with non-science degrees emphasising different skills in their early years of undergraduate or placing a lesser degree of emphasis on content knowledge.

This apparent order in the way students develop graduate attributes was also observed to a greater degree within the students' reflections on specific courses. Students commented on not having the confidence to work on skills such as teamwork or communication skills because they felt they did not have enough content knowledge to be able to make appropriate contributions to tutorials, lectures, or group projects. They reported needing to improve their content knowledge before being able to fully engage in development of other graduate attributes. Related to this point, when discussing students' poor mental health, many remarked that they reduced their engagement with their learning by only focussing on content knowledge as a conscious choice in order to preserve their health. These two examples of students focusing on content knowledge would suggest that students themselves may often consider content knowledge the foundation or the absolute minimum that is required from them in a content-based course, with development of other skills considered as extra engagement above the minimum. During periods of external stress or low confidence, some students therefore tend to focus solely on achieving content knowledge. It is important to note, however, that a student's definition of what constitutes content knowledge may differ from the definitions used in research literature; in the cases above, students may be referring to any new piece of information as content knowledge, even if a researcher would potentially sort that piece of information into another attribute. For instance, students reflecting on skill-focused courses would sometimes comment on prioritising a piece of content knowledge that could also be categorised as part of numerical skills (such as, learning and using the right equation according to context).

While most students across all year groups in this study agreed that content knowledge is uniquely important and prioritised during their courses, many did not see the value in other skills. As such, students may benefit from increased engagement with other skills that could be built alongside content knowledge, especially in the early years of higher education. The apparent lack of transferable skills that graduates demonstrate is well debated within the literature, with little agreement about whether the responsibility is shared between students and the institute or falls

squarely on the institute (M. Clarke, 2018; Hurrell, 2016). As my results echo, the student's role in receiving and creating knowledge must be considered alongside the role of higher education providers and employers. In particular, more focus could be given to students' mental health as a driver of engagement with education and subsequent learning of any and all skills (Daddow et al., 2020). The year of this study saw an unparalleled rate of mental health issues in the general population due to the pandemic (see for example Czeisler et al., 2020; Grubic et al., 2020; Li et al., 2021; Wieczorek et al., 2021; Xiong et al., 2020). While the rate was unprecedented and affected many students, it served to highlight the previously researched connection between poor student mental health and reduced skill learning (Baik et al., 2017). Within this study, some students drew connections from their current experiences with learning to previous struggles with mental health, suggesting that they felt similar barriers to engaging in classes in both instances. This connection, however, was not investigated beyond what students volunteered freely throughout the study.

While the literature on student mental health often focusses on retention and degree completion as hallmarks of effects, this study saw a more nuanced shift in student focus from diverse skills to more foundational skills (in students from all year groups) because of self-reported sustained stress and poorer mental health. This has wide reaching implications for institutional concerns such as student retention and engagement – with students being shown refocussing their engagement to specific skills in periods of stress, institutions may need to pivot what support they provide students in such periods to avoid low performance and dropping out. In the following sections, student partnership is explored as a possible way in which students might be provided with greater opportunities to develop a broader range of graduate attributes.

6.1.1 Intersections of Identity, Sense of Belonging, and Graduate Attributes

Students get exposed to many diverse identities throughout their studies during their interactions with staff and peers. Throughout these interactions, some students report taking on the identities they observe and consider themselves a part of their studied field or profession. This may have some further effect on developing graduate attributes beyond the mechanisms discussed above.

Research within identity, self-constructs, and self-efficacy would suggest that an individual's perception of their identity would affect their graduate attributes (Daniels & Brooker, 2014). For example, an individual who sees themselves as a researcher may place higher value on critical thinking skills, prioritise them, and eventually become more highly skilled in this attribute compared

to those who do not consider critical thinking as part of their identity. This poses the question of whether a specific identity is associated with specific values that an individual has or strives to have – for example, ethics and integrity being particularly important within a researcher identity – or whether certain individuals are drawn toward adopting certain identities based on the values they already possess. If it is the former, it would suggest that when an institution sets values as part of their graduate attributes, it is indirectly encouraging the development of specific identities within their students. Students slowly adopting a new identity over the years of their degree as they remain exposed to graduate values could explain why as students advance through their studies, they focus on more diverse graduate skills. As students develop a more specific identity beyond being a student, they engage in developing skills that reflect the new identity and which are more varied than the foundational content knowledge. This was observed previously in research into academic identities and tribes (Becher & Trowler, 1989; Malcolm & Zukas, 2007), where junior researchers' identities would become increasingly specialised and their sense of belonging to increasingly more specific sub-fields and specialities strengthened. However, undergraduate students are only rarely considered as junior academics (by themselves and in the literature), with research into identity of students often centring around their student identity and other external factors, rather than possible shifts into academic identity. This may be because students often see the university as a transient place where their academic role has been pre-defined for them, with not much space for self-determination into other identities or chance to explore other academic-based identities. As such, even though they exhibit a strong sense of belonging to the university, this sense becomes transient and rarely lasts beyond graduation (K. C. Thomas, 2019). Within the data presented here, students reported changes in their sense of belonging only following major events that shifted their perception of the University and themselves, such as taking part in research projects or discovering a special field of interest, which will be discussed in greater detail further below in section 6.3 starting on page 239.

The intersection of identity formation and graduate attribute building has not been fully explored but does show some promise. If there is a link between building identity and building graduate attributes, then certain types of learning experiences could be strategically interspersed through the first year to jump start the process of focussing on more diverse graduate attributes.

6.1.2 Implications for Graduate Attribute Definitions

Throughout this study, fundamental limitations of using graduate attributes became apparent. Institutional graduate attributes would often be aspirational and vague, making them difficult to translate into usable units for research. Graduate attributes explored within the literature often presented with conflicting or overlapping definitions, leading to issues with comparing studies and transability. This study employed graduate attributes that endeavoured to meet institutional and literature attributes half-way, but the resulting attributes and definitions also suffered from several limitations which may have affected how students interacted with the study. While I can highlight the deficits in graduate attributes elucidated throughout my work, providing suggestions for exact modifications of graduate attributes and their definitions on an institutional level is outside the scope of this study. More research is needed to determine how to best use graduate attributes to benefit students and the institution.

6.2 Research Question 2: Effects of Students as Partners on Graduate Attributes

The second research question was: **What are the immediate and persistent effects of students as partners initiatives on students' perception of their confidence, improvement, and development of their graduate attributes?** Through this question, I wanted to explore the benefits and drawbacks of having partnership as part of a student's University experience, specifically its impact on students' perceptions of their skills.

In general, students reported that they progressed in their graduate attributes more throughout SaP activity than in the rest of their studies, in terms of their confidence, improvement and development. This was seen in the questionnaire data and later observed in the focus groups and interviews. In particular, students reported statistically significantly greater progress in their development of communication skills across all three factors of improvement, confidence, and opportunity; greater opportunity to develop their writing skills, critical thinking, and qualitative skills; and greater levels of confidence in critical thinking and content knowledge. The focus groups and interviews allowed me to explore these patterns further, as well as elucidate some of the mechanisms through which students progressed in these skills. The focus groups and interviews paint a more nuanced picture; while students did perceive increased gains within their partnership experiences, these gains were usually demonstrated in a single specific skill which the partnership focussed on. It cannot thus be said from the data in this study that partnership enhances

development across all skills and attributes, but rather provides significant progress in a specific skill focussed on in certain partnership initiatives.

Communication skills was the only graduate attribute ranked statistically significantly higher across all three questions (confidence, improvement, and chance to develop) during partnership. Further, students also reported developing different kinds of communication skills throughout perceived SaP compared to general year, suggesting that partnership may be suited to develop specific aspects of skills and attributes. This significant difference in communication skills may be explained through the relational nature of most partnership; within focus groups and interviews, students in particular spoke about the relationships they built with staff during partnership activity. Experiencing partnership activities and characteristics gave students more chances to develop their skills, resulting in them gaining greater confidence to engage and subsequently improve these skills. Positive relationships between staff and students are a driver for student motivation and engagement and have been previously thoroughly explored in literature (see for example Cook-Sather et al., 2014; Steele Royston, 2017) and have been directly associated with partnership and co-creation (Bovill, 2020b), so it is not an unexpected result. Importantly however, this study indirectly showcases the diverse positive and negative effects of interpersonal relationships within online spaces on student learning, which is of further importance within the global context of this study (Kostenius & Alerby, 2020) and for the future direction of higher education.

However, not all skills were developed significantly by students (or even at all), as was the case with numerical skills. Students reported in general having less opportunities to develop numerical skills during their partnership experiences compared to their general studies, resulting in less progress in this skill. This unexpected result was expanded upon during the focus groups and interviews, where in general SLICCs students reported that they felt they did not need these skills in their specific project, and STEM students pointed towards activities and initiatives that mainly included interpersonal relationships or personal research that did not include numerical skills as their partnership experience. Similarly, teamwork skills were also not shown to be developed significantly through the types of partnership explored here, which may have been due to the unique individual nature of SLICCs and/or possibly due to the constraints to opportunities for teamwork due to the pandemic. Partnership may therefore have a certain footprint of skills students associate with it, where certain skills are inherently developed during partnerships. Alternatively, it is possible that certain graduate attributes, such as communication, were especially suited to be developed through different types of partnership. However, as the partnerships explored in this study cannot be

considered representative of the broad range of partnerships identified in literature and elsewhere, it cannot be posited that these graduate attributes are uniquely better developed across all partnerships.

From the focus groups and interviews, it became evident that one of the biggest advantages of partnership for students was that students had the flexibility to focus on and develop more diverse graduate attributes beyond what they would normally achieve in class. This was for instance well demonstrated by SLICCs students feeling more prepared for hybrid and online learning because they had the opportunity to work on their time management skills during the SLICCs which later became an important skill for all students. Partnership allowed the students to learn and develop confidence in skills beyond the typical graduate attributes and allows students to explore skills they would not traditionally learn in the curriculum, which enables them to prepare for and develop resilience for unpredictable real world events. While this feature of partnership was likely always present, it was further amplified this year because of COVID19 on learning and teaching, and the subsequent need of students to adjust focus on different skills and attributes, which they did not have the chance to previously appropriately develop in their general studies.

These findings have several implications for the field at large. To start with, they show that partnership, whether perceived or more closely aligned to definitions from the literature, has been demonstrated to effectively contribute to students developing most graduate attributes, making partnership a valuable teaching and learning approach. Since graduate attribute development tends to centre around a specific skill depending on the nature of the partnership experience, it could become a way to supplement specific skill learning for students if appropriately targeted. Furthermore, skills developed as a consequence of partnership seems to be particularly effective in unexpected situations, such as during the changes to teaching caused by the COVID19 pandemic. Changes to education during periods of uncertainty are to be expected (Barnett, 2006); the results described here would suggest that partnership could be strategically interspersed throughout students' university experiences to foster greater flexibility and resilience to unexpected situations, which would then further prepare students for employment. Finally, encouraging students to experience partnership multiple times throughout their studies could raise the chances of students having opportunities to develop graduate attributes, as suggested by some of the focus group data where students reflected on the benefits of experiencing multiple partnerships.

6.2.1 Partnership as Perceived by Students

Students were given minimal guidance on what activities and experiences could be defined as partnership, which led to students interpreting the term in a more diverse way than in definitions found in the literature. For example, some students in this research considered attending workshops or even individual study as partnership (as seen in chapter 4 starting on page 100). While the definition of partnership that this study originally used (and the one that is being referred to when discussing literature-defined partnership) concerned a partnership between students and staff, usually working together towards an objective where the expertise of both partners is valued, it is necessary to acknowledge that partnership has multiple varied definitions in literature and a lot of reference to how different people might define/experience partnership differently and within more diverse contexts (Bovill & Bulley, 2011). There are many definitions of partnership in the literature, with many of them discussing partnership occurring within classrooms, and with large groups of students (see for example Bovill, 2020b; Woolmer et al., 2016). While all these definitions have been acknowledged in this thesis, numerous partnerships described by students here were missing many of the major elements and themes of partnership as seen elsewhere in literature (such as working with staff). However, students' perceived SaP experiences do retain and highlight many elements that could be considered crucial to partnership, such as relationship building or a flatter power hierarchy. This would suggest that students were perceiving some of the common characteristics of partnership whilst not necessarily experiencing something that might more typically be described as partnership; as the partnerships they reported contained one or more of the qualities of literature-defined partnership but did not necessarily constitute what many people might consider full partnership.

Before delving into the details of what students considered as partnership, it is important to examine how valid it was for students to identify their experiences as partnership. After all, the term is not well known among students and not many students were likely to have experience with partnership that is explicitly defined as such before taking part in this study. One possibility for so many unconventional partnerships being reported could be that students were trying to be helpful to the researcher and selecting 'Yes' on the partnership question without fully understanding the question or without believing partnership actually occurred. To prevent this situation, the questionnaire was intentionally designed to not attract attention to the questions about partnership (by for example asking about whether they would consider a specific experience as partnership only at the end of the page as a yes/no question or using survey logic to hide questions about partnership). This should have prevented students reporting an experience as partnership to try and

be helpful to the researcher. Similarly, students were asked to detail their significant learning experiences first, and then asked about whether they would consider them to be partnership. By placing the questions in this order, students were not prompted to try and come up with partnership experiences, rather they were asked about how they would classify a specific experience they already mentioned. Considering that the majority of students across all questionnaires reported that they did not consider their significant experiences to be partnership, it can be assumed that students did not misunderstand the question or attempt to provide an answer to please the researcher; instead, it appears that they felt the definition of partnership provided was applicable to the learning experience they were describing. Ultimately, whether students' definitions of partnership align within the supplied definition (and literature definition) of partnership or not, it is undeniable that the experiences identified by students as partnership provided opportunities for them to develop their graduate attributes, identity, and sense of belonging. Nevertheless, students identifying experiences such as lectures or assignments as partnership was not expected. Considering the definition of partnership supplied to the students, it is noteworthy that students' responses focussed on aspects of partnership such as enhanced engagement, interaction, relationship building, or meaningfulness, as these aspects were not inherently present within that definition.

To acknowledge the breadth of discussion and nuance around the students' experiences which they considered to be partnerships, and whether or not they are partnerships, the experiences have been discussed within this study as perceived partnerships. This retains the student-centric lens of the thesis in acknowledging the students' reporting experiences as partnership, while also highlighting the strength of perceptions on students' evaluation of their learning experience.

The rationales for students deciding what they considered partnership and what they did not were thoroughly investigated. Interestingly, students who completed the same or similar academic courses and learning experiences reported different perceptions on whether that experience was partnership, suggesting that students' individual perceptions of an experience play a crucial role. This difference in perceptions can be observed in Appendices 11, 16, and 20, which show how the same experience was ranked differently by different students in the questionnaires.

Even though students' definitions of partnership appear to depend heavily on perception, there are nevertheless shared themes in what students identified as partnership. Some themes were, as expected, based on the provided definition of partnership, such as perceived partnership being predominantly present in small classes or within specific teaching types (such as tutorials or

workshops). However, this was not always the case. Instead, perceptions of partnership proved to be much more diverse. For instance, students perceived partnership as usually involving some sort of writing element, though it did not have to be the main focus of the partnership. For example, the SPA funded project included grant writing, while SLICCs included weekly blogs and reflective essays. Similarly, many STEM respondents perceived assessments and tutorials as partnership and included writing in some way. Next, the partnership experience tended to be important for students' confidence in their skills, and especially confidence in communication skills. This may be because students have more opportunity to practice and explore specific graduate attributes.

Students overwhelmingly perceived partnership as an activity that they considered meaningful in some way or that provided a unique experience to the student. This may be because students expected partnership to be meaningful and so assigned greater meaning to their experiences, or because all partnerships are uniquely meaningful. It is outside the scope of this research to determine which came first, but it is necessary to point out that not all student-identified meaningful or significant learning experiences were considered partnership by the students. As could be seen in the Appendices 11, 16, and 20, students had a range of experiences significant to them but not all were considered partnership; further, students had different perceptions of the same experience, suggesting a further level of nuance. Considering partnership as an experience that is inherently meaningful to students would provide some explanation of several of the partnership initiatives provided by STEM students; similarly, it could explain why some students reported perceived partnership experiences which could be considered unusual, such as individual study (as can be seen in Table 14 on page 111 or Table 22 on page 130).

The differences between students' perceived partnership and partnership as defined in academic literature does not necessarily mean that these two concepts are not interconnected, but the connections are less immediately apparent. For instance, one of the central concepts of partnership is often the idea of partners having equally important expertise, which was reflected in the definition provided to the students. This level of equalness does not immediately appear to be present in many of the perceived partnership experiences in this study; instead, students reported bringing/developing expertise or sharing responsibility, without these necessarily being on an equal footing with staff. One way to reconcile these ideas would be by considering the space student partnership occupies within the scales and continua of partnership and student engagement that have previously been proposed (see for example Bovill, 2017; Bovill & Bulley, 2011; Healey, 2012); this could be yet another continuum (or perhaps a dimension to an existing continuum) to help

explain partnership. To explore this idea further, several different continua currently proposed for partnership were examined to determine the fit of the dimension of a continuum suggested here. Many continua look at the level of engagement students experience, usually ranging from a passive sort of interaction such as a course or initiative being fully dictated or students only being informed of initiatives, to students being in full control of the initiative, with partnership occurring somewhere in the middle or towards the full control side of the continuum (Healey, 2012). This idea of changing levels of how active students are in an initiative is often expressed as a ladder (Bovill & Bulley, 2011). In this ladder, partnership is flanked by students having control of some chosen or prescribed areas of the project on the lower end of the ladder, and by students being in full control of the project on the upper side. Notably, students being in control is not seen as a form of partnership; a distinction between partnership and student-led initiatives is drawn.

The experiences students reported as partnership within this study could be considered as sitting between student-led initiatives and partnership, with students' perception and evaluation of their situation as partnership being the main reason why these experiences are 'bumped-up' the continuum ladder. Within this space, the level of scaffolding of perceived partnerships would fit as an added dimension or clarification to recognise how these perceived partnerships relate to more commonly defined intended partnerships. However, perceived partnerships were notably not static, with students changing their perceptions of what was happening and where they perceived their projects to be situated on the continuum at different points of their experience. For instance, many SLICCs students expressed strong negative feelings about the perceived lack of supervision at the beginning of their project when they did not consider their work partnership, before re-evaluating this same perceived deficit as a positive once they came to perceive their experience as partnership. This must be accounted for when fitting the projects explored here within these existing structures; one continuum that demonstrates how students can move on the continuum is the participation matrix by Bovill (2017), which shows that the position of individuals in a project is not static, so individuals do not have to be considered partners all the time. This movement extends to staff partners as well, which may go towards explaining how the experiences with development of strong self-agency described by students can still be a type of partnership – just because the student perceives themselves to be a partner does not mean that their staff supervisor occupies that same space with them at all times, resulting in students feeling a sense of partnership with the university as a whole instead (further expanded upon in the next section – 6.2.2 – starting on page 237).

Partnership as perceived by students either contained a strong self-agency development element or contained a strong relational element. Perceived SaP experiences with strong self-agency development generally concerned a project, such as an assignment or a research project, which occurred as part of a course where students felt particularly trusted to make their own decisions on their work. Students within these perceived partnerships reported limited interaction with staff, but students attributed this to being considered as creators of knowledge themselves. These experiences are further explored in the next section (6.2.2, starting on page 237). Perceived SaP experiences with a strong relational element encompassed mainly on the development of relationships with other students and staff. Within these experiences, students reported high progress in for instance communication rather than content knowledge. This could be seen in the STEM questionnaires, focus groups, and interviews, where students mainly reported communication skill progress in their perceived partnership experiences. Students also reported considerable changes in their sense of identity and sense of belonging. These experiences are further discussed alongside the next research question (section 6.3.1 starting on page 241).

The results explored here suggest that the academic understanding of partnership could be expanded to include more diverse and incidental instances of interactions and initiatives. Similarly, it suggests that only certain elements (such as students finding the experience meaningful, developing autonomy, developing agency, or developing relationships) need to be present for the students in this study to consider something as SaP, potentially making partnership or the experience of some of the characteristics of partnership more accessible to larger groups of students. Crucially, one of the major elements of this understanding of partnership is the student's own perception of the situation, indicating that while perceived partnership can be more inclusive, it cannot be manufactured and facilitated by the university completely; instead, it must include student engagement and involvement. In this way, perceived partnerships described by students in this study share similarities with previously described partnerships – they require student input and engagement to be considered successful. Student engagement in this way is often difficult to authentically achieve and may in part be triggered by the overall atmosphere in the community and the values that are seen as important. With universities becoming increasingly consumerist in some aspects, these values of engagement may become more difficult to foster; therefore, in order for students to meet educators halfway with involvement, care must be taken to foster institutional community and values.

6.2.2 Perceived SaP Experiences with Strong Self-Agency Development

From the above considerations of perceived partnership, it can be posited that some students do not necessarily require active staff input for what they would consider a successful partnership, but instead only require interest and engagement from some form of authority. Staff are usually that authority, demonstrated by allowing students the agency to choose their own pathway, such as through independent projects or supervising tutorials but not taking leadership positions. In many SLICCs cases, students reported perceiving this authority being provided by the structure of the course or university itself, through for example the recognition of students' work on the SLICC by awarding credit and offering support if needed. While this authority structure was regardless still provided and maintained by staff, students rarely commented on noticing this level of support from staff and instead focussed on the structure itself, almost as if seeing it as a static piece of environment within which they could act and self-actualise. As such, these experiences would possibly be better described as a development of agency and shift to self-directed learning, rather than a type of partnership; however, it is important to reiterate that the description of this experience emerged through discussions with students and relates to their perception of what is and is not partnership, rather than what description could fit better. At the same time, it would not be accurate to consider these experiences a full partnership simply because that was how students identified it. It is much more plausible that students felt their experience related to some element of partnership within the definition and therefore connected the two based on that. Based on all this, I have denoted this group of student experiences as perceived SaP experiences with a strong self-agency development. This label acknowledges the students' perception of their own situation while not necessarily denoting it as SaP as understood by the education research field. It also recognizes the element of SaP that students are likely identifying and referring to when denoting these experiences as partnership.

Importantly, the success of this perceived SaP experience with a strong self-agency development, remains in the student's perception of the situation. In other words, students must acknowledge and consider the increased autonomy/agency they have within the project and acknowledge their own power in deciding the direction of their project (thus further gaining agency) to achieve positive outcomes and perceive their experience as partnership. If they do not make these connections and thus do not perceive their work as partnership, students tend to explain these types of projects in negative terms, often stating that they miss the typical structure and scaffolding of assignments. This was especially observed in conversations with SLICCs students; students reported having a wide range of negative feelings about their experience at the start of the SLICC, before redefining these

feelings as positive and empowering once they became aware of, and appreciated the benefits of, their own agency. Consequently, they took the perceived lack of guidance and supervision from their supervisor as a sign of approval and trust in their abilities.

These types of experiences were mostly reported by SLICCs students; STEM students more often stressed the relational aspect of their experience, whereas SLICCs students generally stressed independent work, even past their SLICCs when discussing experiences within the semester. This could be accounted for by the possible transformative nature of SLICCs for some students, which resulted in the students gaining a different mindset post-SLICCs that predisposed those students to actively identify and be cognizant of learning experiences with a strong independent component. This could be seen in students mentioning developing understanding of learning outcomes and their own learning during SLICCs, thus gaining more agency over their experiences, and searching for more similar experiences. Meanwhile, students from the STEM groups, who have not had a chance to experience of a significant independent project, often require the relational aspect.

However, one of the reasons for this may also be because of the timing of this study. STEM and SLICCs students were all in their pre-honours years at which point they would not have had much of a chance to engage in independent research projects. It is therefore likely that the SLICCs were the first independent projects the SLICCs student group experienced. As such, they were more likely to consider relational-based experiences as partnership, simply because they did not have the opportunity to take part in a learning experience with a strong self-agency development aspect yet. Again, this was however not the case for all STEM students, as can be observed in Table 14 on page 111, where some STEM students reported research projects as one of the examples of perceived partnership. Perhaps, within these projects, the amount and type of connection they had with their supervisor may have been different to SLICCs, perhaps due to the supervisors in undergraduate STEM projects usually being experts in their field compared to SLICCs supervisors rarely having any expertise in the student's chosen area (guiding the student through the process of self-reflection instead). This could potentially alter the relationship enough to still consider STEM research projects as a form of perceived SaP experience with a strong relational element. Without further follow-up with the involved students, it is not possible to definitively say where these experiences would lie.

Similarly, some students reported solitary and self-led activities as partnership. This could point to a concept explored in section 6.2.1 (starting on page 232) of partnership activities needing to be meaningful in some way; some students appeared to have found great meaning in having control

over their own learning and going at their own pace. This would relate well to gaining agency and responding well to the semi-autonomous process.

It is necessary to point out that similar situations or projects have been explained in literature previously as co-creation or student led work, or autonomous projects. As previously discussed in section 6.2.1, many of the experiences with a strong self-agency development element explored within this study could be said to occupy the space between projects with some student control and partnership, suggesting that they should be compared to student led initiative literature rather than partnership literature. However, the issue of labelling the students' experiences may ultimately be misguided. Students were intentionally given limited information about partnership and reported whether their experiences were partnership based on how much they agreed with a provided definition. It is impossible to say how they interpreted this definition without further discussion with the students; it may only be possible to say that students agreed with some, or all of the definition provided when considering their own experiences. This may mean that students experienced elements of partnership that they felt strongly about rather than a full partnership, or that they perceived their situation as partnership by constructing additional meaning around their experience. Regardless, most students that reported being involved in a partnership also reported some of the benefits that would be expected in partnership. To reject the link between the students' experiences and partnership would therefore be undermining the student's own evaluation of their experiences.

This concept of perceived SaP with strong self-agency development deserves further attention, especially considering that one of the primary concerns when implementing SaP remains scalability. Scalability is often directly impacted by the amount of attention and hours staff are able to give a project, and while SaP initiatives directly involving staff tend to be the norm and produce great results (Mercer-Mapstone et al., 2017), this research has suggested that more self-directed experiences that build agency and may contain less staff input could still produce some positive outcomes similar to partnership.

6.3 Research Question 3: Effects of Students as Partners on Identity and Belonging

The third research question posited was: **How does students' identity and perception of belonging in the academic and professional community change with involvement in students as partners initiatives?** Here, I sought to explore the effects, if any, that student partnerships can have on an

individual's sense of self and sense of membership within a community. Identity and belonging were both considered by the students, sometimes in relation or opposition to each other, sometimes together as one concept. It is worth considering students' reactions to each concept in turn first before looking at their interactions.

The questionnaire data demonstrated identity becoming more varied – students progressed from a purely student identity to also gaining a field specific, professional, or researcher identity when they participated in partnership. This was reflected by the interviewed students as well, suggesting that following partnership experiences some students considered themselves as more than just a student. Of course, not everyone reported these differences – most of the observed differences were more subtle in nature, with only a few students reporting significant changes. Across all the data, several themes became apparent in how students developed identity and to what extent their identities changed. Generally, the more intense students considered their SaP experience, the more transformation in identity they reported. Similarly, students who completed a SaP initiative in an area considerably different to their more usual field of study, such as researching or working in a different field in their SLICCs or joining a research group in a new subject area, reported more drastic changes to identity.

Identity was shown to be altered and built through significant experiences and through reflections on these experiences; otherwise, it seems to stay stable. This fits with the social constructionist concept of identity which posits that identity develops from the context an individual finds themselves in and what meaning they construct from their experiences. As partnership provides a significant experience compared to the general year students normally experience, students in the focus groups and interviews appeared to be using these partnership experiences as a way to re-construct their identity.

Another way to consider identity development within partnership could be through social roles and community building. Partnership could be considered as a period of time where a student's central identity was different to their typical identity and when they were situated in a space where they were exposed to and invited to adopt different social roles. These different social roles then become absorbed into the student's identity. Similarly, in the focus group data it was observed that community building was often the precursor for building identity. A community develops intrinsically through interactions and fledgling relationships, which often occur in partnerships with relational

components, resulting in some form of community that then serves to mould the individual's identity.

Following participating in partnership, students reported an increased sense of belonging to the University, regardless of whether the partnership was perceived or as typically defined in literature. Further, if the SaP was situated in a professional field, then students reported feeling an increased sense of belonging to that field as well. Similarly, students appeared to experience a more specialised sense of belonging, for example from belonging to the University as a whole to belonging to just their School, which could also be considered as the students finding their disciplinary group with whom they identify. This would suggest that there is a strong relationship between partnership experiences and sense of belonging, thereby implying that partnership initiatives could be strategically used to improve student belonging. However, this specialisation in belonging was also observed to occur as students progressed through the years, so may not be fully due to partnership. Instead, partnership may speed up the process. Finally, across all students spoken to in focus groups and interviews, an increase or specialisation in sense of belonging correlated with a successful partnership experience. This indicates that measuring changes in perception of belonging may be a useful metric to judge the success of partnership initiatives.

6.3.1 Perceived SaP Experiences with Strong Relational Element

Perceived partnership with a strong relational element (the second common type of experience that students identified as partnership) was briefly described above in section 6.2.1 (starting on page 232) and is expanded further here due to its particularly strong links to identity and sense of belonging. Students report these experiences as partnership thanks in part to their interactions with their staff, often in a way that personally motivates the student or because the lecturer created a human connection (e.g., showing their personality or willingness to share something personal). These interactions usually took place within curricular work such as lectures or tutorials and was as such most commonly observed within the STEM S1 and S2 student groups. However, this theme of interpersonal relationships has been echoed across all student groups, suggesting that fostering genuine interpersonal relationships within lectures and associated coursework may be the key to creating perceived partnership experiences.

While interpersonal relationships are considered to be one of the cornerstones of successful partnership, casual in-class experiences (reported as partnership by the students in this study) are

more often considered as co-creation or student engagement (Bovill, 2020a; Cook-Sather & Luz, 2015). The students reporting their experiences as partnership did not identify taking part in any explicit initiatives and it is not clear whether any specific experience, such as co-creation or partnership, was planned by the staff; the experiences may none the less have been intended as such. It is hypothesised in the field that classroom based partnership is often missed by the academic community or published about under a different name, so it is interesting that students highlight characteristics of classroom based partnership and co-creation as their most commonly perceived experiences of partnership.

It could be argued that the perceived partnership is more akin to a mindset rather than a set of practices and initiatives. This concept has also been explored by Peseta et al. (2020), as the profound process of changing one's perception of their experiences, such as being mindful of partnership opportunities, consciously noticing engagement, and valuing diversity. A SaP mindset can be fostered outside of SaP schemes and initiatives, making it more accessible to the wider student body and less likely to encounter institutional resistance. Furthermore, staff may be able to intentionally drive towards fostering genuine relationships and communication between students and staff, giving staff ways in which they can more easily enter into partnership. Unsurprisingly, this ends up manifesting in smaller tutorial or workshop spaces rather than lectures as it is much more difficult to forge genuine relationships in large classes. As such, unlike in perceived partnership with strong self-agency development where students' mindset was a greater decider of whether students would consider something a partnership, in this type of partnership, staff can help shape students' perceptions.

Finally, it is important to note that using relationship building to foster partnership cannot exactly be considered as a novel understanding of partnership or of partnership mindset, but rather a reiteration of the success of existing approaches to whole class engagement and co-creation. Similarly, prioritisation of relationships and communication within classrooms is not limited to partnership, but rather a relatively common strategy for good teaching within the modern classroom.

6.3.2 Ripple Effect of SaP and SaP Mindset in Students

As explored in previous chapters, students who underwent perceived SaP experiences changed their behaviour significantly during consequent university activities. In general, students reported more

engagement with their staff counterparts, an increased sense of belonging, and an increased desire to engage with the course material, the staff, and their peers. This effect was not unexpected and has often been observed following partnership (Matthews, 2016, 2017). Students who undergo this transformation in behaviour may thus end up influencing other students indirectly through interactions they have with their peers in other courses and spaces.

As previously observed in chapter 5 (starting on page 187), students may at times construct their identity through relational interdependence (i.e. thinking of oneself in terms of relationships with close others). If their relationships are with those that have been changed through perceived partnership, the students that have never participated in SaP themselves may end up taking on some characteristics or be likely to seek out certain experiences that may result in a similar pattern of graduate attribute improvements. Another way experiences with elements of partnership may affect students that were not directly involved in the activity is through community building. As seen in the focus groups and interviews, students who reported experiencing partnership would often use their increased sense of belonging to their School or speciality to facilitate a community for other students not directly involved, for example through proactively creating new community spaces such as chat rooms. Universities may be able to proactively foster communities themselves by facilitating the space for the community (physically and online), and by supporting the values that lead to community building within their students and staff. This emergent theme was not explored in depth in this study, however.

Partnership and experiences that involve some elements of partnerships, thus have the potential to influence the development of graduate attributes and changes in identity of a much larger group of students than just those originally involved in SaP. The connection between identity and graduate attributes is also very under-researched and would benefit from more targeted inquiry. Finally, it is not clear if the changes in behaviour that students reported after their perceived partnership experience are permanent or how long they remain; researching this further would assist in determining the extent of the possible influence on other students.

6.4 Limitations

The discussion and conclusions presented here needs to be considered within the context of the limitations to the study. While limitations in the methods used in the study were previously explored

in chapter 3 (starting on page 57), the limitations presented below pertain instead to the global context and the interpretations of the data, as well as my personal influence. These limitations provide further context to the study and the data.

6.4.1 Limitations of the Pandemic

The global public health emergency caused by the COVID19 pandemic limited what sort of study was feasible to complete, as well as limiting the translatability and applicability of the research to other contexts. Due to the pandemic, this study applied a snapshot model rather than the previously planned longitudinal study model. To mitigate the effects of this, I specifically asked students about the long-term effects of their experiences. However, the research questions could also be answered through a longitudinal study in the future which might be able to provide a more nuanced representation of students' graduate attribute development over time.

The pandemic created a unique learning situation involving predominantly online learning for all students and creating many challenges including a greater sense of isolation for many students; the results cannot be directly translated to other contexts of in-person, on-campus learning. Similarly, most of the conclusions explored within this thesis also need to be considered within the lens of a global catastrophe, which could have amplified some of the effects seen here and maybe hid other possible effects. For example, the first research question of how graduate attributes progress across year groups must be considered in the context of the pandemic. While numerous patterns of progression were explored, students were still reflecting on their progress while under significant stress. Consequently, the skills and attributes they reflected on may not have been developed in the same ways in pre-COVID19 settings. Due to COVID19, students reported prioritising and scaling back their learning and attribute development because of fewer available opportunities, such as lacking access to physical labs or difficulties with group work, as well as self-imposed withdrawing of their engagement due to changes in their mental health. This resulted in only the attributes that were perceived as the most important by the students being captured by the study.

6.4.2 Limitations of Interpretations

This section considers limitations of the language used in the questionnaire, focus groups and interviews that may limit the scope of interpretations possible; next, limitations pertaining to each research question are considered in turn.

It is necessary to consider that all graduate attribute questions in the questionnaire asked students to rank their ability in a skill compared to some specified point in the past, thereby measuring students' progress in a skill – rather than their inherent ability in that moment. This means that a measurement of ability cannot be determined from the data. This may be best illustrated with an example: a student saying that they are much more confident in a skill this year compared to their last year does not necessarily mean that they are very confident in the skill in general. The questions do not ask for the baseline where the student is progressing from, so the hypothetical student may for example be starting from a place of no confidence, and their increase in confidence still leaves them in a place of low confidence. It therefore is not possible to conclusively say that any one initiative is better than the other based on the data; this would likely be impossible regardless, as what helps and what does not is personal to the student.

The definitions of graduate attributes provided to the students may have likewise caused issues for the students. While care was taken to define each attribute in the clearest way possible, on further reflection, there were nevertheless overlaps and issues with the definitions that may have caused problems in understanding, especially potentially for international or non-native language students, or students with disabilities.

Another language limitation of the study concerns students' understanding of partnership itself. The definition supplied to the students was subject of great discussion with the thesis supervisory team and great care was taken to ensure a definition that centred around cooperation and respect for every individual's expertise. Notably, the decision was made to use the words partnership and Students as partners as little as possible, and never as the sole explanation in a question. Regardless, many students reported experiences that seemingly did not fit the provided definition of partnership, prompting the question of whether the definition was well understood by students and if enough care was taken to make it understandable, or to check if students' experiences were really of partnership or of other meaningful learning experiences. Reassuringly, the conversations within focus groups and interviews would suggest that at least a subgroup of students understood the definition clearly enough to consider whether their situation encompassed partnership; however, the possibility that students simply did not understand what was implied by the term partnership must be considered.

My first research question could not be completely answered by my dataset. As discussed in previous chapters, the study detailed here is a series of snapshots rather than a longitudinal study.

While many patterns across the different year groups were observed, it cannot be comprehensively said that these patterns represent the experience of all students as they progress through their studies, because different students were surveyed for each year. The patterns observed may also have been brought about by sampling error. One way this limitation was mitigated was by asking students about their perceptions of themselves in previous years to determine the validity of the observed patterns. While this gives further credibility, it has its own limitation of relying on students' memories and perception of themselves in years past, rather than more direct observations.

My second research question focussed on the differences between two student experiences, but all students that took part in the study were only contacted at a single point, therefore there was no opportunity to compare students' perceptions before and after taking part in partnership. Because the data is composed of reflections and perceptions of students without any comparison to their earlier states, it is possible that significant parts of the data can be biased through retroactive reflection on events – for example, students may perceive their previous study experiences in a harsher light after SaP experiences. Similarly, this also means that there is little to no way to observe persistent effects of SaP. Instead, students were asked their opinion on how likely they were to continue with the behavioural changes they observed in themselves throughout their SaP initiatives. While this provides the study with students' perception of how important the changes are and their intentions, it cannot serve as a complete answer to how persistent behavioural changes were after partnership.

Within my third research question, several limitations of interpretations must be acknowledged. Both identity and belonging are incredibly complex in how they develop, and my study did not allow sufficient time or focus to explore either in detail necessary to make any conclusive assessments. Due to the design of the study and the size of the final sample size collected, I was not able to control for the natural development of identity and sense of belonging over time with students. Being able to observe these changes would allow for the changes occurring due to participation in partnership to become more apparent. It may also be possible that the wording of the identity and belonging section was too specific. Individual's identities are varied and nuanced, so the small set of options available in the questionnaire and later discussed in the focus groups and interviews perhaps did not capture this nuance well enough, resulting in most students reporting only a student identity. Only listing a student identity within the questionnaire was an expected outcome for all these reasons, which is why the topic of identity was discussed so thoroughly within the focus groups and interviews instead.

6.4.3 Limitations of My Own Influence and Personal Reflections

In keeping with the methodology considered in chapter 3 (starting on page 57), it is necessary to reflect on my own influences and positions in relation to this work. Doing so allows me to not only acknowledge my own influence on the data collection and consider the strengths my own personal history brings to the work, but also critique the inherent limitations of myself collecting and analysing this data.

It is necessary to state that I would consider myself an insider to the field of SaP and education research (scholarship of teaching and learning in particular) as a whole. I have taken part in multiple SaP schemes as a student myself, as well as advocating for the practice across multiple conferences, workshops, and publications. As such, I am cognisant of the desire within the field to champion partnership in all aspects of education and fields. Throughout data collection and analysis, I strived to remain impartial and consider the partnerships presented through a neutral lens. Similarly, I have a close connection to the STEM fields the students in this study were part of thanks to either majoring in the field myself during undergraduate, or working within a near, adjacent field for a while. I used this familiarity with the students' backgrounds to create a comfortable atmosphere during the focus groups and interviews and would often relate to events in my life in response to what the students said. This atmosphere may have inspired students to be open with me about private matters, which directly resulted in the brief exploration of poor mental health in chapter 5 (starting on page 187). This closeness to the students could have however also served to introduce bias into my work – at points, it was easy to self-identify with the students, which will have influenced what questions I chose to focus on within the interviews or how I explained certain topics.

Chapter 7 Conclusion

To draw together conclusions of this study, first, the major findings and discussion explored in detail in the last three chapters are summarised; then, the main contributions of the study are highlighted and considered. Finally, possible future avenues for further research are explored.

7.1 Summary of Findings

The findings in this study centred around three main themes: students' progression in their graduate attributes, identity, and sense of belonging throughout their studies; changes to this progression because of partnership; and how all these mechanisms were affected due to the COVID19 pandemic. Each of these is briefly summarised below.

Students considered discipline-specific skills such as content knowledge as most important attributes in earlier years, with higher year students considering other skills such as communication as the most important and most developed. Their identity as relating to the university remained somewhat stable throughout their education, with only slow changes to their sense of identity due to maturing. Students developed a more specific sense of belonging as they progressed through their studies, from the general sense of belonging to the University to belonging to their School in particular, to sometimes belonging in their degree group only.

These trends were disrupted by students' involvement in partnership, where students came to value a plethora of skills and diversified their identity, in addition to sometimes placing a higher value on their relationship with staff. Partnership projects, such as SLICCs, or perceived partnership involving a degree of autonomy and strong self-agency development, such as project-based assessments, provided students the flexibility and freedom to explore different avenues of learning and consequently learn diverse skills, which allowed the students to better adapt to new contexts such

as the pandemic. These projects also increased the students' sense of belonging to the University and sped up the rate at which students specialised their sense of belonging to their School or field. Other perceived partnership, such as interaction and relationships as part of engaging in lectures or tutorials, gave students greater opportunity to develop skills such as communication, resulting in outcomes in terms of students developing relational skills and likewise a heightened sense of belonging; if the partnership was situated in a professional field, then students reported feeling an increased sense of belonging to that field as well.

Throughout the duration of this study, the world experienced a pandemic of COVID19, which forced all teaching and learning out of in-person spaces into hybrid or fully online learning. Students and staff were severely affected by the pandemic. Beyond the adverse mental health effects brought on by the isolation and uncertainty of the situation, students had to adapt to a different form of learning and interacting with their instructors. These differences to the common on-campus undergraduate experience were explored in detail and included in the research as appropriate. The three student groups I collected data from were affected similarly to the rest of the students, for example through losing opportunities due to limited social gathering, having project work shifted online, and less interaction with their peers and lecturers, with some first years never having experienced a university class in person at the point of data collection.

7.2 Main Contributions to The Field

This thesis explores a range of data showing the benefits of partnership and student experiences of partnership characteristics, furthering the academic discourse on the benefits of partnership. It also argues for the expansion of what is considered partnership, making it more accessible and easier to carry out within universities. Finally, this study connects often disparate ideas from different fields (such as education research, psychology, and sociology) and demonstrates the value in combining them in a single work.

7.2.1 The Benefits of Partnership

One of the most important contributions of this study is that it reaffirmed the general benefits of partnership as previously seen in literature. It also showcased that these benefits prevail even in

periods of great global change, thus demonstrating the resilience of partnership as an educational practice.

The study further demonstrated in detail certain benefits of perceived partnership and established links between partnership, graduate attributes, identity, and belonging. Students overwhelmingly reported positive changes in their identity and sense of belonging, as well as progressing in their graduate attribute building through partnership, suggesting engaging in partnership was beneficial for students themselves; furthermore, the observed changes in students associated with partnership may be beneficial for the institution itself through improved retention of students and student employability. Similarly, these benefits and SaP mindset could be fostered within the student body through not just established partnership schemes and initiatives, but also through partnership as perceived by the students. This suggests that there may be multiple benefits an institution could gain in the long term from integrating partnership or elements of partnership into the curriculum. Furthermore, benefits from partnership could carry implications for the National Student Survey and the Student Engagement Survey, potentially resulting in significant modifications to the scope, content, and use of both.

In particular, the connection between partnership and identity formation or sense of belonging may be of interest to the field. The study has shown that partnership could be a good way to increase student's sense of belonging to the University or School, which could not only lead to increased student retention, but also improve students' wellbeing. Similarly, taking part in field specific partnerships increased student's sense of belonging to those specific fields, indicating that partnership could improve employability by giving them a greater sense of belonging in their potential future career. Importantly, benefits to students seem to manifest quickly at the start of the initiatives and may be scalable with how important students perceive the partnership experience. This suggests that short, intense partnership experiences such as those taking place within tutorials or lectures could be used to boost specific graduate attributes, sense of belonging, or identity formation. In addition, the possible ripple effect of partnership on other students, through improved sense of community and collective belonging, suggests that partnership may be a way to indirectly improve the University's community. After completing a perceived partnership experience, students would express feeling less like a consumer or a client of the University and more as part of it, suggesting that the increased sense of belonging may be a way to start to combat the neo-liberal and consumerist nature of modern university education on a larger scale. Finally, throughout this

study, partnership proved to be a way for students to build their resilience towards unexpected events, such as the pandemic.

7.2.2 Understanding Partnership

The next major contribution of this work to the field is the examination of different elements that can make up a partnership as perceived by students. The data and analysis explored the importance and value of different elements of partnership, and further characterised the different outcomes of experiences that contain these elements.

Within this study, students at the time reported and reflected on partnerships as commonly defined in the literature, where students and staff work together towards a common goal, such as in curriculum design. This type of partnership was understood to involve multiple diverse elements of partnership, such as flatter power hierarchy, engagement, and relationship building, and was the default position of this study in the beginning. However, students would more often identify more standard learning experiences as partnership that would not at first glance match the definitions within the literature. Students appeared to evaluate their learning experiences through a partnership lens, even if possibly no partnership was intended nor in reality was taking place. These reported perceived partnerships were found to involve key elements of partnership, even if they did not involve all the elements commonly understood to make up partnership.

The perceived partnerships that students reported could further roughly be categorised based on what element of partnership was most prevalent in the student's experience. The learning experiences either contained a strong relational element, or strong self-agency development. The experiences with a strong relational element occurred most often in formal and traditional curricular settings such as lectures or tutorials, within which students and staff developed genuine relationships with each other (often as a group, but not necessarily). Typically, the experiences also involved a flatter than usual power hierarchy, resulting in increased engagement and ownership from the student. However, this hierarchy was not as flat as that observed in co-creation or student-led teaching, which this reported partnership most closely resembles. Conversely, experiences with strong self-agency development did not involve staff as partners in the traditional sense. Instead, students gained agency through working in an independent manner on projects, assignments, or research of their choosing (and often working by themselves, though not necessarily). In all instances, the experience was largely self-directed by the student with minimal perceived input or

structuring from a staff member. This resulted in the student feeling empowered by the responsibility of having the choice to make their own decisions about the nature and direction of their work. This learning experience was well illustrated through SLICCs, where many students did not consider their staff tutor to have any influence on their project, but still reported their experience as partnership.

These two ways of perceiving partnership showcase that partnership does not necessarily need institutional buy-in, increased funds, or special training to produce positive outcomes. Instead, elements of partnership can occur through more conventional curricular experiences that still achieve many of the same benefits for students as some of the common institutional partnership project schemes (see for example Mercer-Mapstone & Bovill, 2020).

Much of the perceived partnership explored within this study did not fit into what could commonly be defined as partnership by the academic field. Instead, students focused on many components and elements essential to partnership within their perceived partnership experiences. Therefore, my study shows that not all building blocks of partnership need to be present for students to perceive the experience as partnership and experience positive outcomes; students were gaining the benefits commonly associated with full partnership with only some of the elements of partnership evidently present. Experiencing only some elements of partnership could be much easier to implement on a larger scale and be more accessible to students than fully fledged partnership schemes. This study is in no way suggesting that common institutional partnership schemes are superfluous; only that implementing elements of partnership within curricular settings alongside the institutional schemes would provide more students the opportunities to participate and increase the benefits to the student body as a whole. Further, if faced with institutional resistance, implementing elements of partnership within the curriculum would be a positive initial step – as students perceive benefits akin to partnership, staff could showcase these to build more excitement in the institution for further partnership. This could be done on an individual course through small changes in focus in contact with students, such as through taking care to attempt to foster relationships within classes, or through assessments that allow students to grow their self-agency. Similarly, it could be woven into development of new courses by incentivising new courses to include partnership elements within their design. Through a deeper understanding of what partnership constitutes and what elements are necessary for partnership, the practice could be more easily embedded and encouraged within institutions.

7.2.3 Connecting Partnership with Identity and Belonging

The results of this study indicate that identity and belonging are integrally changed and developed through partnership. The two fields are however not often combined, with little research addressing both to date. Students who experienced partnership within this study reported positive changes in their identity and sense of belonging; as developing a strong identity and sense of belonging within the university has been shown to enhance student retention (Oseguera et al., 2019), partnership could therefore indirectly be contributing to enhancing student retention through identity and sense of belonging. This thesis makes explicit and strong connections between these fields, opening opportunities for further research.

Furthermore, I briefly show that students' sense of belonging can specialise from belonging to a general community to a more specific community sub-group following successful partnership as reported by students. This suggests that developing belonging within specialised disciplinary or other identity groups could be used as markers of successful partnership. Similarly, it suggests that partnership could also be used strategically to foster specific identities or increase belonging in particular groups.

7.3 Possible Future Avenues of Research

Throughout the previous chapters, the many possible ways the conclusions could be expanded upon became apparent, which are now discussed in detail here.

7.3.1 Expanding Impact Through Alternate Study Methods

One of the issues the students as partners field is facing is the lack of long-term examinations of the effects of partnerships on participants. Whilst partnerships have a wealth of recorded outcomes (Bovill, 2019a), the participants commonly only reflect on the outcomes in the short term, either when the initiative is still in effect or directly after the initiative concludes. This consequently poses a question of what the long-term outcomes of partnership are and how these can be evidenced. Completing a longitudinal study following the same set of students throughout their entire degree would appropriately expand on the results explored within this study. This would allow for capturing perceptions in each year and allow for possible patterns to be elucidated. In a longitudinal study, the progression of students' perceptions of how they develop their graduate attributes could be

observed more naturally. Further, the long term nature of the study would allow a researcher to better evaluate the changes in perception and behaviour following involvement in partnership, and therefore how pervasive behavioural changes are following partnership.

7.3.2 Exploring the Extent of Perceived Partnership and Reach of Partnership Experiences

The prospect of self-perceiving and self-defining what partnership is deserves further attention and research. This limits of this perception and what factors drive this identification of experiences as partnership would prove invaluable to institutions when setting partnership policy. As such, further research could focus on what other aspects of experiences (beyond self-agency and relationship development) students consider partnership, what specific experiences may make them change this perception, and how quickly it forms in a situation.

This study suggests that partnership itself may contain a continuum where perceived partnership that requires little intervention or buy in from staff exists on one end from the more commonly understood forms of partnership. A future study could examine the continuum idea further, perhaps through interviews with students that have been engaged in many different partnerships in the past. Furthermore, a possible ripple effect of partnership where students that were involved in partnership positively affect other students that were not involved through community building and identity changes has been proposed. This area would also benefit from a focussed study to ascertain whether the effect truly exists and to what extent it is present with different types of partnership.

Finally, the study data suggest that different partnerships may be uniquely suited to develop different specific skills. For instance, the partnerships examined in this study have been shown to be suited to develop skills such as communication, while also not being suited for other skills such as numerical skills. This emergent theme could be explored further through a targeted study determining what skills and attributes students considered most important and easiest to develop during different partnerships, and how each graduate attribute should be appropriately targeted through partnership.

7.3.3 Exploring Identity Within Partnership Further

This study provided many insights into how identity develops throughout partnership and student's experiences, but there would be benefit from a more focussed study on the links of identity,

partnership, and progressing through education. This could be achieved through a longitudinal study or other methods designed to capture the nuance and explore the subtle differences in how identity develops through partnership compared to how it may develop in general undergraduate studies across the years. Similarly, as was seen in the SPA data point, the only postgraduate student that was included in this study had a much more distinct identity in that it was much more advanced and diverse on all fronts. In a future study, it would be interesting to compare the identity of undergraduates to postgraduates to see the differences between the two groups.

Furthermore, while this study shows a connection between partnership and identity, it does not establish causation. The data does not provide sufficient detail to establish by which mechanism partnership and identity interact, only that successful partnership is accompanied by progress in identity. As identity is often drastically changed by significant events, it is possible for example that the beginning of partnership and the accompanied change in perception triggers a change in identity. This changed identity could then drive the rest of the partnership. Understanding where within a partnership and to what extent identity develops could allow staff to provide appropriate support at the right point in partnership to increase success, while still maintaining a less scaffolded structure.

7.3.4 Exploring Students' Priorities and Perceptions

Within this study, students shared their perceptions of their progress, which may not paint the whole picture of why certain students improve in certain skills more than others. One possible future study could look at how students are explicitly taught which skills or graduate attributes they should prioritise. Students reported favouring and developing some different skills throughout the pandemic compared to before, such as time management, but not all students reported the same skill or reported focussing on a skill to the same extent. This could suggest that students may have prioritised different skills or prioritised the same attribute at different times. A future study could then explore how students decide which skill they should prioritise and how are they explicitly taught or led towards specific skills. Similarly, perceptions as a research medium could be capitalised on in future research to explore nuanced differences between similar interventions, such as exploring the difference between progress in graduate attributes, identity, and belonging during different partnership experiences.

Finally, this study provides a detailed snapshot of student development of graduate attributes, identity, and belonging while amid a pandemic, which has affected students in unique ways. One way to thus expand the impact and translatability of this study would be to reconnect with the students at a later point when the pandemic has ended and teaching has settled into new norms of teaching (whether these will be online, hybrid, blended or fully on-campus approaches). This would also provide a thorough contrast to the effects the pandemic had on students' perceptions that were not immediately evident to the researcher and to students themselves. Further to exploring students' priorities in what skills they focused on, a future study could explore how much guidance students were given on hybrid and online learning, and to what extent they were instructed how to achieve their goals within this new medium.

7.3.5 Exploring Students' Graduate Attributes After Graduation

This study has explored students at the undergraduate level of their education. A further way to expand on this research would thus be to follow students into postgraduate studies or employment to examine how their perceptions of their identity, sense of belonging, and graduate attributes change. Both employment and postgraduate studies are a type of learning, which would suggest that the skills and identity shift developed through partnership could have long lasting effects in these spaces as well. Similarly, as partnership is considered as a possible way to build employability, it would be reasonable to follow students into the job market to examine to what extent partnership assists students in their work and job seeking. Furthermore, one of the conclusions of my study is that partnership allows a student to appropriately respond to unexpected situations and teaches skills that are useful in these situations where traditional teaching does not. Following students beyond their undergraduate degree could provide information on whether this possible greater resilience is extended to life post-graduation.

7.4 Conclusion

This study examined mostly science students' perceptions of their graduate attributes, their identity, and their sense of belonging within and outside of student partnerships. Through careful examination of quantitative and qualitative data, it was shown that students' perception of their progress in graduate attributes is greater when they engage in some form of partnership experience compared to their more general undergraduate studies, and that these partnership experiences

provide students with opportunities to develop their identity and sense of belonging beyond the opportunities general studies allow.

Despite being provided with a definition of SaP, many students reported partnership experiences that did not seemingly align with the definition of partnership often used in education research. Students instead provided their own ideas of what partnership is, thereby leading to the identification of two additional theme clusters of perceived partnership experiences – either with a strong relational element, or with strong self-agency development. The study further showcased the unique benefit of partnership in an uncertain world environment, and the benefits of fostering perceived partnership within everyday class interactions.

The analysis presented here enhances the existing partnership literature and makes a strong case for considering the different elements that make up successful partnerships as discrete elements that can be fostered separately in turn to target development of specific attributes and changes in identity and sense of belonging.

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Appendices

Appendix 1. The initial questionnaire used in the failed longitudinal study.

Indicative Questions for Questionnaire				
1. Please rate:				
	To what extent do you feel you improved than last semester in...? **	To what extent do you feel confident than last semester in...? **	In the last semester, to what extent do you feel you were given the opportunity to develop...? **	Please list up to 3 activities that helped you develop this skill in the last semester: **
Communication	*	*	*	Open-ended
Writing skills	*	*	*	Open-ended
Teamwork skills	*	*	*	Open-ended
Ethical thinking	*	*	*	Open-ended
Content knowledge	*	*	*	Open-ended
Quantitative skills	*	*	*	Open-ended
Qualitative skills	*	*	*	Open-ended

* Answers will be on a 5 point Likert Scale, e.g. Much less confident - less confident – no change – more confident – much more confident

** These will be appropriately adapted for the first questionnaire

- Of the activities you described in question 1, which activity was the most significant academic/learning experience for you? What made this experience significant? (open-ended, limit 250 words)
- Would you describe this experience as a programme, project, or initiative where your expertise was considered just as important as the staff members you worked with (Students as Partners)? Yes or No
 - If No, how would you describe it?
- I feel most like/I would define myself most as: (sliding rule from not at all to completely feel like)

Student –

Researcher/Academic –

Professional –

[field specific name, e.g. physicist] –
- In the last semester, were you involved in any other (not previously mentioned here) students as partners work - programme, project, or initiative where your expertise was considered just as important as the staff members you worked with? Yes or No
 - If No, skip question 8
 - If Yes, skip question 9
- Please briefly describe your experiences; what did you do, how long were you involved, to what extent were you involved? (open-ended box, limit 1000 characters)
- Thinking about this experience:
 - If you have had more than one such experience since the last questionnaire, please choose which one you will be talking about:
 - n/a
 - open-ended box (limit of 80 characters)
 - Please tell us about how this experience affected your skills development:

	To what extent do you feel you improved than before this experience in...?	To what extent do you feel confident than before this experience in...?	To what extent do you feel you were given the opportunity to develop...?	Please list up to 3 activities that helped you develop this skill in the last semester:
Communication	*	*	*	Open-ended
Writing skills	*	*	*	Open-ended
Teamwork skills	*	*	*	Open-ended
Ethical thinking	*	*	*	Open-ended
Content knowledge	*	*	*	Open-ended
Quantitative skills	*	*	*	Open-ended
Qualitative skills	*	*	*	Open-ended

* Answers will be on a 5 point Likert Scale, e.g. Much less confident - less confident – no change – more confident – much more confident

8. Since I became involved in students as partners Initiatives:

I feel more part of my chosen academic community	Strongly disagree – disagree – neither agree nor disagree – agree – strongly agree
I feel more respected in my chosen subject/field	
I feel more established in my chosen field	
I feel more comfortable being a university student	
I feel I belong in my discipline beyond the university	
I believe I have as much to offer in expertise as my professors and tutors, even if it is not the same type of expertise	

9. Since last semester:

I feel more part of my chosen academic community	Strongly disagree – disagree – neither agree nor disagree – agree – strongly agree
I feel more respected and established in my chosen field	
I feel more comfortable being a university student	
I feel I belong in my discipline beyond the university	
I believe I have as much to offer in expertise as my professors and tutors, even if it is not the same type of expertise	

Indicative Questions for Focus Groups

1. Thinking back to the last semester:
 - a. What skills do you feel you developed and worked on the most?
 - b. What was the most significant academic/learning experience that contributed to developing your skills?
2. Thinking about this significant academic experience:
 - a. What made it significant for your learning and skills development?
 - b. What would have made the experience more impactful?
 - c. How did this experience impact your perception of your place at the university and in the field?
 - d. Would you describe the initiative as working in partnership with staff?
3. Looking into the future:
 - a. Which skill will you want to focus on developing the most next semester?

Appendix 2. Full questionnaire for the STEM student group in semester 1 (Nov 2020).

Page 1: Information Sheet

1. If you wish to participate, please tick the 'I consent' box at the bottom of this screen and fill out your student number.
 - a. I consent to participate, or I do NOT consent.
 - b. This question is required

Page 2: Introduction

2. Please select your School:
 - a. All University of Edinburgh Schools listed as option, including 'Other'
3. Please indicate the type of programme you are on:
 - a. Undergraduate, Postgraduate Taught, and Postgraduate Research as options
4. Please indicate year of study
 - a. 1st year to 5th year as options

Page 3: Your Perceptions of Graduate Attributes

5.
 - a. Please rate:

Over the last academic year (2019/2020), how do you feel your abilities changed in the following skills?

Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- b. Please rate:

Over the last academic year (2019/2020), to what extent do you feel confident in the following skills?

Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- c. Please rate:

Over the last academic year (2019/2020), to what extent do you feel you were given the opportunity to develop the below skills?

Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- d. Please rate:

Please list up to 3 activities (done in class or as part of your university, academic experience) that helped you develop this skill in the last academic year (2019/2020):

Communication skills	Open text boxes
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	

Qualitative skills	

6. Of the activities you described above, which activity was the most significant academic/learning experience for you?
 - a. Short open text box
7. How long were you involved?
 - a. Short open text box
8. What made this experience significant?
 - a. Short open text box
9. What did you do during the activity, and to what extent were you involved?
 - a. Short open text box
10. Would you describe this as an experience where your expertise was considered just as important as the staff members you worked with (also known as students as partners)?
 - a. Binary yes/no question. When 'No' is selected, question 14 appears:
11. If 'No,' how would you describe it?
 - a. Short open text box
12. Would you consider any of the activities/initiatives you took part in throughout your time at the university to be students as partners (an experience where your expertise was considered just as important as the staff members you worked with)? This includes anything you have already talked about.
 - a. Yes, No, Not Sure answers possible. When students answer 'No,' the questionnaire navigates to page 5, skipping page 4.

Page 4: Your experiences of skills development during your students as partners Experience

1. Please tell us about how this experience affected your skills development:
 - a. Please rate:

Compared to before this experience, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
 - b. Please rate:

Compared to before this experience, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
 - c. Please rate:

During this experience, to what extent do you feel you were given the opportunity to develop...?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
 - d. Please rate:

Which aspects of your experience in particular contributed to changes in the following skills?	
Communication skills	Open text boxes

Writing skills		
Teamwork skills		
Critical thinking		
Content knowledge		
Numerical skills		
Qualitative skills		

Page 5: Identity and Belonging

2. In my day to day life, I feel most like/I would define myself most as a:

Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely
Researcher/Academic	
Professional	
Field specific name, e.g. Physicist, engineer	

3. Since this time last year:

		In the past year, were there any events (and if so, what) that changed how you feel in these areas?
I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box
I feel more respected in my chosen subject/field		
I feel more established in my chosen subject/field		
I feel more comfortable being a university student		
I feel I belong in my discipline beyond the university		
I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise		

Page 6: Focus Group

4. As part of this study, I will run an informal focus group about students as partners and graduate attributes in the future. The session will last no longer than 1 hour and will occur either in person or virtually. Please let me know if you would be interested in attending a focus group and would like me to contact you when dates are set:

a. Binary yes/no answer. If Yes is selected, student is asked for a contact email address:

5. Please enter your email:

a. Open text box

Page 7: Final Page & Page 8: Contact Details

Provides a final thank you and contact details.

Appendix 3. Full questionnaire for the STEM student group in semester 2 – STEM S2 (Feb 2021).

Page 1: Information Sheet

6. If you wish to participate, please tick the 'I consent' box at the bottom of this screen and fill out your student number.
- I consent to participate, or I do NOT consent.
 - This question is required

Page 2: Introduction

7. Please select your School:
- All University of Edinburgh Schools listed as option, including 'Other'
8. Please indicate the type of programme you are on:
- Undergraduate, Postgraduate Taught, and Postgraduate Research as options
9. Please indicate year of study
- 1st year to 5th year as options

Page 3: Your Perceptions of Graduate Attributes

10. Please rate:
- Please rate:

Throughout this academic year, how do you feel your abilities changed in the following skills?

Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

Throughout this academic year, to what extent do you feel confident in the following skills?

Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

Throughout this academic year, to what extent do you feel you were given the opportunity to develop the below skills?

Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

Please list up to 3 activities (done in class or as part of your university, academic experience) that helped you develop this skill in the current academic year:

Communication skills	Open text boxes
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	

Qualitative skills	

11. Of the activities you described above, which activity was the most significant academic/learning experience for you?
 - a. Short open text box
12. How long were you involved?
 - a. Short open text box
13. What made this experience significant?
 - a. Short open text box
14. What did you do during the activity, and to what extent were you involved?
 - a. Short open text box
15. Would you describe this as an experience where your expertise was considered just as important as the staff members you worked with (also known as students as partners)?
 - a. Binary yes/no question. When 'No' is selected, question 14 appears:
16. If 'No,' how would you describe it?
 - a. Short open text box
17. In the last year, did you have any other students as partners experiences not yet mentioned here (where your expertise was considered just as important as the staff members you worked with)?
 - a. Binary yes/no question. When 'Yes' is selected, question 16 appears:
18. Please specify:
 - a. Short open text box
19. Would you consider any of the activities/initiatives you took part in throughout your time at the university to be students as partners (an experience where your expertise was considered just as important as the staff members you worked with)? This includes anything you have already talked about.
 - a. Yes, No, Not Sure answers possible. When students answer 'No,' the questionnaire navigates to page 5, skipping page 4.

Page 4: Your experiences of skills development during your students as partners Experience

20. Please tell us about how this experience affected your skills development:

a. Please rate:

Compared to before this experience, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

b. Please rate:

Compared to before this experience, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

c. Please rate:

During this experience, to what extent do you feel you were given the opportunity to develop...?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	

Numerical skills		
Qualitative skills		
d. Please rate:		
Which aspects of your experience in particular contributed to changes in the following skills?		
Communication skills	Open text boxes	
Writing skills		
Teamwork skills		
Critical thinking		
Content knowledge		
Numerical skills		
Qualitative skills		
Page 5: Identity and Belonging		
21. In my day to day life, I feel most like/I would define myself most as a:		
Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely	
Researcher/Academic		
Professional		
Field specific name, e.g. Physicist, engineer		
22. Since this time last year:		
		In the past year, were there any events (and if so, what) that changed how you feel in these areas?
I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box
I feel more respected in my chosen subject/field		
I feel more established in my chosen subject/field		
I feel more comfortable being a university student		
I feel I belong in my discipline beyond the university		
I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise		
Page 6: Focus Group		
23. As part of this study, I will run an informal focus group about students as partners and graduate attributes in the future. The session will last no longer than 1 hour and will occur either in person or virtually. Please let me know if you would be interested in attending a focus group and would like me to contact you when dates are set:		
a. Binary yes/no answer. If Yes is selected, student is asked for a contact email address:		
24. Please enter your email:		
a. Open text box		
Page 7: Final Page & Page 8: Contact Details		
Provides a final thank you and contact details.		

Appendix 4. Full questionnaire for the SLICC student group in semester 1 (Oct 2020).

Page 1: Information Sheet

25. If you wish to participate, please tick the 'I consent' box at the bottom of this screen and fill out your student number.
- I consent to participate, or I do NOT consent.
 - This question is required

Page 2: Introduction

26. Please select your School:
- All University of Edinburgh Schools listed as option, including 'Other'
27. Please indicate the type of programme you are on:
- Undergraduate, Postgraduate Taught, and Postgraduate Research as options
28. Please indicate year of study
- 1st year to 5th year as options
29. Please indicate in which year did you undertake your SLICC:
- Years 2011 to 2020 as options, including 'Other'

Page 3: Your experiences of skills development during your SLICC

30. Please tell us about how this experience affected your skills development:
- Please rate:

Compared to before your SLICC, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

Compared to before your SLICC, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

During your SLICC, to what extent do you feel you were given the opportunity to develop...?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

- Please rate:

Which aspects of your SLICC experience in particular contributed to changes in the following skills?	
Communication skills	Open text boxes
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

31. Since last year:

Please rate:

I feel I have developed a better understanding of learning outcomes and what they are for	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree
I feel I can now use learning outcomes more effectively to enhance my learning	
I feel I am more able to recognise and receive formative feedback	
I feel I can better reflect on and use feedback more effectively to improve my work	
I feel more able to use a marking scheme on my own work, to enable me to see how to improve it	
I feel more confident in understanding how I am assessed	
I feel more aware of the linkage between learning outcomes and my assessment	
I feel I better understand the importance of formative tasks to receive feedback to allow me to improve my work	

Page 4: Your Perceptions of Graduate Attributes Outside of Your SLICC

32. Please rate:

a.

Compared to this time last year, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

b. Please rate:

Compared to this time last year, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

c. Please rate:

In this last year, to what extent do you feel you were given the opportunity to develop the below skills?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently – All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

d. Please rate

Please list up to 3 activities (done in class or as part of your university, academic experience) that helped you develop this skill in this last year:	
Communication skills	Open text boxes
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

33. Of the activities you described above, which activity was the most significant academic/learning experience for you?

a. Short open text box 34. How long were you involved? a. Short open text box 35. What made this experience significant? a. Short open text box 36. What did you do during the activity, and to what extent were you involved? a. Short open text box 37. Would you describe this as an experience where your expertise was considered just as important as the staff members you worked with (also known as students as partners)? a. Binary yes/no question. When 'No' is selected, question 14 appears: 38. If 'No,' how would you describe it? a. Short open text box 39. In the last year, did you have any other students as partners experiences not yet mentioned here (where your expertise was considered just as important as the staff members you worked with)? a. Binary yes/no question. When 'Yes' is selected, question 16 appears: 40. Please specify: a. Short open text box																
Page 5: Identity and Belonging 41. In my day to day life, I feel most like/I would define myself most as a: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Student</td> <td rowspan="4" style="width: 50%; padding: 5px; vertical-align: top;">5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely</td> </tr> <tr> <td style="padding: 5px;">Researcher/Academic</td> </tr> <tr> <td style="padding: 5px;">Professional</td> </tr> <tr> <td style="padding: 5px;">Field specific name, e.g. Physicist, engineer</td> </tr> </table> 42. Since this time last year: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 45%; height: 40px;"></td> <td style="width: 10%;"></td> <td style="width: 45%; padding: 5px;">In the past year, were there any events (and if so, what) that changed how you feel in these areas?</td> </tr> <tr> <td style="padding: 5px;">I feel more part of my chosen academic community</td> <td rowspan="6" style="padding: 5px; vertical-align: top;">5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree</td> <td rowspan="6" style="padding: 5px; vertical-align: top;">Open text box</td> </tr> <tr> <td style="padding: 5px;">I feel more respected in my chosen subject/field</td> </tr> <tr> <td style="padding: 5px;">I feel more established in my chosen subject/field</td> </tr> <tr> <td style="padding: 5px;">I feel more comfortable being a university student</td> </tr> <tr> <td style="padding: 5px;">I feel I belong in my discipline beyond the university</td> </tr> <tr> <td style="padding: 5px;">I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise</td> </tr> </table>	Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely	Researcher/Academic	Professional	Field specific name, e.g. Physicist, engineer			In the past year, were there any events (and if so, what) that changed how you feel in these areas?	I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box	I feel more respected in my chosen subject/field	I feel more established in my chosen subject/field	I feel more comfortable being a university student	I feel I belong in my discipline beyond the university	I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise
Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely															
Researcher/Academic																
Professional																
Field specific name, e.g. Physicist, engineer																
		In the past year, were there any events (and if so, what) that changed how you feel in these areas?														
I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box														
I feel more respected in my chosen subject/field																
I feel more established in my chosen subject/field																
I feel more comfortable being a university student																
I feel I belong in my discipline beyond the university																
I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise																
Page 6: Focus Group 43. As part of this study, I will run an informal focus group about students as partners and graduate attributes in the future. The session will last no longer than 1 hour and will occur either in person or virtually. Please let me know if you would be interested in attending a focus group and would like me to contact you when dates are set: a. Binary yes/no answer. If Yes is selected, student is asked for a contact email address: 44. Please enter your email: a. Open text box																
Page 7: Final Page & Page 8: Contact Details Provides a final thank you and contact details.																

Appendix 5. Full questionnaire for the SPA student group in semester 1 (Oct 2020).

Page 1: Information Sheet 1. If you wish to participate, please tick the 'I consent' box at the bottom of this screen and fill out your student number. a. I consent to participate, or I do NOT consent. b. This question is required	
Page 2: Introduction 2. Please select your School: d. All University of Edinburgh Schools listed as option, including 'Other' 3. Please indicate the type of programme you are on: a. Undergraduate, Postgraduate Taught, and Postgraduate Research as options 4. Please indicate year of study a. 1 st year to 5 th year as options	
Page 3: Your experiences of skills development during your SPA funded project 5. Please briefly describe your SPA funded project: a. Open text box 6. Please tell us about how this experience affected your skills development: a. Please rate:	
Compared to before your SPA funded project, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
b. Please rate:	
Compared to before your SPA funded project, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
c. Please rate:	
During your SPA funded project, to what extent do you feel you were given the opportunity to develop...?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	
d. Please rate:	
Which aspects of your SPA funded project experience in particular contributed to changes in the following skills?	
Communication skills	Open text boxes
Writing skills	

Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

Page 4: Your Perceptions of Graduate Attributes Outside of Your SPA Funded Project

7. Please rate:

a.

Compared to this time last year, how do you feel your abilities changed in the following skills?	
Communication skills	5-point Likert scale: Greatly deteriorated – Somewhat deteriorated – No change – Somewhat improved – Greatly improved
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

b. Please rate:

Compared to this time last year, to what extent do you feel confident in the following skills?	
Communication skills	5-point Likert scale: Much less confident – Less confident – No change – More confident – Much more confident
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

c. Please rate:

In this last year, to what extent do you feel you were given the opportunity to develop...?	
Communication skills	5-point Likert scale: Never – Rarely – Sometimes – Frequently - All the time
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

d. Please rate:

Please list up to 3 activities (done in class or as part of your university, academic experience) that helped you develop this skill in this last year:	
Communication skills	Open text boxes
Writing skills	
Teamwork skills	
Critical thinking	
Content knowledge	
Numerical skills	
Qualitative skills	

8. Of the activities you described above, which activity was the most significant academic/learning experience for you?

a. Short open text box

9. How long were you involved?

a. Short open text box

10. What made this experience significant?

a. Short open text box

11. What did you do during the activity, and to what extent were you involved?

a. Short open text box

12. Would you describe this as an experience where your expertise was considered just as important as the staff members you worked with (also known as students as partners)? a. Binary yes/no question. When 'No' is selected, question 14 appears: 13. If 'No,' how would you describe it? a. Short open text box 14. In the last year, did you have any other students as partners experiences not yet mentioned here (where your expertise was considered just as important as the staff members you worked with)? a. Binary yes/no question. When 'Yes' is selected, question 16 appears: 15. Please specify: a. Short open text box																
Page 5: Identity and Belonging 16. In my day to day life, I feel most like/I would define myself most as a: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Student</td> <td rowspan="4" style="width: 50%; padding: 5px; vertical-align: top;">5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely</td> </tr> <tr> <td style="padding: 5px;">Researcher/Academic</td> </tr> <tr> <td style="padding: 5px;">Professional</td> </tr> <tr> <td style="padding: 5px;">Field specific name, e.g. Physicist, engineer</td> </tr> </table> 17. Since this time last year: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; height: 40px;"></td> <td style="width: 33%;"></td> <td style="width: 34%; padding: 5px;">In the past year, were there any events (and if so, what) that changed how you feel in these areas?</td> </tr> <tr> <td style="padding: 5px;">I feel more part of my chosen academic community</td> <td rowspan="6" style="padding: 5px; vertical-align: top;">5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree</td> <td rowspan="6" style="padding: 5px; vertical-align: top;">Open text box</td> </tr> <tr> <td style="padding: 5px;">I feel more respected in my chosen subject/field</td> </tr> <tr> <td style="padding: 5px;">I feel more established in my chosen subject/field</td> </tr> <tr> <td style="padding: 5px;">I feel more comfortable being a university student</td> </tr> <tr> <td style="padding: 5px;">I feel I belong in my discipline beyond the university</td> </tr> <tr> <td style="padding: 5px;">I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise</td> </tr> </table>	Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely	Researcher/Academic	Professional	Field specific name, e.g. Physicist, engineer			In the past year, were there any events (and if so, what) that changed how you feel in these areas?	I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box	I feel more respected in my chosen subject/field	I feel more established in my chosen subject/field	I feel more comfortable being a university student	I feel I belong in my discipline beyond the university	I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise
Student	5-point Likert scale: Not at all – Very little – Somewhat – Almost entirely - Entirely															
Researcher/Academic																
Professional																
Field specific name, e.g. Physicist, engineer																
		In the past year, were there any events (and if so, what) that changed how you feel in these areas?														
I feel more part of my chosen academic community	5-point Likert scale: Strongly disagree – Somewhat disagree – Neither – Somewhat agree – Strongly agree	Open text box														
I feel more respected in my chosen subject/field																
I feel more established in my chosen subject/field																
I feel more comfortable being a university student																
I feel I belong in my discipline beyond the university																
I believe I have as much to offer in expertise as my lecturers and tutors, even if it is not the same type of expertise																
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Page 7: Final Page & Page 8: Contact Details Provides a final thank you and contact details.																

Appendix 6. Focus group questions for students that completed a SLICC.

Motivations for SLICCs

- Tell me more about your experience? How would you define the experience?
- What motivated you to do a SLICC?
- Was doing a SLICC what you expected it to be? In what way?
- To what extent were you involved in the design of your SLICC? and 'how did this compare with your other courses?
- Do you think you will want to have such an experience again?
- How different was it compared to other courses and what was more enjoyable?
- What do you think should be different in a SLICC?
- With what you know now, what would you do different during the SLICC?

Future Outlook

- How did your outlook on your future studies change, if at all, because of this project?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you find yourself approaching your studies differently? If so, how?
- Has how you see and interact with your lecturers changed and if so, how?
 - o If yes, do you think these changes will last?

COVID19 Effects

- How did COVID19 impact your experience? What changed what improved, what got worse?
- Were there things that had to change from what you expected? If so, in what way?
- Do you think there was anything that improved because of COVID19? If so, in what way?
- Do you think it made your SLICCs experience more unique?
- What skills did you develop during your SLICC that are of benefit to you now that you are in hybrid learning?

Identity and Belonging

- As a result of taking the SLICC, do you think you view yourself differently? In what way? Why do you think this experience (didn't) change your view of your identity?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you see your future differently?
- How do you feel about being back at university (after SLICCs, during COVID19)?

Appendix 7. Focus group questions for student that completed a SPA funded project.

Motivations for SPA

- Tell me more about your experience? How would you define the experience?
- What motivated you to do the SPA funded project? How did you come about getting involved in the project?
- Was it what you expected it to be? In what way?
- To what extent were you involved in the design of it? How did this compare with your other courses?
- Do you think you will want to have such an experience again?
- Would you want to work in such a structure again?
- How different was it compared to other courses and what was more enjoyable?
- What do you think should be different in these projects?
- With what you know now, what would you do different during the project?

COVID19 Effects

- How did COVID19 impact your experience? What changed what improved, what got worse?
- Were there things that had to change from what you expected? If so, in what way?
- Do you think there was anything that improved because of COVID19? If so, in what way?
- Do you think it made your SPA experience more unique?
- What skills did you develop during your experience that are of benefit to you now that you are in hybrid learning?

Future Outlook

- How did your outlook on your future studies change, if at all, because of this project?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you find yourself approaching your studies differently? If so, how?
- Has how you see and interact with your lecturers changed and if so, how?
 - o If yes, do you think these changes will last?

Identity and Belonging

- As a result of working on the project, do you think you view yourself differently? In what way? Why do you think this experience (didn't) change your view of your identity?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you see your future differently?
- How do you feel about being back at university (after SPA, during COVID19)?

Appendix 8. Focus group questions for semester 1 students in the STEM study group.

General skills introductory questions

- Thinking back to the last year, what skills do you feel you developed and worked on the most?
- What was the most significant academic/learning experience that contributed to developing your skills? / Were there any academic experiences this year that stood out to you and why?
- What made it significant for your learning and skills development?
- How did you come about getting involved in them?

Motivations for most significant academic experience

- Thinking about this significant experience, was it what you expected it to be? In what way?
- How different was it compared to other courses/learning and what was more enjoyable?
- How did it impact your perception of your place at the university and in the field?
- How would you define the experience? Why would you define it that way?
- Do you think you will want to have such an experience again?

COVID19 Effects

- How did COVID19 impact your experience this past year? What changed what improved, what got worse?
- What helped you cope?
- Were there things that had to change from what you expected? If so, in what way?
- Do you think there was anything that improved because of COVID19? In what way?
- Do you think it made your university experience more unique?
- What skills did you develop during lockdown and semester 2 2020 that are of benefit to you now that you are in hybrid learning?
- With what you know now, what would you do different during lockdown and hybrid learning?

Future Outlook

- Looking into the future, which skill will you want to focus on developing the most next semester?
- How did your outlook on your future studies change, if at all, because of your experiences last year?
- Have you found yourself making different choices based on your new knowledge from the experience of last year?
- Do you find yourself approaching your studies differently? If so, how?
- Has how you see and interact with your lecturers changed and if so, how?
 - o If yes, do you think these changes will last?

Identity and Belonging

- As a result of your experiences last year, do you think you view yourself differently? In what way? Why do you think this experience (didn't) change your view of your identity?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you see your future differently?
- How do you feel about being back at university this semester?

Appendix 9. Focus group questions for semester 2 students in the STEM study group.

General skills introductory questions

- Thinking back to the last year, what skills do you feel you developed and worked on the most?
- What was the most significant academic/learning experience that contributed to developing your skills? / Were there any academic experiences this year that stood out to you and why?
- What made it significant for your learning and skills development?
- How did you come about getting involved in them?

Motivations for most significant academic experience

- Thinking about this significant experience, was it what you expected it to be? In what way?
- How different was it compared to other courses/learning and what was more enjoyable?
- How did it impact your perception of your place at the university and in the field?
- How would you define the experience? Why would you define it that way?
- Do you think you will want to have such an experience again?

COVID19 Effects

- How did COVID19 impact your experience this past year? What changed what improved, what got worse?
- What helped you cope?
- Were there things that had to change from what you expected? If so, in what way?
- Do you think there was anything that improved because of COVID19? In what way?
- Do you think it made your university experience more unique?
- What skills did you develop during the last semester that are of benefit to you now that you are in hybrid learning?
- With what you know now, what would you do different during hybrid learning?
- What changes did you implement this semester based on your experiences? What do you expect to implement?

Future Outlook

- Looking into the future, which skill will you want to focus on developing the most next semester?
- How did your outlook on your future studies change, if at all, because of your experiences last year?
- Have you found yourself making different choices based on your new knowledge from the experience of last year?
- Do you find yourself approaching your studies differently? If so, how?
- Has how you see and interact with your lecturers changed and if so, how?
 - o If yes, do you think these changes will last?

Identity and Belonging

- As a result of your experiences last year, do you think you view yourself differently? In what way? Why do you think this experience (didn't) change your view of your identity?
- Have you found yourself making different choices based on your new knowledge from the experience?
- Do you see your future differently?
- How do you feel about being back at university this semester?

Appendix 10. Coding Hierarchy from NVivo 12 at the end of coding.

Change in Behaviour	
	Building Community
	Building Relationships
	Change in Behaviour in Lectures after Initiative
	Engaging with Material More
	Reflecting on Previous Study Experience
	Reflection on Independent Learning
	Disliking Online or Hybrid Learning
	Enjoying Online or Hybrid Learning
Change in Future Mindset	
	Changing Study Trajectory
	Positive Outlook on Future
	Focus on Career
	Uncertainty about Future
COVID19 Effects	
	Adapting Plans
	Being Isolated
	Change in stress
	Developing Skills for Online Learning
	Keeping Connected with Others
	Lack of Chance to Connect
	Keeping Occupied
	Flexible Time
	Visualising Future
	Losing Opportunities
	Not Much Change in Plans
Developing Graduate Attributes	
	Developing Collaborative Skills
	Developing Communication Skills
	Comms through Assignments
	Comms through Interpersonal Comms
	Comms through Solo Work
	Comms through Uni Related Activities
	Communication through In Class Activities
	Not Enough Options to Develop
	Developing Content Knowledge
	Novel Way of Learning
	Developing Critical Thinking
	Through Assignments
	Through Essays
	Through in Class Activities
	Through Personal
	Through Research
	Developing Independent Learning
	Developing Skills for Employment
	Independence
	Developing Teamwork Skills
	None
	Through Assignments
	Through in Class Activities
	Through Uni Related Activities
	Developing Time Management
	Flexible Working
	Independence
	Developing Writing Skills
	Through Assignments and Assessment
	Through Essays
	Through Scientific Writing
	Through Solo Work
Initiative Information	
	Expectations of the Initiative

	Explanation of Initiative Motivation for Doing Initiative
Online Learning	
	Allowing Flexibility Comparing to High School Exceeding Expectations Lacking Strategy for Optimisation Small Groups
Perceptions of SaP Initiative	
	Choosing own Topic Frustration with the Initiative Lack of Knowledge or Understanding About Initiative
	Perceiving Staff Good Support from Staff Lack of Support from Staff
	Positive Initiative Experience Being Treated Equally
Quotes for Report	
	SLICC Quote SPA Quote STEM S1 Quote STEM S2 Quote
Reflecting on Abilities	
	Being Self Aware of Gaps in Ability Understanding Own Learning and Teaching
Reflecting on Identity	
	Confidence Considering own Identity Interest in research Mental health Reflection on self

Appendix 11. Important learning experiences and perceived students as partners initiatives experienced by the STEM S1 student group.

Theme of Experience	Student's Activities	What made it significant?	Length of Involvement	SaP ?	If Not Partnership, what?
High School Learning Experiences (research projects, extra preparatory classes) from 1st year students (2x)	Class discussions Essay writing Group study Presenting work	Deep learning Good class environment (productive and motivating) Good peer interactions Learning how to communicate effectively Learning independent research skills	6 months 1 year	Yes No	Individual work/project
In Class Experiences (lectures, tutorials, workshops) (8x)	Following instructions Answering content knowledge questions (2x) Critically engaging with ideas Programming Small group discussions (2x)	Applying knowledge in a practical way (2x) Approaching problems differently Communicating viewpoints to others Communicating with lecturers/tutors (2x) Communicating with peers Content learning Developing in depth knowledge Interacting with lecturers and classmates Non-specified improvement	< 1 month 1 semester (3x) 1 year (3x)	Yes (2x) No (5x) n/a	Class/course/module Group work with other students (2x) Lecturers as experts (3x)
Online Class Experiences (Q&A, online presentations, online lectures) (4x)	Answering content knowledge questions (2x) Learning new ideas Presenting project online Small group discussions Watching lectures	Developing in-depth content knowledge Approaching problems differently Communicating with lecturers/tutors Communicating with peers Developing many skills simultaneously Enjoyable learning experience Getting motivated and enthused in a subject by lecturers Novel activity for the student	1 semester (3x) 1 year	Yes (3x) No	Lecturers as experts
Practical Experience in Curriculum (field work, tutoring) (3x)	Field data collection Field skills Group fortnightly tutoring Large group project and presentation Learning data gathering techniques One-to-one weekly tutoring	Building professional relationships with members of staff Improving writing skills Incorporating multiple aspects of content knowledge Making friends Solidifying and visualising content knowledge/techniques Testing understanding of own content knowledge	< 1 month (2x) 4 months	Yes (2x) No	Lecturers as experts

	R boot camp and statistics Writing reports				
Practical Experience Outside Curriculum (living abroad, industry experience, WWOOF, Model UN) (3x)	Attending conferences Attending meetings Helped farmers with harvesting Participated in mock debate	Becoming flexible and adaptable to new situations Approaching a problem in different ways Communicating with strangers Continuous opportunities for growth Developing skills not taught at university Improving public speaking/stage fright Increasing knowledge about global issues Living outside of home	< 1 month 1 year Unspecified	Yes (3x)	
Research, Project Work, and Assignments (7x)	Reading research Essay writing Learned to reference properly Work on the assignment Writing a scientific paper Wrote various articles/reviews/reports for different audiences on different topics	Learning how to write scientific articles Getting familiar with writing long text Novel to the student Presenting Providing insight into future career Research (individual) (2x) Taking care and ensuring sufficient detail in work Working individually with little support	< 1 month (3x) 1 semester (3x) 3 Years	Yes (3x) No (4x)	Assessment Class/course/module (2x) Lecturers as experts (2x)
Self-study (3x)	Reading notes/books by themselves (2x) Worked through material prepared for the course	Getting a broad overview that can then be deepened Making connections between different parts of the course Spending an appropriate amount of time on each topic Taking time to reflect Working at own pace (2x)	1 year All the time (2x)	Yes No (2x)	Learning/ Studying (2x)
None/Not Filled In (7x)					

Appendix 12. Perceptions of graduate attributes of STEM S1 students within and outside of SaP.

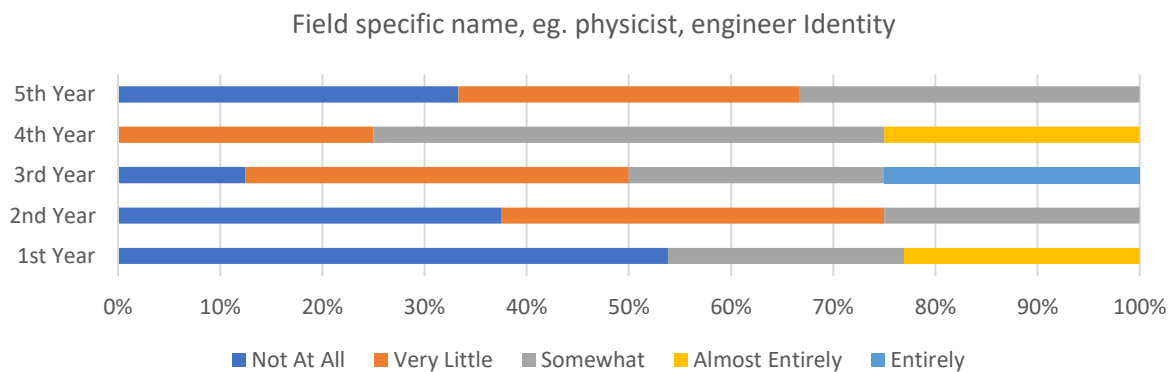
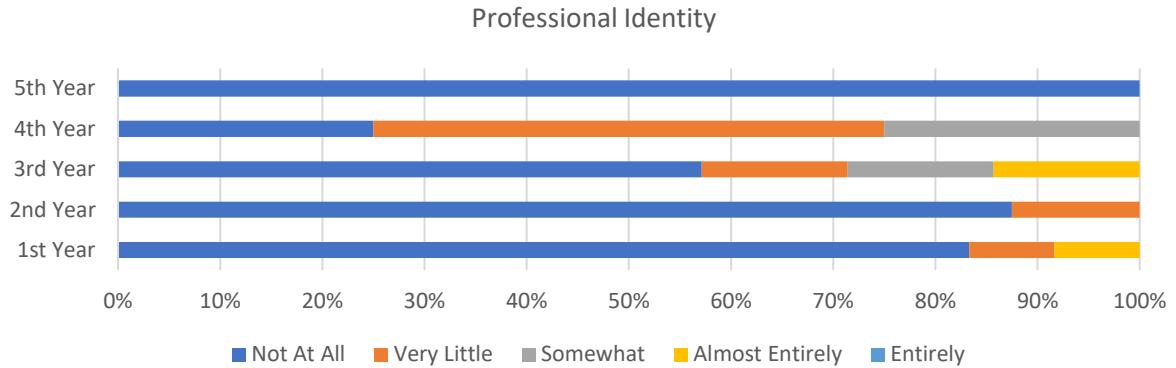
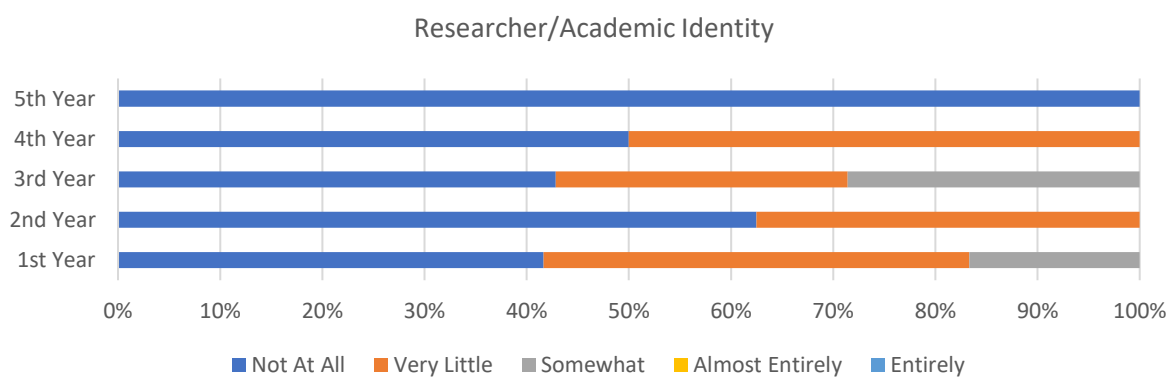
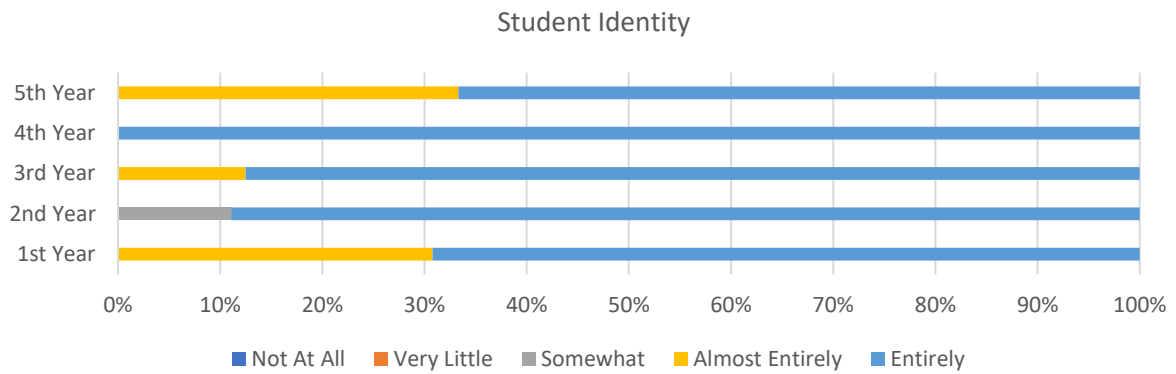
Ranks		Test Statistics ^a							
SaP?		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	Out	36	50	21.07	758.50	92.5	758.5	-3.701	0.000
	In	14		36.89	516.50				
2.1 Communication skills - Confidence	Out	37	51	22.68	839.00	136.0	839.0	-2.901	0.004
	In	14		34.79	487.00				
3.1 Communication skills - Opportunity to develop	Out	37	51	21.68	802.00	99.0	802.0	-3.491	0.000
	In	14		37.43	524.00				
1.2 Writing skills - Ability change	Out	37	51	26.19	969.00	252.0	357.0	-0.159	0.874
	In	14		25.50	357.00				
2.2 Writing skills - Confidence	Out	37	51	25.19	932.00	229.0	932.0	-0.665	0.506
	In	14		28.14	394.00				
3.2 Writing skills - Opportunity to develop	Out	37	51	25.51	944.00	241.0	944.0	-0.394	0.693
	In	14		27.29	382.00				
1.3 Teamwork skills - Ability Change	Out	37	51	23.46	868.00	165.0	868.0	-2.163	0.031
	In	14		32.71	458.00				
2.3 Teamwork skills - Confidence	Out	37	51	22.91	847.50	144.5	847.5	-2.613	0.009
	In	14		34.18	478.50				
3.3 Teamwork skills - Opportunity to develop	Out	37	51	22.03	815.00	112.0	815.0	-3.181	0.001
	In	14		36.50	511.00				
1.4 Critical thinking - Ability change	Out	37	51	26.47	979.50	241.5	346.5	-0.399	0.690
	In	14		24.75	346.50				
2.4 Critical thinking - Confidence	Out	37	51	24.05	890.00	187.0	890.0	-1.668	0.095
	In	14		31.14	436.00				
3.4 Critical thinking - Opportunity to develop	Out	37	51	25.28	935.50	232.5	935.5	-0.585	0.558
	In	14		27.89	390.50				
1.5 Content knowledge - Ability change	Out	37	51	26.95	997.00	224.0	329.0	-0.785	0.433
	In	14		23.50	329.00				
2.5 Content knowledge - Confidence	Out	37	51	25.65	949.00	246.0	949.0	-0.288	0.774
	In	14		26.93	377.00				
3.5 Content knowledge - Opportunity to develop	Out	37	51	26.77	990.50	230.5	335.5	-0.650	0.516
	In	14		23.96	335.50				
1.6 Numerical skills - Ability change	Out	37	51	26.61	984.50	236.5	341.5	-0.492	0.622
	In	14		24.39	341.50				
2.6 Numerical skills - Confidence	Out	37	51	25.73	952.00	249.0	952.0	-0.220	0.826
	In	14		26.71	374.00				
3.6 Numerical skills - Opportunity to develop	Out	37	51	26.16	968.00	253.0	358.0	-0.131	0.895
	In	14		25.57	358.00				
1.7 Qualitative skills - Ability change	Out	37	51	26.62	985.00	236.0	341.0	-0.525	0.600
	In	14		24.36	341.00				
2.7 Qualitative skills - Confidence	Out	37	51	24.95	923.00	220.0	923.0	-0.882	0.378
	In	14		28.79	403.00				
3.7 Qualitative skills - Opportunity to develop	Out	37	51	24.77	916.50	213.5	916.5	-1.012	0.312
	In	14		29.25	409.50				

a. Grouping Variable: SaP?

Appendix 13. STEM S1 group graduate attribute data subdivided by students that reported completing a SaP initiative and those that did not. A-F. Individual graphs of each of the graduate attributes.



Appendix 14. STEM S1 students' identity separated out by year group for each of the positional identity questions.



Appendix 15. STEM S1 student identity and belonging statistical tests as grouped by whether they self-reported being engaged in SaP in the last year or not.

Ranks						Test Statistics ^a				
Perception of Involvement in SaP		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Student Identity	Yes	13	35	21.00	273.00	104.0	357.0	-2.034	0.042	.191 ^b
	No	22		16.23	357.00					
Researcher/Academic Identity	Yes	13	32	19.08	248.00	90.0	280.0	-1.440	0.150	.209 ^b
	No	19		14.74	280.00					
Professional Identity	Yes	13	32	18.35	238.50	99.5	289.5	-1.165	0.244	.362 ^b
	No	19		15.24	289.50					
Field specific name, e.g. physicist, engineer Identity	Yes	13	34	21.46	279.00	85.0	316.0	-1.895	0.058	.070 ^b
	No	21		15.05	316.00					
Belonging - chosen academic community	Yes	13	35	22.38	291.00	86.0	339.0	-2.099	0.036	.053 ^b
	No	22		15.41	339.00					
Belonging - more respected in chosen subject/field	Yes	13	35	23.81	309.50	67.5	320.5	-2.750	0.006	.009 ^b
	No	22		14.57	320.50					
Belonging - more established in my chosen subject/field	Yes	13	35	22.65	294.50	82.5	335.5	-2.240	0.025	.038 ^b
	No	22		15.25	335.50					
Belonging - more comfortable being a university student	Yes	13	35	18.00	234.00	143.0	396.0	0.000	1.000	1.000 ^b
	No	22		18.00	396.00					
Belonging - in discipline beyond the university	Yes	13	35	20.42	265.50	111.5	364.5	-1.134	0.257	.287 ^b
	No	22		16.57	364.50					
SaP mindset	Yes	13	35	21.81	283.50	93.5	346.5	-1.793	0.073	.091 ^b
	No	22		15.75	346.50					

a. Grouping Variable: 6. Would you consider any of the activities/initiatives you took part in throughout your time at the university to be students as partners (an experience where your expertise was considered just as important as the staff members you worked with)? This includes anything you have already talked about.

b. Not corrected for ties.

Appendix 16. Important learning experiences and perceived students as partners initiatives experienced by the STEM S2 student group.

Theme of Experience	Student's Activities	What made it significant?	Length of Involvement	SaP?	If Not SaP, what?
Specific Course Experience (6x)	Class discussions Coursework Essay writing Group essay/project (3x) Programming Replicating academic reports Thinking about course material Tutorials	Developing career skills Gaining confidence in skills Good class environment (productive and motivating) Good peer interactions and teamwork (2x)	3 months 1 semester (3x) 1 year	Yes No (5x)	No staff involved Power hierarchy Taught course (3x)
Lecture Experiences (lectures, online lectures) (5x)	Answering content knowledge questions Following instructions Listening (2x) Small group discussions Taking notes (2x) Working through problems with assistance	Applying knowledge in a practical way (2x) Communicating with lecturers/tutors Content learning Learning material quickly and efficiently Opportunity to ask questions Sense of being back at university	1hr/week 1 semester (3x) 1 year (2x)	Yes (2x) No (4x) n/a	Lecturers as experts (2x) Power hierarchy
Online Course Experiences (tutorials, workshops) (9x)	Answering content knowledge questions Applying theory from lectures Collecting data Listening to discussions Small group discussions (3x) Writing reports	Communicating with lecturers/tutors Communicating with peers and making friends (2x) Developing in-depth content knowledge Developing many skills simultaneously Enjoyable learning experience Feeling challenged Gaining a sense of camaraderie Getting motivated in a subject Going out of one's comfort zone/gaining confidence Novel activity for the student	2 months 1 semester (2x) 1 year (3x) n/a (2x)	Yes (3x) No (5x) n/a	Lecturers as experts (2x) Taught course (2x) n/a
Coursework and Assessments Throughout and at the End of the Semester (11x)	Answering content knowledge questions Having involved conversations No significant experiences Searching for relevant information (3x) Solving physics problems Working on assignments/reports (3x) Working on tests	Being tested frequently Changing working habits Communicating with lecturers/tutors Developing critical thinking skills (2x) Developing many skills simultaneously (4x) Feeling anxious and overworked Getting good feedback Researching answers quickly and efficiently Solidifying and visualising content knowledge/techniques Testing and demonstrating understanding of content knowledge (3x)	< 1 month (2x) 4 years 1 year (5x) n/a (3x)	Yes (2x) No	Lecturers as experts No staff involved No staff involved Student's expertise more important (2x) n/a
Group Work (9x)	Creating a poster Maintaining equal distribution of work (2x)	Developing creative writing Developing many skills simultaneously (2x)	< 1 month (2x) 1 year (2x)	Yes (6x) No (2x)	

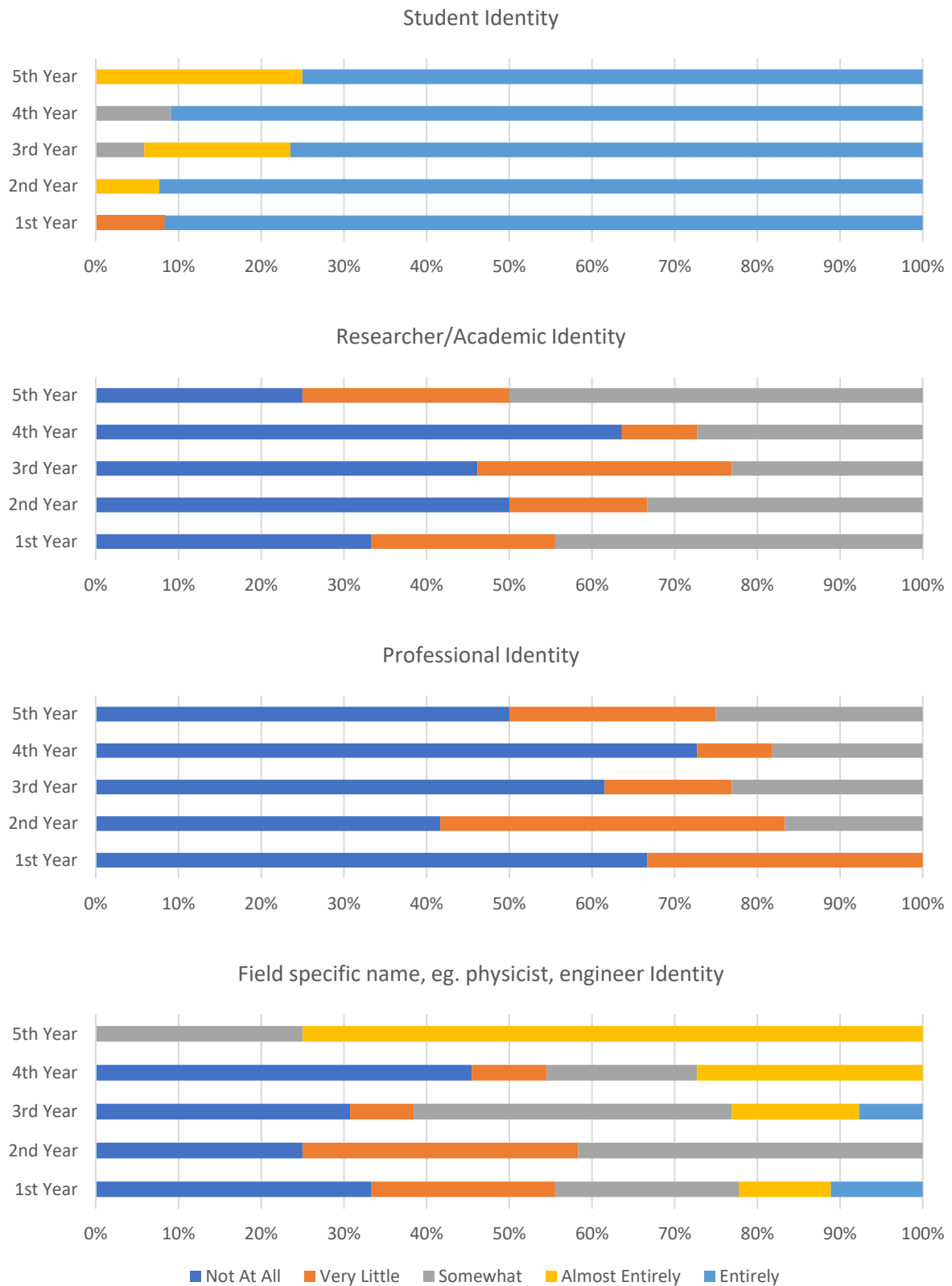
	Meeting with group mates Meeting with supervisor Presenting at a conference Programming Research (2x) Working in a team (2x) Writing a report (2x)	Developing teamwork (e.g. Getting over obstacles) Developing communication skills Gaining insight into field and gaining connections (2x) Going out of one's comfort zone/gaining confidence Having independence in research Interacting with peers/colleagues (2x) Interacting with staff/supervisors Novel experience for the student Working as a group (2x)	Unspecified 1 semester (4x)	n/a	Lecturers as experts (2x)
Research and Project Work (5x)	Choosing research direction (2x) Manuscript writing Producing original data Research (3x) Working with a supervisor/mentor (4x)	Most important part of the degree Novel to the student Research for a long time period Working individually/independently with little support (2x) Working professionally Working with online supervision	1 semester (2x) 1 Years (3x)	Yes (5x)	
University committee work	Organise club structure Participate in training/matches	Spending a lot of time	2 years	Yes	
None/Not Filled in (14x)				Yes (1x) No (13x)	

Appendix 17. Perceptions of graduate attributes of STEM S2 Students within and outside of SaP.

		Ranks				Test Statistics ^a			
Perceptions in and out of SaP		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	Out	58	80	37.51	2175.50	464.5	2175.5	-1.995	0.046
	In	22		48.39	1064.50				
2.1 Communication skills - Confidence	Out	58	80	36.46	2114.50	403.5	2114.5	-2.655	0.008
	In	22		51.16	1125.50				
3.1 Communication skills - Opportunity to develop	Out	58	80	36.07	2092.00	381.0	2092.0	-2.881	0.004
	In	22		52.18	1148.00				
1.2 Writing skills - Ability change	Out	58	80	38.89	2255.50	544.5	2255.5	-1.066	0.287
	In	22		44.75	984.50				
2.2 Writing skills - Confidence	Out	58	79	38.74	2247.00	536.0	2247.0	-0.855	0.392
	In	21		43.48	913.00				
3.2 Writing skills - Opportunity to develop	Out	58	80	39.81	2309.00	598.0	2309.0	-0.452	0.651
	In	22		42.32	931.00				
1.3 Teamwork skills - Ability Change	Out	58	80	37.44	2171.50	460.5	2171.5	-2.033	0.042
	In	22		48.57	1068.50				
2.3 Teamwork skills - Confidence	Out	58	80	38.57	2237.00	526.0	2237.0	-1.271	0.204
	In	22		45.59	1003.00				
3.3 Teamwork skills - Opportunity to develop	Out	58	80	37.04	2148.50	437.5	2148.5	-2.249	0.025
	In	22		49.61	1091.50				
1.4 Critical thinking - Ability change	Out	58	80	39.09	2267.50	556.5	2267.5	-0.967	0.334
	In	22		44.20	972.50				
2.4 Critical thinking - Confidence	Out	58	80	37.42	2170.50	459.5	2170.5	-2.089	0.037
	In	22		48.61	1069.50				
3.4 Critical thinking - Opportunity to develop	Out	58	80	38.37	2225.50	514.5	2225.5	-1.414	0.157
	In	22		46.11	1014.50				
1.5 Content knowledge - Ability change	Out	58	80	42.29	2453.00	534.0	787.0	-1.239	0.215
	In	22		35.77	787.00				
2.5 Content knowledge - Confidence	Out	58	80	35.73	2072.50	361.5	2072.5	-3.128	0.002
	In	22		53.07	1167.50				
3.5 Content knowledge - Opportunity to develop	Out	58	80	42.29	2453.00	534.0	787.0	-1.211	0.226
	In	22		35.77	787.00				
1.6 Numerical skills - Ability change	Out	58	80	42.22	2449.00	538.0	791.0	-1.119	0.263
	In	22		35.95	791.00				
2.6 Numerical skills - Confidence	Out	58	80	41.28	2394.50	592.5	845.5	-0.511	0.609
	In	22		38.43	845.50				
3.6 Numerical skills - Opportunity to develop	Out	58	80	43.99	2551.50	435.5	688.5	-2.248	0.025
	In	22		31.30	688.50				
1.7 Qualitative skills - Ability change	Out	58	80	39.84	2311.00	600.0	2311.0	-0.449	0.653
	In	22		42.23	929.00				
2.7 Qualitative skills - Confidence	Out	58	80	38.73	2246.50	535.5	2246.5	-1.196	0.232
	In	22		45.16	993.50				
3.7 Qualitative skills - Opportunity to develop	Out	58	80	37.80	2192.50	481.5	2192.5	-1.758	0.079
	In	22		47.61	1047.50				

a. Grouping Variable: SaP?

Appendix 18. STEM S2 student identity and belonging as grouped by year group.



Appendix 19. STEM S2 student identity and belonging statistical tests as grouped by whether they self-reported being engaged in SaP in the last year or not.

Ranks						Test Statistics ^a			
Any SaP Experience in the last year		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Student Identity	Yes	19	54	28.21	536.00	319.0	949.0	-0.420	0.675
	No	35		27.11	949.00				
Researcher/Academic Identity	Yes	17	46	32.59	554.00	92.0	527.0	-3.770	0.000
	No	29		18.17	527.00				
Professional Identity	Yes	17	46	28.15	478.50	167.5	602.5	-2.014	0.044
	No	29		20.78	602.50				
Field specific name, e.g. physicist, engineer Identity	Yes	17	46	33.26	565.50	80.5	515.5	-3.909	0.000
	No	29		17.78	515.50				
Belonging - chosen academic community	Yes	19	54	34.32	652.00	203.0	833.0	-2.416	0.016
	No	35		23.80	833.00				
Belonging - more respected in chosen subject/field	Yes	19	54	34.87	662.50	192.5	822.5	-2.709	0.007
	No	35		23.50	822.50				
Belonging - more established in my chosen subject/field	Yes	19	54	39.11	743.00	112.0	742.0	-4.169	0.000
	No	35		21.20	742.00				
Belonging - more comfortable being a university student	Yes	19	54	30.63	582.00	273.0	903.0	-1.169	0.242
	No	35		25.80	903.00				
Belonging - in discipline beyond the university	Yes	19	54	29.26	556.00	299.0	929.0	-0.631	0.528
	No	35		26.54	929.00				
SaP mindset	Yes	19	54	33.55	637.50	217.5	847.5	-2.203	0.028
	No	35		24.21	847.50				

a. Grouping Variable: Any SaP experience in the last year

Appendix 20. Important learning experiences and perceived students as partners experiences (other than SLICCs) experienced by the SLICCs student group.

Theme of Experience	Student's Activities	What made it significant?	Length of Involvement	SaP?	If Not Partnership, what?
In Class Experiences (lectures, tutorials, workshops) (9x)	Listen and participate in discussions (3x) Attending lectures (3x) Attending tutorials (4x) Coursework (3x) Developing a wide range of skills Developing communication skills Engaging in workshops Essay writing (2x) Getting feedback from tutors Independent research and analysis (2x) Learning content knowledge Problem solving tasks	Being encouraged to think critically Gaining confidence Gaining understanding of professional standards of future career Gaining understanding of the practicals Getting practice in through practical examples Immersing oneself in the course content to prepare for class Improved written communication Interesting content in the course Learning to communicate ideas better Novel experience for student (2x) Overcoming feeling intimidated in class	< 1 month (2x) 1/2 semester 1 semester (2x) 1 year (3x) n/a	Yes (5x) No (3x) n/a	Lecturers as experts (3x)
Practical Experience in Curriculum (field work, tutoring) (3x)	Conducting patient interviews Developing critical thinking skills Developing strategy Engaging in laboratories Getting feedback from the team Participating in mock trials Research (2x)	Chance to reflect on own progress Developing skills independently Gaining confidence in public speaking Gaining understanding of professional standards of future career Having a balance of theoretical and practical work Incorporating multiple aspects of content knowledge	< 1 month All year (2x)	Yes (2x) No	n/a
Practical Experience Outside Curriculum (SLICCs, academic society) (3x)	Participating in university (mooting) society Reflective writing process Working in a non-profit	Academic freedom to research whatever student wanted Completing independent research Feeling more confident writing in a new style	6 weeks 8 weeks 1 year	Yes (2x) No	n/a

	Writing up the SLICCs research	Freedom to write in a way they student enjoys Learning content before being taught it in class Presenting arguments and debating			
Research, Project Work, and Assignments (3x)	Expanding content knowledge Expanding knowledge in area of personal interest Preparing for seminars Presenting Reading provided resources Research Working in a team Writing out notes	Learning about area of personal and career interest Learning how to learn on their own Providing a quality presentation Providing insight into future career Splitting up work equally in a team Working well together in a team	< 1 month (2x) 3 Years	Yes (2x) No	More like an internship
Writing Practice (4x)	Attending tutorials Developing communication / writing skills Discussing with classmates Independent research Learning how to write essays Writing a variety of different essay types and reports	Exploring new writing styles Feeling pressure to perform Getting graded Getting practice in an area that has not been used for a while (2x) Getting the opportunity to express oneself in different writing styles	6 months All degree 1 year n/a	Yes (3x) No	Not sure what SaP means
None/Not Filled in (1x)					

Appendix 21. Perceptions of graduate attributes of SLICCs student group throughout and outside of their SLICCs.

Ranks		Test Statistics ^a							
Within or Outside of SLICCs		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	In SLICCs	25	50	23.56	589.00	264.000	589.000	-1.040	0.298
	Outside	25		27.44	686.00				
2.1 Communication skills - Confidence	In SLICCs	24	48	20.02	480.50	180.500	480.500	-2.458	0.014
	Outside	24		28.98	695.50				
3.1 Communication skills - Opportunity to develop	In SLICCs	25	50	23.38	584.50	259.500	584.500	-1.097	0.272
	Outside	25		27.62	690.50				
1.2 Writing skills - Ability change	In SLICCs	25	50	26.46	661.50	288.500	613.500	-0.519	0.604
	Outside	25		24.54	613.50				
2.2 Writing skills - Confidence	In SLICCs	24	48	23.96	575.00	275.000	575.000	-0.301	0.763
	Outside	24		25.04	601.00				
3.2 Writing skills - Opportunity to develop	In SLICCs	25	50	28.70	717.50	232.500	557.500	-1.717	0.086
	Outside	25		22.30	557.50				
1.3 Teamwork skills - Ability Change	In SLICCs	25	50	21.32	533.00	208.000	533.000	-2.480	0.013
	Outside	25		29.68	742.00				
2.3 Teamwork skills - Confidence	In SLICCs	24	48	18.81	451.50	151.500	451.500	-3.266	0.001
	Outside	24		30.19	724.50				
3.3 Teamwork skills - Opportunity to develop	In SLICCs	24	48	16.71	401.00	101.000	401.000	-3.986	0.000
	Outside	24		32.29	775.00				
1.4 Critical thinking - Ability change	In SLICCs	25	49	22.72	568.00	243.000	568.000	-1.295	0.195
	Outside	24		27.38	657.00				
2.4 Critical thinking - Confidence	In SLICCs	24	48	23.00	552.00	252.000	552.000	-0.829	0.407
	Outside	24		26.00	624.00				
3.4 Critical thinking - Opportunity to develop	In SLICCs	25	50	25.74	643.50	306.500	631.500	-0.132	0.895
	Outside	25		25.26	631.50				
1.5 Content knowledge - Ability change	In SLICCs	25	50	25.50	637.50	312.500	637.500	0.000	1.000
	Outside	25		25.50	637.50				
2.5 Content knowledge - Confidence	In SLICCs	24	48	25.21	605.00	271.000	571.000	-0.395	0.693
	Outside	24		23.79	571.00				
3.5 Content knowledge - Opportunity to develop	In SLICCs	25	50	25.80	645.00	305.000	630.000	-0.167	0.867
	Outside	25		25.20	630.00				
1.6 Numerical skills - Ability change	In SLICCs	25	50	23.02	575.50	250.500	575.500	-1.565	0.118
	Outside	25		27.98	699.50				
2.6 Numerical skills - Confidence	In SLICCs	24	48	22.10	530.50	230.500	530.500	-1.615	0.106
	Outside	24		26.90	645.50				
3.6 Numerical skills - Opportunity to develop	In SLICCs	25	50	22.50	562.50	237.500	562.500	-1.515	0.130
	Outside	25		28.50	712.50				
1.7 Qualitative skills - Ability change	In SLICCs	25	50	23.88	597.00	272.000	597.000	-0.845	0.398
	Outside	25		27.12	678.00				
2.7 Qualitative skills - Confidence	In SLICCs	24	48	24.00	576.00	276.000	576.000	-0.270	0.787
	Outside	24		25.00	600.00				
3.7 Qualitative skills - Opportunity to develop	In SLICCs	25	50	25.90	647.50	302.500	627.500	-0.203	0.839
	Outside	25		25.10	627.50				

a. Grouping Variable: Within or Outside of SLICCs

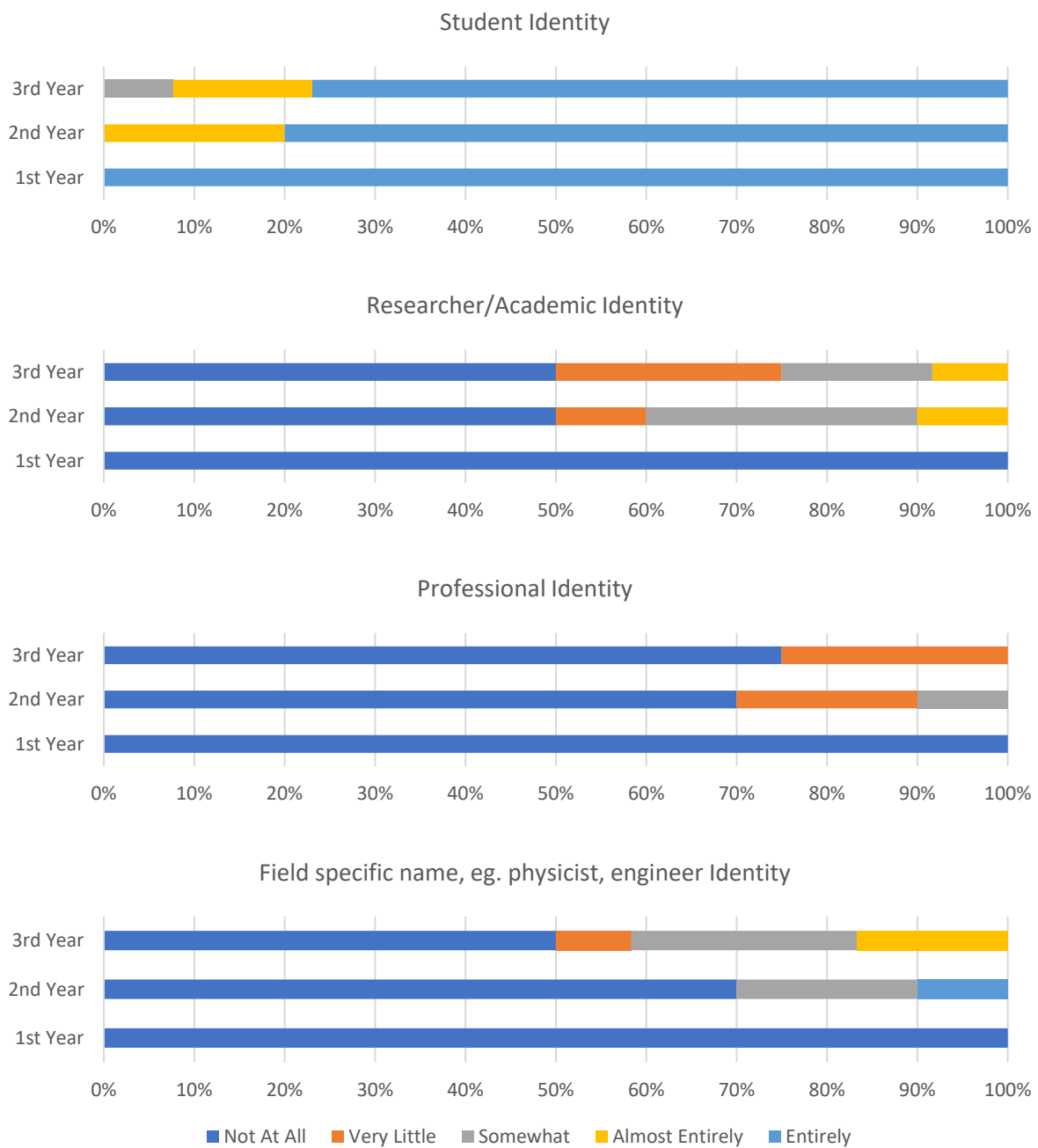
Appendix 22. SLICCs student identity and belonging statistical tests as grouped by whether they considered their experiences to be SaP or not.

Ranks						Test Statistics ^a				
Perceived to be involved in SaP or not		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Student Identity	Yes	16	21	10.84	173.50	37.5	173.5	-0.278	0.781	.842 ^b
	No	5		11.50	57.50					
Researcher/Academic Identity	Yes	14	19	10.61	148.50	26.5	41.5	-0.860	0.390	.444 ^b
	No	5		8.30	41.50					
Professional Identity	Yes	14	19	9.54	133.50	28.5	133.5	-0.788	0.431	.559 ^b
	No	5		11.30	56.50					
Field specific name, e.g. physicist, engineer Identity	Yes	14	19	9.21	129.00	24.0	129.0	-1.191	0.234	.343 ^b
	No	5		12.20	61.00					
Belonging - chosen academic community	Yes	16	21	11.19	179.00	37.0	52.0	-0.264	0.791	.842 ^b
	No	5		10.40	52.00					
Belonging - more respected in chosen subject/field	Yes	16	21	12.66	202.50	13.5	28.5	-2.460	0.014	.025 ^b
	No	5		5.70	28.50					
Belonging - more established in my chosen subject/field	Yes	16	21	12.06	193.00	23.0	38.0	-1.519	0.129	.179 ^b
	No	5		7.60	38.00					
Belonging - more comfortable being a university student	Yes	16	21	12.53	200.50	15.5	30.5	-2.180	0.029	.040 ^b
	No	5		6.10	30.50					
Belonging - in discipline beyond the university	Yes	16	21	11.75	188.00	28.0	43.0	-1.060	0.289	.354 ^b
	No	5		8.60	43.00					
SaP mindset	Yes	16	21	11.06	177.00	39.0	54.0	-0.086	0.932	.968 ^b
	No	5		10.80	54.00					

a. Grouping Variable: Perceived SaP or not

b. Not corrected for ties.

Appendix 23. SLICCs student group identity and belonging as grouped by year group. One response was removed from this as they did not indicate a year group.



Appendix 24. Progression in graduate attributes throughout the year by semester.

Ranks						Test Statistics ^a			
Progression Throughout Semesters		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	STEM S1	36	94	52.57	1892.5	861.5	2572.5	-1.509	0.131
	STEM S2	58		44.35	2572.5				
2.1 Communication skills - Confidence	STEM S1	37	95	54.96	2033.5	815.5	2526.5	-2.099	0.036
	STEM S2	58		43.56	2526.5				
3.1 Communication skills - Opportunity to develop	STEM S1	37	95	55.66	2059.5	789.5	2500.5	-2.266	0.023
	STEM S2	58		43.11	2500.5				
1.2 Writing skills - Ability change	STEM S1	37	95	56.45	2088.5	760.5	2471.5	-2.525	0.012
	STEM S2	58		42.61	2471.5				
2.2 Writing skills - Confidence	STEM S1	37	95	57.62	2132.0	717.0	2428.0	-2.830	0.005
	STEM S2	58		41.86	2428.0				
3.2 Writing skills - Opportunity to develop	STEM S1	37	95	52.93	1958.5	890.5	2601.5	-1.458	0.145
	STEM S2	58		44.85	2601.5				
1.3 Teamwork skills - Ability Change	STEM S1	37	95	54.92	2032.0	817.0	2528.0	-2.096	0.036
	STEM S2	58		43.59	2528.0				
2.3 Teamwork skills - Confidence	STEM S1	37	95	49.12	1817.5	1031.5	2742.5	-0.338	0.735
	STEM S2	58		47.28	2742.5				
3.3 Teamwork skills - Opportunity to develop	STEM S1	37	95	48.27	1786.0	1063.0	2774.0	-0.080	0.937
	STEM S2	58		47.83	2774.0				
1.4 Critical thinking - Ability change	STEM S1	37	95	53.42	1976.5	872.5	2583.5	-1.644	0.100
	STEM S2	58		44.54	2583.5				
2.4 Critical thinking - Confidence	STEM S1	37	95	52.08	1927.0	922.0	2633.0	-1.255	0.209
	STEM S2	58		45.40	2633.0				
3.4 Critical thinking - Opportunity to develop	STEM S1	37	95	52.54	1944.0	905.0	2616.0	-1.343	0.179
	STEM S2	58		45.10	2616.0				
1.5 Content knowledge - Ability change	STEM S1	37	95	45.22	1673.0	970.0	1673.0	-0.863	0.388
	STEM S2	58		49.78	2887.0				
2.5 Content knowledge - Confidence	STEM S1	37	95	54.23	2006.5	842.5	2553.5	-1.849	0.064
	STEM S2	58		44.03	2553.5				
3.5 Content knowledge - Opportunity to develop	STEM S1	37	95	48.11	1780.0	1069.0	2780.0	-0.033	0.973
	STEM S2	58		47.93	2780.0				
1.6 Numerical skills - Ability change	STEM S1	37	95	52.38	1938.0	911.0	2622.0	-1.279	0.201
	STEM S2	58		45.21	2622.0				
2.6 Numerical skills - Confidence	STEM S1	37	95	52.36	1937.5	911.5	2622.5	-1.278	0.201
	STEM S2	58		45.22	2622.5				
3.6 Numerical skills - Opportunity to develop	STEM S1	37	95	48.89	1809.0	1040.0	2751.0	-0.260	0.795
	STEM S2	58		47.43	2751.0				
1.7 Qualitative skills - Ability change	STEM S1	37	95	51.54	1907.0	942.0	2653.0	-1.091	0.275
	STEM S2	58		45.74	2653.0				
2.7 Qualitative skills - Confidence	STEM S1	37	95	52.20	1931.5	917.5	2628.5	-1.278	0.201
	STEM S2	58		45.32	2628.5				
3.7 Qualitative skills - Opportunity to develop	STEM S1	37	95	51.05	1889.0	960.0	2671.0	-0.909	0.364
	STEM S2	58		46.05	2671.0				

a. Grouping Variable: Progression Throughout Semesters

Appendix 25. Progression in graduate attributes during perceived SaP experiences.

Ranks						Test Statistics ^a				
STEM S1 or S2?		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
1.1 Communication skills - Ability change	STEM S1	14	36	24.46	342.50	70.5	323.5	-2.979	0.003	.006 ^b
	STEM S2	22		14.70	323.50					
2.1 Communication skills - Confidence	STEM S1	14	36	20.54	287.50	125.5	378.5	-1.024	0.306	.360 ^b
	STEM S2	22		17.20	378.50					
3.1 Communication skills - Opportunity to develop	STEM S1	14	36	24.04	336.50	76.5	329.5	-2.662	0.008	.011 ^b
	STEM S2	22		14.98	329.50					
1.2 Writing skills - Ability change	STEM S1	14	36	20.00	280.00	133.0	386.0	-0.726	0.468	.511 ^b
	STEM S2	22		17.55	386.00					
2.2 Writing skills - Confidence	STEM S1	14	35	22.04	308.50	90.5	321.5	-2.024	0.043	.056 ^b
	STEM S2	21		15.31	321.50					
3.2 Writing skills - Opportunity to develop	STEM S1	14	36	20.18	282.50	130.5	383.5	-0.789	0.430	.451 ^b
	STEM S2	22		17.43	383.50					
1.3 Teamwork skills - Ability Change	STEM S1	14	36	21.64	303.00	110.0	363.0	-1.537	0.124	.160 ^b
	STEM S2	22		16.50	363.00					
2.3 Teamwork skills - Confidence	STEM S1	14	36	21.50	301.00	112.0	365.0	-1.446	0.148	.180 ^b
	STEM S2	22		16.59	365.00					
3.3 Teamwork skills - Opportunity to develop	STEM S1	14	36	22.21	311.00	102.0	355.0	-1.756	0.079	.095 ^b
	STEM S2	22		16.14	355.00					
1.4 Critical thinking - Ability change	STEM S1	14	36	18.68	261.50	151.5	404.5	-0.093	0.926	.936 ^b
	STEM S2	22		18.39	404.50					
2.4 Critical thinking - Confidence	STEM S1	14	36	20.11	281.50	131.5	384.5	-0.803	0.422	.470 ^b
	STEM S2	22		17.48	384.50					
3.4 Critical thinking - Opportunity to develop	STEM S1	14	36	19.68	275.50	137.5	390.5	-0.565	0.572	.597 ^b
	STEM S2	22		17.75	390.50					
1.5 Content knowledge - Ability change	STEM S1	14	36	16.93	237.00	132.0	237.0	-0.758	0.449	.490 ^b
	STEM S2	22		19.50	429.00					
2.5 Content knowledge - Confidence	STEM S1	14	36	16.50	231.00	126.0	231.0	-0.963	0.335	.377 ^b
	STEM S2	22		19.77	435.00					
3.5 Content knowledge - Opportunity to develop	STEM S1	14	36	19.00	266.00	147.0	400.0	-0.242	0.809	.835 ^b
	STEM S2	22		18.18	400.00					
1.6 Numerical skills - Ability change	STEM S1	14	36	21.25	297.50	115.5	368.5	-1.317	0.188	.215 ^b
	STEM S2	22		16.75	368.50					
2.6 Numerical skills - Confidence	STEM S1	14	36	21.57	302.00	111.0	364.0	-1.506	0.132	.170 ^b
	STEM S2	22		16.55	364.00					
3.6 Numerical skills - Opportunity to develop	STEM S1	14	36	21.89	306.50	106.5	359.5	-1.577	0.115	.124 ^b
	STEM S2	22		16.34	359.50					
1.7 Qualitative skills - Ability change	STEM S1	14	36	18.18	254.50	149.5	254.5	-0.159	0.874	.885 ^b
	STEM S2	22		18.70	411.50					
2.7 Qualitative skills - Confidence	STEM S1	14	36	20.11	281.50	131.5	384.5	-0.790	0.429	.470 ^b
	STEM S2	22		17.48	384.50					
3.7 Qualitative skills - Opportunity to develop	STEM S1	14	36	18.43	258.00	153.0	258.0	-0.034	0.973	.987 ^b
	STEM S2	22		18.55	408.00					

a. Grouping Variable: S1 or S2

b. Not corrected for ties.

Appendix 26. Combined STEM S1 and S2 datasets split perceptions within and outside of SaP.

Ranks					Test Statistics ^a				
SaP?		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	Outside	94	130	58.5	5494.5	1029.5	5494.5	-3.675	0.000
	Inside	36		83.9	3020.5				
2.1 Communication skills - Confidence	Outside	95	131	58.7	5581.0	1021.0	5581.0	-3.799	0.000
	Inside	36		85.1	3065.0				
3.1 Communication skills - Opportunity to develop	Outside	95	131	57.7	5481.5	921.5	5481.5	-4.198	0.000
	Inside	36		87.9	3164.5				
1.2 Writing skills - Ability change	Outside	95	131	64.6	6135.5	1575.5	6135.5	-0.735	0.462
	Inside	36		69.7	2510.5				
2.2 Writing skills - Confidence	Outside	95	130	63.3	6013.5	1453.5	6013.5	-1.147	0.251
	Inside	35		71.5	2501.5				
3.2 Writing skills - Opportunity to develop	Outside	95	131	64.9	6163.0	1603.0	6163.0	-0.574	0.566
	Inside	36		69.0	2483.0				
1.3 Teamwork skills - Ability Change	Outside	95	131	60.6	5753.5	1193.5	5753.5	-2.851	0.004
	Inside	36		80.3	2892.5				
2.3 Teamwork skills - Confidence	Outside	95	131	61.1	5806.5	1246.5	5806.5	-2.536	0.011
	Inside	36		78.9	2839.5				
3.3 Teamwork skills - Opportunity to develop	Outside	95	131	58.5	5555.0	995.0	5555.0	-3.806	0.000
	Inside	36		85.9	3091.0				
1.4 Critical thinking - Ability change	Outside	95	131	65.2	6196.0	1636.0	6196.0	-0.415	0.678
	Inside	36		68.1	2450.0				
2.4 Critical thinking - Confidence	Outside	95	131	61.1	5801.0	1241.0	5801.0	-2.636	0.008
	Inside	36		79.0	2845.0				
3.4 Critical thinking - Opportunity to develop	Outside	95	131	63.2	6005.0	1445.0	6005.0	-1.432	0.152
	Inside	36		73.4	2641.0				
1.5 Content knowledge - Ability change	Outside	95	131	68.7	6527.0	1453.0	2119.0	-1.437	0.151
	Inside	36		58.9	2119.0				
2.5 Content knowledge - Confidence	Outside	95	131	60.8	5779.5	1219.5	5779.5	-2.651	0.008
	Inside	36		79.6	2866.5				
3.5 Content knowledge - Opportunity to develop	Outside	95	131	68.6	6514.5	1465.5	2131.5	-1.361	0.173
	Inside	36		59.2	2131.5				
1.6 Numerical skills - Ability change	Outside	95	131	68.2	6481.5	1498.5	2164.5	-1.128	0.259
	Inside	36		60.1	2164.5				
2.6 Numerical skills - Confidence	Outside	95	131	66.5	6321.0	1659.0	2325.0	-0.273	0.785
	Inside	36		64.6	2325.0				
3.6 Numerical skills - Opportunity to develop	Outside	95	131	69.7	6621.0	1359.0	2025.0	-1.861	0.063
	Inside	36		56.3	2025.0				
1.7 Qualitative skills - Ability change	Outside	95	131	66.0	6270.5	1709.5	2375.5	-0.003	0.998
	Inside	36		66.0	2375.5				
2.7 Qualitative skills - Confidence	Outside	95	131	63.2	6008.5	1448.5	6008.5	-1.453	0.146
	Inside	36		73.3	2637.5				
3.7 Qualitative skills - Opportunity to develop	Outside	95	131	62.1	5897.0	1337.0	5897.0	-2.011	0.044
	Inside	36		76.4	2749.0				

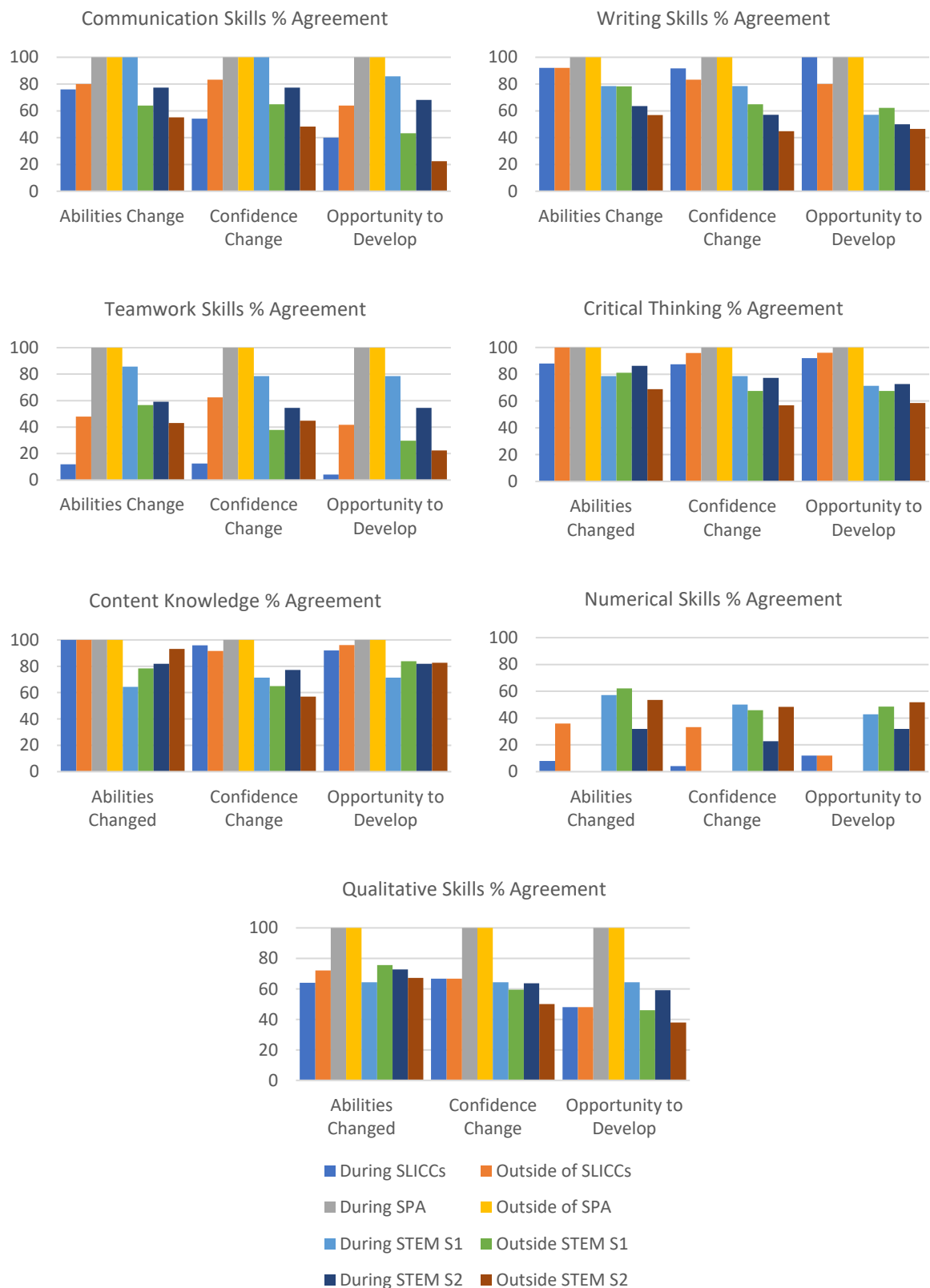
a. Grouping Variable: SaP?

Appendix 27. Comparisons of perceptions of identity and belonging across the semesters.

Ranks						Test Statistics ^a			
Progression General Throughout Year		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Student Identity	STEM S1	37	95	47.19	1746.0	1043.0	1746.0	-0.352	0.725
	STEM S2	58		48.52	2814.0				
Researcher/Academic Identity	STEM S1	34	84	38.59	1312.0	717.0	1312.0	-1.315	0.189
	STEM S2	50		45.16	2258.0				
Professional Identity	STEM S1	34	84	38.93	1323.5	728.5	1323.5	-1.301	0.193
	STEM S2	50		44.93	2246.5				
Field specific name, e.g. physicist, engineer Identity	STEM S1	36	86	41.19	1483.0	817.0	1483.0	-0.752	0.452
	STEM S2	50		45.16	2258.0				
Belonging - chosen academic community	STEM S1	37	95	55.97	2071.0	778.0	2489.0	-2.343	0.019
	STEM S2	58		42.91	2489.0				
Belonging - more respected in chosen subject/field	STEM S1	37	95	53.15	1966.5	882.5	2593.5	-1.541	0.123
	STEM S2	58		44.72	2593.5				
Belonging - more established in my chosen subject/field	STEM S1	37	95	52.54	1944.0	905.0	2616.0	-1.357	0.175
	STEM S2	58		45.10	2616.0				
Belonging - more comfortable being a university student	STEM S1	37	95	57.89	2142.0	707.0	2418.0	-2.978	0.003
	STEM S2	58		41.69	2418.0				
Belonging - in discipline beyond the university	STEM S1	37	95	53.41	1976.0	873.0	2584.0	-1.592	0.111
	STEM S2	58		44.55	2584.0				
SaP mindset	STEM S1	37	95	54.72	2024.5	824.5	2535.5	-1.984	0.047
	STEM S2	58		43.72	2535.5				

a. Grouping Variable: Progression General Throughout Year

Appendix 28. Percentage agreement across all the data groups.



Appendix 29. Comparison of SLICCs and STEM S1 graduate attributes throughout the general year.

Ranks						Test Statistics ^a			
SLICCs or STEM S1?		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1.1 Communication skills - Ability change	SLICCs	25	62	50.00	1250.0	0.0	703.0	-7.526	0.000
	STEM S1	37		19.00	703.0				
2.1 Communication skills - Confidence	SLICCs	24	61	32.15	771.5	416.5	1119.5	-0.448	0.654
	STEM S1	37		30.26	1119.5				
3.1 Communication skills - Opportunity to develop	SLICCs	25	62	31.96	799.0	451.0	1154.0	-0.177	0.859
	STEM S1	37		31.19	1154.0				
1.2 Writing skills - Ability change	SLICCs	25	61	38.14	953.5	271.5	937.5	-2.849	0.004
	STEM S1	36		26.04	937.5				
2.2 Writing skills - Confidence	SLICCs	24	61	36.88	885.0	303.0	1006.0	-2.259	0.024
	STEM S1	37		27.19	1006.0				
3.2 Writing skills - Opportunity to develop	SLICCs	25	62	39.18	979.5	270.5	973.5	-2.870	0.004
	STEM S1	37		26.31	973.5				
1.3 Teamwork skills - Ability Change	SLICCs	25	62	24.72	618.0	293.0	618.0	-2.585	0.010
	STEM S1	37		36.08	1335.0				
2.3 Teamwork skills - Confidence	SLICCs	24	61	27.98	671.5	371.5	671.5	-1.127	0.260
	STEM S1	37		32.96	1219.5				
3.3 Teamwork skills - Opportunity to develop	SLICCs	24	61	27.00	648.0	348.0	648.0	-1.476	0.140
	STEM S1	37		33.59	1243.0				
1.4 Critical thinking - Ability change	SLICCs	24	61	43.56	1045.5	142.5	845.5	-4.751	0.000
	STEM S1	37		22.85	845.5				
2.4 Critical thinking - Confidence	SLICCs	24	61	43.06	1033.5	154.5	857.5	-4.527	0.000
	STEM S1	37		23.18	857.5				
3.4 Critical thinking - Opportunity to develop	SLICCs	25	62	45.46	1136.5	113.5	816.5	-5.160	0.000
	STEM S1	37		22.07	816.5				
1.5 Content knowledge - Ability change	SLICCs	25	62	38.10	952.5	297.5	1000.5	-2.609	0.009
	STEM S1	37		27.04	1000.5				
2.5 Content knowledge - Confidence	SLICCs	24	61	39.96	959.0	229.0	932.0	-3.456	0.001
	STEM S1	37		25.19	932.0				
3.5 Content knowledge - Opportunity to develop	SLICCs	25	62	37.50	937.5	312.5	1015.5	-2.305	0.021
	STEM S1	37		27.45	1015.5				
1.6 Numerical skills - Ability change	SLICCs	25	62	23.08	577.0	252.0	577.0	-3.147	0.002
	STEM S1	37		37.19	1376.0				
2.6 Numerical skills - Confidence	SLICCs	24	61	25.17	604.0	304.0	604.0	-2.172	0.030
	STEM S1	37		34.78	1287.0				
3.6 Numerical skills - Opportunity to develop	SLICCs	25	62	17.24	431.0	106.0	431.0	-5.269	0.000
	STEM S1	37		41.14	1522.0				
1.7 Qualitative skills - Ability change	SLICCs	25	62	32.58	814.5	435.5	1138.5	-0.405	0.686
	STEM S1	37		30.77	1138.5				
2.7 Qualitative skills - Confidence	SLICCs	24	61	34.54	829.0	359.0	1062.0	-1.313	0.189
	STEM S1	37		28.70	1062.0				
3.7 Qualitative skills - Opportunity to develop	SLICCs	25	62	31.30	782.50	457.5	782.5	-0.075	0.940
	STEM S1	37		31.64	1170.50				

a. Grouping Variable: Unique Response Number

Appendix 30. Global data comparison of students' perceptions of their graduate attributes throughout the general year (Gp1) to throughout their SaP initiative (Gp2).

		Ranks				Test Statistics ^a			
SaP?		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asym p. Sig. (2-tailed)
1.1 Communication skills - Ability change	Gp1	120	182	83.90	10067.5	2807.5	10067.5	-2.918	0.004
	Gp2	62		106.22	6585.5				
2.1 Communication skills - Confidence	Gp1	120	181	84.94	10192.5	2932.5	10192.5	-2.353	0.019
	Gp2	61		102.93	6278.5				
3.1 Communication skills - Opportunity to develop	Gp1	121	183	82.27	9955.0	2574.0	9955.0	-3.602	0.000
	Gp2	62		110.98	6881.0				
1.2 Writing skills - Ability change	Gp1	121	183	87.37	10572.0	3191.0	10572.0	-1.763	0.078
	Gp2	62		101.03	6264.0				
2.2 Writing skills - Confidence	Gp1	120	180	86.30	10355.5	3095.5	10355.5	-1.616	0.106
	Gp2	60		98.91	5934.5				
3.2 Writing skills - Opportunity to develop	Gp1	121	183	85.25	10315.5	2934.5	10315.5	-2.519	0.012
	Gp2	62		105.17	6520.5				
1.3 Teamwork skills - Ability Change	Gp1	121	183	89.96	10885.0	3504.0	10885.0	-0.788	0.431
	Gp2	62		95.98	5951.0				
2.3 Teamwork skills - Confidence	Gp1	120	181	89.49	10739.0	3479.0	10739.0	-0.584	0.559
	Gp2	61		93.97	5732.0				
3.3 Teamwork skills - Opportunity to develop	Gp1	120	181	90.45	10853.5	3593.5	10853.5	-0.205	0.837
	Gp2	61		92.09	5617.5				
1.4 Critical thinking - Ability change	Gp1	120	182	90.36	10843.5	3583.5	10843.5	-0.440	0.660
	Gp2	62		93.70	5809.5				
2.4 Critical thinking - Confidence	Gp1	120	181	84.31	10117.0	2857.0	10117.0	-2.626	0.009
	Gp2	61		104.16	6354.0				
3.4 Critical thinking - Opportunity to develop	Gp1	121	183	86.33	10445.5	3064.5	10445.5	-2.142	0.032
	Gp2	62		103.07	6390.5				
1.5 Content knowledge - Ability change	Gp1	121	183	93.54	11318.0	3565.0	5518.0	-0.606	0.545
	Gp2	62		89.00	5518.0				
2.5 Content knowledge - Confidence	Gp1	120	181	82.29	9875.0	2615.0	9875.0	-3.317	0.001
	Gp2	61		108.13	6596.0				
3.5 Content knowledge - Opportunity to develop	Gp1	121	183	93.64	11331.0	3552.0	5505.0	-0.642	0.521
	Gp2	62		88.79	5505.0				
1.6 Numerical skills - Ability change	Gp1	121	183	97.20	11761.5	3121.5	5074.5	-1.951	0.051
	Gp2	62		81.85	5074.5				
2.6 Numerical skills - Confidence	Gp1	120	181	93.67	11240.5	3339.5	5230.5	-1.023	0.306
	Gp2	61		85.75	5230.5				
3.6 Numerical skills - Opportunity to develop	Gp1	121	183	100.54	12165.0	2718.0	4671.0	-3.122	0.002
	Gp2	62		75.34	4671.0				
1.7 Qualitative skills - Ability change	Gp1	121	183	93.36	11297.0	3586.0	5539.0	-0.528	0.598
	Gp2	62		89.34	5539.0				
2.7 Qualitative skills - Confidence	Gp1	120	181	87.40	10488.0	3228.0	10488.0	-1.403	0.161
	Gp2	61		98.08	5983.0				
3.7 Qualitative skills - Opportunity to develop	Gp1	121	183	86.96	10522.0	3141.0	10522.0	-1.882	0.060
	Gp2	62		101.84	6314.0				

a. Grouping Variable:
SaP?

Appendix 31. Students' perception of identity and belonging depending on whether they perceived to have completed a SaP initiative or not.

Ranks						Test Statistics ^a			
Group		N	Total N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Took part in SaP?	Yes	49	111	57.60	2822.5	1440.5	3393.5	-0.713	0.476
	No	62		54.73	3393.5				
Researcher/ Academic Identity	Yes	45	98	60.37	2716.5	703.5	2134.5	-3.765	0.000
	No	53		40.27	2134.5				
Professional Identity	Yes	45	98	54.02	2431.0	989.0	2420.0	-1.707	0.088
	No	53		45.66	2420.0				
Field specific name, e.g. physicist, engineer Identity	Yes	45	100	58.86	2648.5	861.5	2401.5	-2.719	0.007
	No	55		43.66	2401.5				
Belonging - chosen academic community	Yes	49	111	65.83	3225.5	1037.5	2990.5	-2.993	0.003
	No	62		48.23	2990.5				
Belonging - more respected in chosen subject/field	Yes	49	111	69.71	3416.0	847.0	2800.0	-4.299	0.000
	No	62		45.16	2800.0				
Belonging - more established in my chosen subject/field	Yes	49	111	72.43	3549.0	714.0	2667.0	-5.067	0.000
	No	62		43.02	2667.0				
Belonging - more comfortable being a university student	Yes	49	111	62.82	3078.0	1185.0	3138.0	-2.113	0.035
	No	62		50.61	3138.0				
Belonging - in discipline beyond the university	Yes	49	111	62.15	3045.5	1217.5	3170.5	-1.878	0.060
	No	62		51.14	3170.5				
SaP mindset	Yes	49	111	67.19	3292.5	970.5	2923.5	-3.403	0.001
	No	62		47.15	2923.5				

a. Grouping Variable: Took part in perceived SaP?