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Digital Annotations: an exploration of experiences

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Abstract

Digital texts and learning platforms introduce possibilities of forms of reading and writing that can be contrasted with pre-digital understandings of how readers and writers interact with texts. In current Higher education contexts, there is a requirement to embrace the use of digital technologies to access study materials and engage with academic practices; these technologies are often selected and supported by university computing support, or staff creating the course of study, and those participating are expected to accept and grasp the potential for their own work. At the same time students and staff, who can be from diverse language and cultural contexts, are expected to conform to the visible academic, linguistic and cultural practices for writing, submitting texts, and taking part in learning discussions. Study practices also include various forms of notes, comments and annotations to texts that are sometimes private and sometimes exchanged in various ways, including digital formats. Although constraints are placed on what is acceptable in the visible academic settings, the digital choices available to staff and students are extensive. Concurrent to this, changes in course design, resources and support (for staff and students) are being subtly changed in a way that may seem routine (Goodfellow & Lea, 2013) but are gradually and significantly changing the way reading and writing are regarded.

This study explores the use of modifications to texts which are variously labelled as digital notes, comments or annotations, with a focus on how these are valued and how they can change perceptions of reader, writer and text in Higher education study practices. These modifications often (but not necessarily) take the form of additions that are marked, separated, or indicated by colour/emphasis to indicate that they are not part of the original text; however, the original digital text has been changed by these modifications, and the resulting text now incorporates the original with layers of new text. This creates a new digital text, which can, of course, undergo further transformation if the process is repeated. In the context of this study, the term "digital annotations" is used for modifications that are created digitally (using different modalities, so could include graphic, photographic as well as written and audio texts) and therefore become part of the creation of new texts. The study draws on theories of literacy, applied linguistics, and social semiotics.

The main research questions for the study are "How do users evaluate, use and contribute to digital annotations?" and "what perceived value is placed on modified texts following the creation of digital annotations?" In answering these questions, the conclusions lead to greater understanding of the practical concerns as well as the theoretical questions connected to the process of interacting with digital texts. Using digital annotations to make sense and meaning from digital texts implicates the reader as a writer but also involves the form or mode of the text in a way that demonstrates this is more than an arbitrary choice.

Activity Theory (Engestrom, 2000) was used to identify the tensions and contradictions in these choices. A survey and conversations (semi-structured interviews) were used to

provide data, and analysis was done using thematic and narrative enquiry. Conclusions show that the choices made by users are subject to the affordances offered by the digital tools, but also their own familiarity with the digital tools, their perceptions of public and private study practices, and the languages they can utilize to probe and create meaning. This has implications for the ways in which digital technologies are promoted in educational contexts, and for the ways in which digital innovations guide and steer institutions, staff and students in an increasingly global world.

Lay summary

In Higher education today, there is an expectation that both students and staff are familiar with and use digital texts for both reading and writing. While many individuals use hard copy of texts for reading and for creating their own notes, it is also possible to harness digital forms of notes, comments and annotations. In this format, the original text is changed to incorporate the new annotations. These digital modifications to texts can be used in different teaching and learning contexts, where, for example, a tutor returns a script to a student with digital comments, or where students share notes from lectures or study.

This thesis explores the use of digital modifications to texts with an emphasis on the ways in which these annotations are perceived to have similar value to the original text. Conclusions show that the choices made by users are subject to the affordances offered by the digital tools, but also their own familiarity with the digital tools, their perceptions of public and private study practices, and, very importantly, the languages they can utilize to probe and create meaning. The use of different languages is potentially more important than the desire to create collaborative study practices. This has implications for the ways in which digital technologies are promoted in educational contexts, and for the ways in which digital innovations guide and steer institutions, staff and students in an increasingly global world.

Dedication

For Mum, Dad and Steve

Acknowledgements

I am hugely indebted to the participants who agreed to give their time and expertise to this study, and I am extremely grateful for their willingness to take part at various times and while overcoming different obstacles. It would not be possible to have this study without them. I am also very grateful to the numerous colleagues over many years who shared their experiences with me. These formed the basis for my thinking. I appreciate all the conversations and academic discussions (particularly in the Floor 3 common room) that forced me to extend my ideas and move forward. I have had the privilege of working with some colleagues who have demonstrated not only their high standards in academic practices but have also been exemplary human beings in their care and kindness towards students and colleagues alike.

I am very grateful to my supervisors, Dr Christine Sinclair and Dr Aileen Irvine, for their continued encouragement and support over several years. They were both able to guide me while also patiently standing back to let me find my feet and formulate my ideas. I am particularly grateful to Christine for her ability to empathise with the various obstacles that I have had over the years, and for her kind and patient prodding that enabled me to restore my self-belief that it was possible to engage in this kind of study.

Since beginning this study, I have lost my father to Parkinson's Disease and subsequently my mother has encountered and come through her own health issues; it is in reflection on these personal events that I am aware of time passing. Both Mum and Dad have shown me in so many ways how they are willing to make personal sacrifices to support their family. The 2020 pandemic has, of course, brought its own difficulties and experiences, not least financial concerns and health worries. Throughout all of this I have had the support and encouragement from my husband and best friend, Steve. Without him being there to keep me going in both practical and emotional ways, this would not have been possible.

Thank you.

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1 Introduction and context

1.1 General introduction

Annotation can open up transformative learning opportunities for educators and their students to take intellectual risks, share personal opinions, and make meaning together about challenging texts and topics.

(Kalir, 2020)

This thesis explores the use of digital annotations in Higher education, the way they are used in the process of making meaning from a text, and how they contribute to the development of literacy and knowledge. The argument is developed from an exploration of experiences in the annotating of digital texts. The participants in this study are users of digital technology who are involved in Higher education.

The process of annotating texts is not a new phenomenon unique to the digital era – annotations have been used on print books and texts literally since they first appeared, such as marginalia in Medieval manuscripts (British Library, n.d.; Bullard, 2013). In educational contexts, many forms of taking/making notes have been used and advocated as an essential part of the learning process (Einstein, Morris, & Smith, 1985; Peverly et al., 2007). Annotations are one form of notes, but while notes can also be completely separate from the original text, annotations are connected to it in some way – whether by being written/drawn in the margin of the (hard copy) book or digital text, anchored digitally to the digital text, or layered in a digital programme or app. The original text could be (as in the case of this thesis) written, aural (as in a lecture presentation), visual, or a combination of text types/modalities; similarly, the annotations could also be formatted in a variety of modalities.

As an example of anchoring, in Microsoft Word (the programme being used to create this thesis document) it is possible to insert a comment that links to a specific text; this comment will move with the main text if it is augmented in any way (if more words are added to this paragraph, for example).
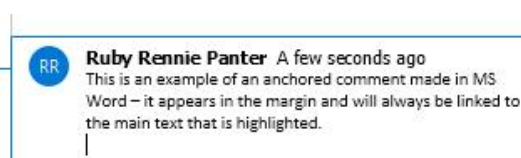
Figure 1: example of an annotation using an anchored comment in MS Word

The following is a further example of layered annotations, showing multimodal text (a photograph) and both typed and digitally handwritten (using a stylus) text:

Example of multimodal layered annotated text

12 December 2018   15:30

Swarm of honey bees

Queen bee in the swarm

Figure 2: example of multimodal text created using MS OneNote

This example (figure 2) illustrates how digital annotations can be used to incorporate a number of annotations, here including a photograph, typed notes, digitally handwritten notes and a graphic (arrow). In layered annotations like this, the annotations can be individually manipulated (moved across the page, or deleted, for example) but are also anchored to each other. The digitally-created page can also be digitally copied and shared with others, often using email but in this case the whole page can be shared to specific users of the MS OneNote notebook in which this text was created.

The potential to share texts that have been modified by annotations has been studied and developed in educational contexts, often focussing on the affordances that digital tests can offer. A number of studies (Goertzen & Kristjansson, 2007; Liang, 2021; Luo, Kiewra, & Samuelson, 2016) have considered the learning potential of working collaboratively by using the sharing potential of digital texts, thus starting from the premise that collaborative learning is worthwhile and it is useful to consider how digital annotations in different formats can be exploited for this supportive and social form of learning. Other studies (Craig et al., 2020; De Weerdt, 2020; Messinger et al., 2008; Stray & Moe, 2020) have focussed on specific programmes, apps or software and often incorporate specific training with the participants in the research so that their ability to use the new software, and possibly performance, can be measured. However, there are few studies that look at case studies of the range of ways in which digital annotations are being used in educational contexts, and that are not necessarily using the software or apps that have been selected by the educational establishment. This thesis explores this aspect of the use of digital annotations: accounting for how and why users have incorporated annotations into their learning practices. The focus is therefore on the ways in which the participants interact with digital annotations rather than on the specific software (although the methodology requires a choice in software). The study leads to conclusions about the ways in which this interacting with digital texts is not arbitrary, but neither is it based fully on personal choice. The

contribution of this thesis is a consideration of various pertinent factors, both internal and external, which contribute to learning via digital texts being enriching, enjoyable and sustained, or having difficulties and obstacles.

1.2 Background

As a classroom teacher and then a university lecturer, I have seen enormous changes in the way students are expected to read and write as part of their studies. As a personal anecdote, I submitted a hand-written dissertation for my first Master's degree in the early 1990s. In Higher education in the UK today it would be very unusual to submit a handwritten assignment or thesis: it is required to submit a digital/electronic version. The use of digital technology "has enabled a world of opportunity, connectivity, discovery and rising global Learning" (Redmond, Smart, Powell, & Albion, 2021: 2895); Redmond et al further argue that in education the emphasis has shifted from learning how to use the technology, to appropriating technology for learning purposes, and now to ways in which digital technology is transforming our knowledge and understanding.

What is becoming increasingly clear is that the technology works alongside other factors and it is not a case of one activity requiring one particular technology. In universities there is a recognition that digital technologies have a vital role in teaching, learning and research (Chapelle, 2001; Lankshear & Knobel, 2006; Wood et al., 2021). An example of this is the development of specialised courses for staff to help create online teaching spaces (Information Services The University of Edinburgh, 2021a). There is an emphasis on the building of "communities" and "presence" in this course description: "It isn't a 'how to' course in terms of showing you all the functionality of a technology, rather it provides materials to help you think about pedagogy, building community online, and teacher presence" (Information Services The University of Edinburgh, 2021: unpaginated). In addition to the social aspects of greater academic community involvement with digital technologies, there is also a recognition that digital texts in various forms are essential for academic work such as "digital scholarship activities and long-term access to large-scale digitised collections and content" (Information Services The University of Edinburgh, 2021b: unpaginated). In academic activities the delineation between online and offline work has become blurred as the technology has permeated. This was even more evident during the Covid-19 pandemic, when most academic activities were moved to online modes.

The students who arrive at a university are, of course, not "blank sheets" in terms of the technology they have used before, and they may have a variety of different educational and cultural experiences of digital technologies that they bring with them, as well as general cultural and linguistic backgrounds. This study has emerged from many years of being involved in teaching and learning in various contexts and at various levels. I have taught literature and language in secondary schools in Scotland, English language learning in Peru, South Korea and Malaysia, and language and literacy development for teachers at university level in South Korea, Malaysia and Scotland. In a very broad sense, I am aware that a level of

literacy in reading any text, including digital texts, will involve linguistic/language information, knowledge and understanding of previous texts, cultural background, and familiarity with the literary style (Juvan, 2008). Typically, guided study of texts in an academic setting is focussed on building understanding of some or all of these areas. Where there is lack of experience, this can cause reading, comprehension and understanding difficulties for those who do not have that range of knowledge (Hinnov, Rosenblum, & Harris, 2013). The study of academic texts is likely to be tutor-led analysis and discussion of illuminating aspects that will contribute to the understanding and enjoyment of the reader's engagement with the text. Where the text is in English and the reader does not have English as their first language, understanding the text can therefore require a range of types of input, including "knowledge of the dominant culture, history and personalities, literary references, and sometimes even pop culture" (Lau, 2012: 327). So although the tools and technologies used in a particular university course may be very similar to previous experiences for that individual, there is the possibility that the cultural and linguistic nuances brought to the learning experience, mixed with additional cultural and linguistic experiences from other students, can affect the ways in which the technologies are appropriated and used successfully as part of the learning experience. Thus there are socio-cultural issues associated with successfully adopting digital technologies in the university.

Alongside these institutional requirements and socio-cultural aspects, users of the technology have to negotiate the adoption of digital technologies as part of the learning process in courses (Sørensen, 2018). Teaching and learning classroom methodology and techniques very often involve some pre-reading tasks as well as tasks while-reading, to give support at the time of need (techniques derived from "just-in-time" philosophy: Tuffs, 1995). From experience of supporting readers (both native English speakers and those who have English as a second or additional language), I am aware that the need to stop the flow of reading can often be counter-productive for the individual, and can cause a lack of engagement with the text because the linguistic, lexical, cultural, and academic knowledge required can be frustrating. Yet continuing to read without some kind of support can be equally frustrating as parts of the text are not clear and so the overall meaning can also be unclear. The problem is how to give the right amount of support for the individual reader, and also allow that reader to make the choices he/she needs for full enjoyment of the text. While there are broad, general ideas on how to approach this, individuals may have varying needs, and one size does not fit all when academic literacy development is the focus.

In Higher education, giving digital feedback on written work very often involves a tutor annotating the text with margin notes, footnotes or endnotes. Using annotations for support in reading and understanding texts is not new ("marginalia" were present in Medieval manuscripts, often including pictures and decoration related to the text; British Library, n.d.). Similarly, in teaching and learning there is a long tradition of encouraging students to make their own notes for texts, making reading an active (but individualised) engagement with the text and encouraging the reader to explore links to other texts or

background knowledge. With the appropriation of hypertext and other digital technologies, authors have included some ways of reading texts that offer attractive possibilities for extra information that can be presented to the reader along with the original text. Some early examples of these digital texts include narratives with features such as inbuilt translation (Moving Tales, 2013) or virtual world environments ("The 39 Steps" Faber and Faber, 2013), created using iPad apps. These give the reader choices about how to engage with the text, and offer support for reader's choice in how much information to use in order to enjoy the text fully. There have also been developments in the use of intertextuality and multi-modal experiences to enable the reader to choose between reading only the original text or adding information in different modes to have an enhanced experience - for example, the iPad application "The Waste Land" (T. Eliot & Touch Press, 2013), which has the text of The Waste Land by T S Eliot (T. S. Eliot, 1922) and also has video clips, audio clips, and facsimiles of original documents related to the text. Multi-modal hypertext narratives, such as *Inanimate Alice* (Pullinger & Joseph, 2005), use the experience of visual materials, audio materials, investigative reading and textual graphics to create texts that engage readers (Kress, 2010) and that must be read online to be able to experience the digital multi-modal components of the text. Other developments in online text annotation include Hypothes.is ("Hypothes.is," n.d.) and Scribl (National Science Foundation, n.d.), both free software extensions that can be added to a Chrome browser and used for online webpage annotations that can also be shared with other users. Developments like these allow the reader to engage with the text on different levels, and on re-visiting the text, this choice of level of support can be altered. The flow of reading does not have to be interrupted with extra information if the reader chooses to continue with the main strand of text.

Alongside enhancements such as these, texts can also be amplified to help or support understanding using annotations provided by the teacher or encouraging collaborative sharing of questions and insights with a text. An example of this, in another Chrome add-in, was created by school teachers who wanted to encourage their pupils to explore webpages while learning critical engagement with the ideas raised in the article: Insert Learning ("Insert Learning," n.d.) allows teachers to "scaffold text with questions and media that help all of your students be more successful learners". This form of interaction is different from sharing ideas with peers as there is a level of hierarchy involved, although it is possible to encourage learners / users to create questions as well as answer them. This kind of approach allows for clarification of the meaning by offering focussed and pertinent questions, and also allows for exploration of meaning that may have been overlooked by problematising the text. Text augmentation by the reader is one way in which they would choose to make sense of the text, either for themselves or for some other future reader/user of the text if collaborative sharing of texts and annotations is also considered. Thus, digital annotations added by readers can include appreciation, or augmentation of the idea, or further interpretations, or intertextual links (e.g. "this reminds me of …"). These different forms of engagement with the text can be examined as a broader investigation of

how readers view their relationship to the text – as a reader and as someone who at the same time is writing/contributing to the text (Atrash, Abel, & Moulin, 2015).

A study of digital technologies and their uses has to take into account that there are constant innovations in this area, and it is extremely difficult to keep up with all the changes and new developments brought in by different companies. The aim of this thesis is not to give a comprehensive account of different apps or programmes and their uses in Higher education, although that is a worthwhile study that could track a constantly-changing scene. Instead, the focus of this thesis is an investigation of the values, perceptions and approaches taken by readers/users who also act as writers or contributors to digital annotations. The choices made by the reader-as-writer are not arbitrary, but are influenced by the factors outlined in the paragraphs above:

- Requirements of the institution
- Socio-cultural and linguistic experiences
- Affordances of the digital technologies
- Interaction and collaborative processes
- Relationships and hierarchies for the direction taken in digital annotations
- Individual goals and objectives

In order to tackle examination of these factors, this study presents a number of theoretical areas and uses data collected from a survey and a series of conversations with participants.

This study has developed out of my own teaching practice and over recent years I have been exploring the use of digital texts in various formats. I therefore have extensive background notes on which to build the current research project. These background notes were gathered from a number of formats and teaching experiences, were wide-ranging, and across several different degree programmes and levels:

- Questionnaires related to courses and support sessions for study skills
- Formative assessment – both oral and written
- Workshop or seminar discussions and questions
- Course feedback questionnaires
- Tutor support – group, individual in class, individual tutorials
- Using digital technologies in various teaching contexts

More specifically for this particular project, I had been using Mendeley and OneNote as part of teaching, and had introduced students to aspects of using these platforms. Mendeley was introduced to several groups of students in courses taught by myself, and also to all Moray House PG students (in a session for voluntary attendance) in an initial introduction to use of this referencing and annotating software. The online guides for Microsoft OneNote indicate that the primary market is school teachers, but it is also used in Higher education, and I had been exploring the use of OneNote for course groups and my group of personal tutees to

facilitate collaborative sharing of ideas. The class notebook setup in MS OneNote enables documents that are read-only, documents that can be annotated in real time by multiple users, and a private space for the individual user.

These background notes have given me a number of areas and concerns for possible action research as systematic analysis of practice in teaching (Burns, 2010; Sowa, 2009). Related to this current study, some of the topics/themes that emerged from using digital apps included:

- On introducing the use of Mendeley for saving personal readings and creating bibliographies, a common statement made by participants was "I wish someone had told me about this sooner". As many teachers can testify, it is notoriously difficult to time the introduction of a new technology for all users and inevitably there will be some who don't make use of something as they don't yet see the need, and for others they have already started using a particular style or process and making changes to this is more difficult than finding something completely new. It is clear from the number of responses like this that students find it difficult to take on board suggestions for using digital technologies if they don't fit into the current model or system of working.
- On introducing MS OneNote to keep personal notes and share course content: "OneNote – nice to have an alternative to Learn" [1]. This has prompted me to consider how and when would be a suitable time for students to have access to a range of apps and software, and how could they find out about these.
- There were also comments about the use of OneNote for an interactive course handbook which were not so positive: students didn't like the use of yet another different app or software chosen by the tutor for a course. This particular dissatisfaction could have several different causes, and consideration of these have been useful in the current study.

1.3 Personal relationship to this study

This study commenced in 2016, and there was at the time no indication of the global health pandemic that was to occur in 2020; this pandemic has had an influence on the use of digital technology amongst other things. During 2016 and 2017 I started working on the project, and since then the Covid-19 lockdowns have caused dramatic changes to digital education provision. In my experience as a university lecturer (from 1999 to 2019), there was a relatively slow but steady inclusion of different forms of digital technologies in education, and these were treated with enthusiasm by some academics and educators, while others treated the innovations and ideas with sometimes a tentative speculation, sometimes hostility, and sometimes disdain. No-one could have foreseen the rapid catapult into using technology that happened due to the Covid-19 pandemic in 2020. At the time of writing

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[1] BlackBoard Learn is the virtual learning environment (VLE) currently being used by the University of Edinburgh.

now (2022), there is still speculation about how quickly education can "return to normal", alongside a realisation that the "new normal" of online and blended learning will be with us for some time, and although for some this could seem catastrophic it may also have accelerated a process that was actually inevitable. This leads to an even greater need to research, review, and understand the complexities of issues for teaching and learning that come from using digital technology. This realisation has also led to a change in the [implications and conclusions](#) I draw from this study.

My experiences in education have involved me in digital technologies in a variety of ways. When I started work as a lecturer in TESOL, the Master's degree in TESOL had both face-to-face and distance students – the distance education programme was one of the oldest in the UK (an obituary for Alexander McLellan notes that the Scottish Centre for Education, based at the then Moray House College of Education, had "300 foreign students from 45 countries": (Shaw, 2012). In the 1990s this was a paper-based system, involving sending books and materials to students all over the world. In the years following my first terms as a lecturer, there was a rapid expansion of the use of computers in education and I had a personal interest in reviewing and experimenting with what was available; this led to signing up for "Masterclass" with the Scottish government education support agency *Education Scotland* (with the promise of a laptop on participation in the programme – which at the time was considered extremely innovative). The university started providing some course materials using WebCT (now known as Blackboard Learn) and I volunteered to be in the trials of how this could be used as a supplement to courses. I saw the potential to involve face-to-face and distance students in joint learning on one of the courses I was directing: the International students doing the face-to-face Master's degree were full-time students who had previous experience of classroom teaching but were not currently in a classroom, but had time to read and theorise; while the distance (part-time) students were engaged in teaching and so had access to real life contexts that they could use for teaching/learning practice and research. The shared experiences on the course were discussed in the online course forums, and I found this model of collaboration to be illuminating and fascinating. Following a few years of being able to offer this, and with expectations that we could further expand the distance programme by using the emerging technologies, there was a management decision to close down the distance programme and instead focus on face-to-face Master's degrees. However, several students had already shown their interest in also using digital technologies for learning, and following two years of dissertation supervision of students who chose this topic, I created a new Master's degree course in Online Learning. The students who attended this course came from a variety of master's programmes, which again allowed for an exchange of ideas which the students (and I) found was extremely conducive to shared learning, as the input from language students, engineering students, and computing students provided areas of expertise that could be shared amongst the students. Concurrent to the development of this course, some colleagues were developing a new Master's degree in E-Learning (now called MSc in Digital Education). After the launch of

this new degree programme, there was no longer a need for a separate course. However, I had the pleasure of being involved in the new degree programme from the beginning.

It is not surprising, therefore, that in exploring the use of digital annotations I have been influenced by my own experiences of social practices in learning, collaboration across disciplines, language and literacy development, the changing nature of digital technologies, and cognitive processing of ideas related to personal and cultural identity. Prior to the Covid-19 events in 2020, there was often a need to justify consideration of using technologies and digital education, and how technology could support and enhance learning given suitable conditions. However, the explosion of the use of digital technology has made that rather redundant. There is no doubt that many people across the world have not only embraced the technology but have had to actively work with developing it (in the case of school teachers, for example). What happens next, though, is not necessarily going to be a steady progression towards wholesale use of digital technology at all levels of education; it is equally possible that there will be a "backlash" from frustrated teachers and learners and a desire to "go back" to face-to-face education where that is at all possible. There are already studies being conducted, and investigations into the concerns and developments that have come to the fore during the pandemic; for example, new directions in learning practices that include elements of culturally-situated introductions to learning platforms (Green, Burrow, & Carvalho, 2020).

In my role as a university lecturer I have found that consideration of new technologies can be similar to embracing a different culture – a point noted by Hayles in an interview, where she comments that "you begin to bring into view assumptions you didn't even know that you had, and now you have to think critically and sceptically about them" (Piper & Hayles, 2010: 319). The desire to consider the use of digital technology in place of existing modes can be treated as an indication that those advocating the use of technology would use the digital mode every time and in preference to other modes, rather than a considered approach to the affordances and how these would be compatible to the learning outcomes proposed (Shaffer & Clinton, 2006). This study is in part a recognition that it is in the sceptical and critical examination of digital technologies that we move forward with strategies and practices that are worthwhile; it is in the examination of alternatives that we can often see the flaws in our current practice that we have not examined simply because we assume they have always been "good" practices and therefore should continue. It is also in the recognition that what can seem today as a binary position could tomorrow change to embracing the potential. More dialogue with colleagues about how and why digital technologies are incorporated into our academic practices would be welcome, a point noted by Gourlay, Hamilton, & Lea (2013) in their account of conversations between colleagues coming from different traditions and disciplines.

In terms of ontology and epistemology, my stance is interpretivist and idealist: while texts exist as artefacts they only have meaning when there is some kind of interaction with the

human mind. The provision of digital platforms and modes of using those platforms will only make sense to the users if they can perceive their value and can shape them for their own purposes.

1.4 Research questions

The process of developing the research questions and the process of gathering data are given more fully in [chapter 3 Methodology](). As a very brief statement, the study considers a practical area of teaching and learning as well as exploring the ways users of digital technologies create their sense of the value of those technologies. This study investigates the following overarching research questions:

1. How do users evaluate , use, and contribute to digital annotations in digital texts?
2. What perceived value is placed on modified texts following the creation of digital annotations?

1.5 Significance of this investigation

The study has relevance to policy and practice in general education, Higher education, Digital Humanities, and understanding language in use. The findings are relevant for the participants who took part in the study and for users of digital technologies who can identify with the choices those participants made for their study practices. This could be of relevance as a means of enhancing their own practice and also (for participants who plan to teach in the future) the ways they may choose to help their future learners to access texts and use texts for learning. It is also possible that there is a recognition of values and approaches that has allowed them to choose NOT to engage with particular technologies, either because they have seen that it is not immediately relevant to their work or thinking processes, or because they have had the opportunity to review and reflect critically on the consequences of taking on a particular approach. This latter potential is equally valid for continuing developments in the use of technology and in the argument in this study I also explore how raising awareness of the consequences of choices of platforms and processes can develop greater understanding of how small changes and expectations delivered by technology companies can subtly change our thinking. The investigation is also relevant to those in education who have or use more than one language, and how readers/listeners of texts can make choices about the use of digitally-enhanced texts for understanding and enjoyment and for study practices. The study is also relevant to course creators who plan to use digital technologies in the learning course, and the study demonstrates how choices made related to digital annotations can permeate the whole learning process.

There are numerous digital applications (henceforth shortened to apps; these are software applications designed specifically for mobile devices such as iPad, Android tablet) which will now allow users to make their own annotations on texts. An example[2] of an app for academic texts is ReadCube (Labtiva Inc, 2016) with a marketing title and byline that reads:

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[2] The company was a start-up in 2007, and was recognised in 2011 by Macmillan Publishers Ltd

"Bring your papers to life. Read, manage & discover new literature like never before." One of the listed features is that you can highlight text and make annotations; this is a common feature of apps and software that manage libraries and research papers. There is an assumption by the companies that produce these apps that making annotations is worthwhile as part of reading and understanding texts. Yet just because the technology exists does not mean it should be used without question or without understanding the choices. This study explores the values inherent in the appropriation of digital technologies like this, providing a focus on areas to consider before simply accepting that any app that provides the potential to make digital annotations is as worthwhile as another.

Developing a greater understanding of the processes involved in making notes and annotations of texts for study and enjoyment could also have relevance to the use of annotating and note-making for formative assessments (Harding, Pill, & Ryan, 2011), where the assessment involves making visible the routes to understanding that have been taken by the candidate. Revealing the process of creating the annotations/notes, and gaining from the socio-constructivist collaborative nature of digital annotations that can be shared, could both be used by learners and teachers to understand where and how choices could be made in creating meaning from texts.

1.6 Conventions used

This study explores some aspects of the use of digital technology related to reading and writing, and so it is appropriate to use both standard/traditional means to present this, and also to explore some digital innovations. I have used a standard convention where data from the participants has been used: names have been anonymised but identifying letters allow the reader to relate data from the same participant. The transcription from the data is given as an indented paragraph with italic font:

R: example of transcription from recordings

The study of the data was done using digital tagging on the recordings, alongside the written transcription of the full text, giving the researcher access to vocal/linguistic nuances. The recordings and other data were uploaded to nVivo[3] for analysis. This allowed digital tagging of aspects of audio recordings as well as linking this to data from the online questionnaires and other artefacts.

This document makes use of hyperlinks to navigate to designated sections of the work. For readers who are unfamiliar with hyperlinks, this will be a feature that works only if reading this as a digital text. When a hyperlink is created in a sentence, the text will show as a different colour and will be underlined (although it is possible to change these settings, I have retained the most common way to indicate a hyperlink in text). I have also used Mendeley to create the bibliography (some readers may be familiar with EndNote, which

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[3] nVivo is software for qualitative data analysis https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/about/nvivo

works in a similar way). When the reference is cited in the text, this creates a bibliographic entry. This feature for creating in-text citations that link to the bibliography is now common with many academic journal publications.

Some of these links will be "live" (i.e. if reading this text on a computer or mobile device, the links will contain digital information that will allow the reader to click and go to the place in this text that has been linked, or to a different text altogether). The use of a hyperlink allows a reader to immediately find the relevant information by following the link, when reading in electronic format. This ability to "jump" within a text or move to another text is the basis for the development of hypertext narratives (discussed in a previous paragraph and linked here). One problem with hyperlinks in MS Word, pdf, and Apple Pages documents is that for the reader there is no clear distinction between hyperlinks that are intra-text (moving to a place in the same text) or intertextual (moving to a different text, available via Internet and usually hosted on the wordwideweb but can also be documents stored on servers). For the reader, this means that a link shows in the text in the same way. Another difficulty with using intratext hyperlinks is that there is no easy way to return to the original location (unless the author inserts another hyperlink). Intertextual hyperlinks require Internet access while intratext hyperlinks can be read and used without being connected to Wi-Fi/ broadband.

1.7 Overview of the thesis

This introductory chapter has introduced the main themes of this study, and the relationship I have to the study. Further chapters will present the literature that has informed my thinking, the data that has been used, and the findings and conclusions merging from the study.

Chapter 2 explores previous research and theories to related to the research questions, while also introducing aspects of methodology to be explored further in the data collection and analysis. Previous research in digital annotations is considered, as well as consideration of related fields such as understanding text, multimodality and translanguaging.

Chapter 3 gives information about the methodology and methods used in the data collection. It also outlines the platforms, apps, and software used in this study.

Chapters 4, 5, and 6 give data findings and discussion. These have been separated into chapters with broad headings. Chapter 4 considers values given to features and use of digital annotations; chapter 5 considers multimodal practice and literacy development, and chapter 6 considers collaboration and languaging features.

Chapter 7 draws conclusions and implications from the study as well as suggesting some possible future directions for study.

2 Review of relevant research and theories

In this chapter I present a range of discipline areas that have contributed to understanding how and why people would use digital annotations, and that form the basis for this thesis. In approaching a review of relevant literature, I recognise that my stance is towards a view that there is no one discipline area that can explain the complex ways in which individuals relate to reality. I also recognise that my personal experience (outlined in 1.3 personal relationship to this study) has shaped my own choices of what I consider to be relevant in the investigation of text, reader, writer, and digital humanities.

2.1 Introduction and terminology

From the late 1990s and into the 2000s, the availability of digital technologies, with their associated software, has increased steadily and globally. During 2020 this saw exponential growth in education and other sectors, due to the Covid-19 pandemic; the use made of digital systems and texts changed rapidly in Higher education in the UK as well as in primary and secondary schools. In Higher education contexts where digital technology had been gradually implemented in a variety of considered and focussed ways, during 2020 there was rapid change in what was considered essential to be able to support students and staff as they moved to fully online education. Prior to this, involvement in using computers and digital content could have been marginalised by staff for some areas of academic work if wanted (where lecturers preferred a conventional lecture scenario, for example). In addition to the practical necessity of continuing to provide education when face-to-face contact was not possible, the accelerated change to digital support for non-face-to-face teaching and learning has made research in aspects of digital humanities more prominent as we try to understand the implications. The term "digital humanities" is used to encompass the way digital technologies are used across a wide range of academic disciplines, and came into prominence with the publication of *A Companion to Digital Humanities* (Schreibman, Siemens, & Unsworth, 2004). It acknowledges that digital technologies can provide resources and ways of making meaning that are beyond the capabilities of individuals; by harnessing the power of digital technologies, new insights can be added to scholarly practice (Hockey, 2004).

Preceding the Covid-19 pandemic, the distinctions between teaching and learning methods that are "pre-digital" (face-to-face discussions; attending a lecture; preparing notes for a seminar using hard copy, to name a few) had in some instances moved to become more blended with digital methods. One example of this is "lecture capture" where either a lecture is recorded as it is presented, or a pre-recorded lecture is uploaded to a designated online course as part of the learning module. In their study of lecture capture in the first months of the Covid-19 pandemic, Lamb & Ross (2021) note that prior to the pandemic the awareness surrounding the use of digital technologies like this tended to focus on either instrumentalist framings "within university strategy documents … presents these systems as tools that might be attached to a particular educational or organisational outcome" or

essentialist framings "where these technologies are seen to dictate student behaviour" (Lamb & Ross, 2021: 6). There have been controversies about the use made of lectures that are digitally recorded, with concerns about attendance changing attitudes to learning (Wood et al., 2021) and job security for staff (Robson, Gardner, & Dommett, 2022). However, Lamb & Ross (2021) note in their study that the Covid-19 pandemic situation provoked a rapid change to strategic significance of the use of technology to support the continuation of university studies.

While there are studies like Lamb and Ross (2021) starting to emerge, much of the literature and theorising surrounding the use of digital technologies in education is pre-pandemic, and a variety of terminology is used in different studies, so terms such as "electronic", "digital" and "e-learning" are used interchangeably to mean "learning using computers". This is problematic for the researcher if he/she wants to clarify and scrutinise the discourses surrounding the use of digital technologies. For example, there can be a need to clarify the use of terms from different publications, although this is not uncommon in educational research in general and is a common occurrence in the emerging nature of technologies. In the digital humanities the use of definitions is further complicated by the rate at which changes happen in both the technologies available and the appropriation of these by users. In this section I will consider terminology and the variants used in this study and provide an explanation of how I will use these.

Throughout this thesis I have used the term "annotations" used digitally but this term can be used in different ways. It can refer to further information on the word/phrase as metadata, or it could also refer to the way extra content in meaning and understanding of the text is provided. Metadata is the non-visible information about a document that is used to detect properties of a document – for example, when adding a file to the Mendeley app, the authors name, the title, and other information will automatically appear because it is already present as metadata as part of the document. In an early study of hypertext literature, Marshall notes that "the most formal end of the spectrum is metadata, specifically metadata that follows structural standards and is assigned values using conventional naming authorities" (Marshall, 1998: 41). Metadata is seen here as a type of annotation that uses a prescribed format and enables digital searching of the document. This also could be tags, for example, which conform to a pre-set list of desired categories. Marshall contrasts this with "marginalia of the sort that we write to ourselves as we read a journal article" (ibid), and she notes that this is at the opposite end of a spectrum – the most informal or personal use of annotations. Moving forward a number of years, Atrash, Abel, & Moulin (2015) suggest that one of the distinguishing features between notes and annotations is that annotations have a "target" and are linked to the document; they go on to examine the uses made of notes and annotations in learning processes. Note-taking and annotations differ in this feature: notes are not linked digitally to a specific place in the document and can be digitally stored separately from the document (if required). In another study, Agosti & Ferro (2007) clarify their use of different types of annotation, noting that it

can be either as metadata or as commentary. They point out that one type of annotation "can be considered metadata, that is, additional data which relate to an existing content and clarify the properties and semantics of the annotated content" (Agosti & Ferro, 2007: 3/5). This function of tagging or indexing in the document is of particular use to libraries and the storing of digital content; it is also valuable in studies of documents as it enables electronic searching of the document by means of the tags or indexed items. A separate use of annotations mentioned by Agosti & Ferro is "annotations as content" and this provides "an additional layer of elucidation and explanation" (Agosti & Ferro, 2007: 3/10).

It is this second meaning – and "additional layer of content" - that I am exploring in this thesis. While the use of annotations as metadata is primarily for information retrieval, the second use is primarily for the human/personal exploration of meaning and content. Of course, annotations in this sense existed in a pre-digital format also, as when a reader chose to add a note to a text – either in the margin or on top/foot of the existing text. The selecting of words or phrases as being of particular significance has been a common study aid in hard (non-digital) copy of text. The mode used could include pen, pencil or a highlighter pen; a combination of these is also frequently used, for example, using a highlighter pen to colour the text and then to add information using pen in the margin alongside the highlight. In Higher education the use of annotations could include, for example, notes written on hard copy of printed notes for lectures, printed journal articles for further study. It can also be annotations written in books (and I am sure that I am not alone in finding annotations in a library book written by someone else quite irritating!).

As early as 1999, Ovsiannikov et al (Ovsiannikov, Arbib, & McNeill, 1999) conducted a survey of how users in an academic setting used annotations (in print / hard copy form) in their research and studies, and what features they would consider useful in a digital form of annotation. At this time historically the use of digital annotations was very limited and although MS Word had already created the capability for using digital annotations of documents, it was not commonplace. Ovsiannikov et al discovered that the most popular type of annotation made on print copy by their participants was to highlight portions of the text; this was to draw attention to that part of the text. Also very popular was writing notes in the margin, and these tended to be the writer's own "thoughts, ideas and clarifications" (Ovsiannikov et al., 1999: 6). When asked about what they would like to see in a digital annotation system, the participants in this study responded that the ability to annotate on pictures was an interesting innovation (as this was at that time not a common feature of existing systems). They also noted that being able to highlight and add comments in the margins was an important feature to retain from their current practice. Ovsiannikov et al further note that in their study they categorise annotations according to content, form, and functionality (functionality could include hypertext links, which are possible in digital formats but not in hard copy; this also includes the potential for public comments in their categorisation).

The technology has changed considerably since the Ovisiannikov et al study was published, and the taxonomy has also varied. One more recent distinction is that between "user experience design" (often shortened to UX) and "user interface" (UI). The distinction here is between a focus on "everything that involves why, what, and how the product is being used by its users" (Canziba, 2018: 8), which is UX, and the structural design of the choice of fonts, colours, layout etc., which is UI This terminology is used frequently in discussions and studies focussed on digital gaming and digital education products. In this thesis the focus is not on computing systems, but on the ways in which the user engages with digital annotations. The use of annotations in this study therefore refers to the user experience (UX) of working with content, form and function of the user choice of digital annotations.

The distinction made between digital annotations and digital note-taking/making is rather more complicated and will be discussed in later sections of this study. At this point it is helpful to indicate that these distinctions are blurred when it is the user or reader/writer experience that is the focus (UX), but it could be the case that when considering digital annotations or digital note-taking/making for interface design this could be a distinction that is more important. For the purposes of clarification here, the terms digital annotations, digital note-taking and digital notes as used in this study refer to using digital technologies to add to an existing text, unless marked as separate notes. This includes texts of different types (written texts as well as pictures, for example), which could include making notes during a lecture or seminar as well as adding highlights and comments in the margin of a journal article.

The literature review in the following sections takes into account different contexts for digital annotations, but the focus of this study is on the use of digital annotations in Higher education as part of both private and social-collaborative study practices.

2.2 Studies and developments in digital annotations

In this section I explore the nature of digital annotations, and to do this I have considered a synthesis of publications related to relevant social, digital and computing annotations, following guidelines given by Norris and Ortega (2006). The discussion here is domain-specific – looking at digital annotation systems, social annotation, and pedagogical uses of annotations. I also consider a select number of systems that have been developed and that illustrate some of the trends in the technology.

2.2.1 Digital annotation systems

Since the mid-1990s when computers and text-based programmes like MS Word became more popular, there has been continued expansion in the number of apps and software that are considered helpful for supporting learning and many of these also enable making digital annotations. In the Apple App Store alone there are now more than 75,000 apps that are categorised as "educational" (Apple Inc, 2022), and there are, of course, other apps that were not originally created as learning apps but can be used for educational purposes, such as gaming apps. Simply having software/apps that have been created for educational

purposes, or harnessed for that purpose, does not, of course, mean that these are suitable for use in the classroom, for families, or for individuals, and a growing body of research looks into the affordances and disadvantages of digital technologies for learning purposes (Bi, 2018; Godwin-Jones, 2011; Simpson, Bloch, & Sutherland-Smith, 2009). One such study by Apps et al (2019) considers the "factors which work to enable and constrain technology practice. This is important for educational technology researchers in order to better inform initiatives to overcome digital inequality" (Apps, Beckman, & Bennett, 2019: 414). They conclude that features such as context, purpose, family background, rules around use of technology, availability of range of technology and other "technological capital within school fields as well as within everyday life contexts within which the students operated" (417) will all work to constrain or enable the individual to have successful appropriation of the technology. Their list of features that constrain or enable learning does not specifically mention language experiences, which will be discussed later in this thesis, although they do stress the differences in cultural backgrounds.

In addition to concerns about being able to successfully integrate use of the technology alongside these factors, the apps themselves may change over time. It can be frustrating to be comfortable with the functioning of an app and then find that an "update" requires re-learning how it works, or even that some functionality has disappeared. One example of this was with Amazon Kindle ebook public annotations (explained more fully in section 3.4.1 where I explain how I made contact with Amazon representatives). The outcome of this particular episode (through conversations and emails with Amazon) was the realisation that Amazon did not have a policy or goal in terms of readership but had created the potential for the technology to be used for public annotations, opened it to public use to see if it was used in some useful way, then discovered that there were problems with this that prevented adequate use of annotations across the platform. Subsequently[4], the system was changed again and does not offer the same functionality for public digital annotations.

The technology required to create digital annotations is not only in the creation of apps, but also in the systems for writing the annotations. There have been developments by companies of digital stylus or pens that can be used on paper that at the same time keep a digital record of what is written; one example is the stationery company Moleskine who have developed a "smart writing system" (Moleskine, n.d.). This consists of a special kind of dotted paper (available from the company as a notebook or planner) and a "smart pen" which makes it possible to write on the notebook and at the same time record a digital copy that is stored and transferred to the user's computer, thus creating notes that are not linked to an original text. The website blurb about the system states that it "[makes] it possible to write a thought down on paper and organize, edit and store it digitally, to sketch a design, illustration or drawing in your favorite [sic] notebook and be able to instantly transfer it to your computer or digital device, or to experience the touch and feel of a notebook in a

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[4] The new resource for private annotations was changed to https://read.amazon.com/kp/notebook in 2017

digital environment" (Moleskine, n.d.). This description makes clear that in the expectations of the company, the experience of the user entails an accepted or subconscious progression of thought to handwriting, the author of this paragraph assuming that the reader will agree with this view of the connection between thought and handwriting. In this view, thinking happens, and then this is recorded by making the annotation or note, and the technology is simply a means of recording the thought.

This is not an isolated instance of expectations about a "normal" or "natural" connection between the process of thought to writing alongside arguments for the added advantages of being able to include digitisation of this process. This process of writing notes or annotations is variously called "note-taking" and "note-making". The distinction, according to the University of Edinburgh Institute for Academic Development (IAD):

> Students often talk about "taking notes", but it is much better to aim to "make" your own notes. When you make notes you select and summarise the content and this allows deeper learning to take place (Institute for Academic Development, 2020)

The focus in the IAD statement is on the use made of the notes, or the learning processes that come from not simply writing down items but instead processing them in some way. In their 2010 paper discussing a proposal for an annotation system, Chao et al (2010), outline their view of developments in digital note-making. They propose a system that allows for annotations that "may provide a set of intuitive digital pen gestures that enable students to integrate cross-media content" (Chao, Chen, & Chang, 2010: 40). They suggest that making notes (whether digital or hard copy) uses two functions: encoding and product. They define these as:

> "encoding (process) and product (external storage). The encoding function can increase recall of notes by encouraging meaningful transformation of the input information. The product function assists in rehearsal of notes, which can help learners consolidate noted information" (Chao et al., 2010: 38).

Their article is written largely from a computing perspective (or the more technical side of digital technologies), and the explanations and language used are from that domain. They suggest that the choice of how "encoding" is done can have an effect on the ability to recall the information. This "encoding" by using digital annotation is a distinct feature that has developed as an important part of the way computing systems can record and analyse text and is fundamental to creating digital texts. In more recent years this has developed into the potential for unlimited language translation systems, such as this proposal using a system known as MARKUS[5] (De Weerdt, 2020):

> "For some marking up texts is a flexible way to produce a digital edition of a source; annotation is then above all about the structural

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[5] https://dh.chinese-empires.eu/markus/beta/

features of the text (its parts, chapters, sections, etc.). For others digital annotation is equivalent to the notepads and card files of the past: it is a means to collect, organize, and retrieve important topics and passages relevant to particular research questions." (De Weerdt, 2020: 520).

This acknowledges the importance of different types of digital annotation. For personal use within educational contexts, the relevance of making digital annotations is more fully explained in studies and theories concerned with literacy development and cognitive processing. In the IAD statement above, there is mention of "deeper learning", which is terminology from theorising about deep and surface learning processes (Entwistle, 2000) which has developed from the 1980s and considers how differences in approaches can lead to different outcomes in learning. The focus in this theory is mainly on the individual, and the cognitive processes that an individual can harness to achieve more successful learning outcomes for that individual. The implication is that "deep" learning is good, and "surface" learning is not good. This has become such a common way of considering learning that it is often not questioned, and it is expected that any learner should strive to have "deeper" learning. The discourse in these papers typically includes phrases such as "active learning", "examining evidence", and "monitoring" as examples of ways a deep learning approach is identified; this is set in opposition to a surface approach which relies more on memorisation (Haggis, 2003; Howie & Bagnall, 2013). The implication is that surface learning is inferior because it does not use approaches such as analysing and evaluating: vocabulary taken from Bloom's taxonomy for cognition (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956), while deep learning uses more of these cognitive skills. However, this is assuming that all learning is consistently of this type and much of the scrutiny used to identify learning in results is based on achievement in assignments or academic output. At the stage of making notes or annotations this is not perhaps the most relevant focus for the users. If, however, the user employs "strategic learning" (Entwistle, 2000) then the focus can change from grappling with understanding at the time, to successfully storing and finding the information later so that it can be evaluated and synthesized with other information. The metaphor of the "learning footprint" (Sharpe, Beetham, & Freitas, 2010) is useful here: seeing where a learner has been and where they are going. Instead of the conceptualisation that learning takes place in a particular static environment, with digital technologies there is potential to weaken these boundaries (Czerniewicz & Brown, 2010). Instead of an emphasis on "selecting", "summarising" and "deeper learning", for the user of digital technologies the emphasis has changed to include being able to balance the requirement to store information and access it when needed (Fawns, 2015). This distributed cognition (Shaffer & Clinton, 2006) therefore harnesses the potential of using digital annotation in a way that supports learning even though at the time of making the note/annotation the information is not used directly but is instead stored. As a form of literacy, this means that the user has to be able to access the technology and use it for storing the information (the annotation or note) in a way that it can be later accessed.

In his useful *Taxonomy of Literacies* Stordy (2015) tackles the problem of the multitude of "new literacies" that have been proposed, often to take into account what is seen as a change in focus for digital practices. The aim of this work was "to identify the diversity of literacy types that relate directly or indirectly to digital technologies, and to identify those conceptions of literacy that are considered key" (Stordy, 2015: 458). Stordy suggests a framework for categorising literacies consisting of two dimensions: "Lankshear and Knobel's (2007) conception of traditional, paradigm and peripheral literacies, and Street's (1984) distinction between autonomous and ideological literacies" (Stordy, 2015: 472). Although this is useful as a way of comparing and categorising, Stordy recognises that the distinctions between where a "literacy" may lie in this framework is blurred. Stordy also comments that in reviewing the literature about digital literacies it is clear that there are both political and ideological implications both from the point of view of the users (the students, for example) and also from the institutions in which these users are engaging in digital literacy practices. One example of this is the observation that students could be using a wide range of digital technologies in their daily lives that they don't necessarily use directly in their university studies but certain features or strategies could be utilized. An example might be something like identifying that there is a hyperlink and then having the expectation that more information is available by clicking on the link.

A distinction is made between digital annotation and digital note-taking by Adriano and Ricarte (2012) in their discussion of trends and future requirements for digital annotation systems. They suggest that (following Kiewra et al., 1991) note-taking has three essential scenarios: "coding (taking notes and not reviewing), coding and storing (that also includes the review) and external storage (abstain from taking notes and review the ones taken by another student)" (Adriano & Ricarte, 2012: 25). They then go on to categorise annotations in a number of ways:

- Annotation for discussion and to help recollection
- Annotation as contextualised writing
- Annotation as a review

They also suggest a number of scenarios in which digital annotations could be used, in order to suggest future developments for appropriate digital annotation systems (they include note-taking in this list). They distinguish between types of annotation that impact on the original document and those where the annotation can be free-standing. The outcome of their review is given in a table that shows their classification of activities and the scenarios in which they are used:

Activities	Reading	Note taking	Ontologies	Collaborative writing	Discussion	Review
Analyse	X				X	X
Synthesize	X	X		X	X	
Memorize		X				

Copy		X		X		
Classify			X			X
Search		X	X			
Question	X				X	X
Mark	X				X	X

Figure 3: table of activity types at each use scenario (Adriano and Ricarte, 2012)

Coming from a technical and computing viewpoint, their study considers annotations to be composed deliberately but while linked to the existing document they must be able to exist separately as well – making the point that if the original document is destroyed, the annotation will continue to exist. They note that the term "annotation" can be used differently in different contexts, and for the purposes of academic work their definition of digital annotation is different in this respect. In the sense used in this thesis, a digital annotation only exists as part of the original text, and where it is later shared with others, the original with the annotation can be seen to be a new text. Also, Adriano et al suggest that annotation is not primarily for any kind of sharing but in the example of note-taking that they propose, the texts with the added digital notes are separate documents (so that the teacher can review the notes but the original text remains intact). However, even with these differences in approach and use of the terminology, the study is useful in presenting the range of activities that can be associated with digital annotations: analyse, synthesize, question, memorise, classify, search. In terms of learning activities, their study demonstrates that digital annotation can be a key and integral part of learning and study pursuits.

2.2.2 Social and collaborative annotation

The last two decades have witnessed a steady growth in digital software and apps which encourage social and collaborative sharing of ideas and comments: in 2018 the most popular use of the Internet was still email, but 69% of women / 60% of men used the Internet for social networking and "89% of adults in Great Britain used the internet at least weekly in 2018, up from 88% in 2017 and 51% in 2006" (National Office of Statistics, 2018). Since March 2020, there is a general understanding that the trend in using digital software has increased exponentially in both leisure and work, although the ONS does not yet have statistics for this (they note that in March 2020 resources were channelled to Covid-19 statistics). The latest available statistics from the Opinions and Lifestyle Survey include:

> "In January to February 2020, 96% of households in Great Britain had internet access, up from 93% in 2019 and 57% in 2006 when comparable records began.
>
> … In January to February 2020, 49% of adults in Great Britain aged 25 to 34 years used a virtual assistant smart speaker or app, compared with 17% of those aged 65 years and over; 35% of all adults used

these "internet of things" devices." (Office for National Statistics, 2020)

In society in general, developments in digital technology have enabled, and progressed, the use of social and collaborative annotations. During the Covid-19 pandemic, it was seen as essential that people could "stay connected" by using the Internet: "Just like that, our internet connection has become an umbilical to the outside world" (Heaven, 2020, np). In education there was a boom in the use of apps and software that supported collaborative and social dialogue (Craig et al., 2020; Stracke et al., 2022), with Zoom being popular, as well as Microsoft Teams (Finnegan, 2020). Even before the pandemic lockdowns, the use of digital technologies that can support collaborative dialogues had appeal – tutors who want students to engage in dynamic dialogue about texts, and the ideas within the texts, find the potential exciting (Brown & Croft, 2020). Where the underlying theoretical stance is scaffolding and ZPD, or knowledge/meaning through dialogue, the possibilities for digital technologies as a means of facilitating this are enticing (Sinclair & Macleod, 2016).

A number of studies have considered the social and collaborative potential of digital annotations (some examples include Brown & Croft, 2020; Brugman & Russel, 2004; C. M. Chen & Tsay, 2017). These studies have a basis in the much-researched area of collaboration in learning / education, suggesting, for example, that professionals have much more tacit knowledge than they readily share, but collaboration can enhance understanding (Kergel & Heidkamp, 2018). Confusingly, while collaboration is discussed in both education and management studies, writers in both locales use the terms "collaboration" and "cooperation" synonymously. In their discussion of how teachers can benefit from collaboration, Duncombe & Armour (2004) note that collaboration is more than simply working together (which is more like cooperation); even collaboration does not necessarily enhance progress on the task at hand, however. They noted that in several studies there were instances of experience-swapping and telling stories that were not productive for teachers, and that in the classroom activities that involved sharing resources, pupils did not benefit from collaboration unless they worked "together to solve a problem by discussing and exploring possible solutions" (Duncombe & Armour, 2004: 146). Simply giving the potential for working collaboratively does not in itself mean that active collaboration in the sense of enhancing knowledge (rather than simply sharing consolidated ideas) will happen.

Since the publication of Bloom's taxonomy (Bloom et al., 1956) there have been debates and discussions about how collaboration has been shown to contribute to thinking skills, and in particular to developing so-called higher-level thinking skills or critical thinking skills (Anderson & Krathwohl, 2001). Many of the studies on which these conclusions were based were conducted in pre-digital environments, and so collaborative or social learning involved dialogue and face-to-face experiences. The necessity to share ideas with others is part of the "learning styles" and "active learning" paradigm and, although it contains controversial areas, is encouraged in classroom learning (Coffield, Moseley, Hall, & Ecclestone, 2004; W. West, Rosser, & Monani, 2006).

As many educational institutions move from non-digital to digital in different aspects of teaching and learning (even taking into account the consequences of the Covid-19 pandemic) there has been a tendency to try to compare the modes (Cook, 2009; Huxham, 2005; Starkey, 2011). For example, there have been studies looking at how well digital technologies can provide a similar experience to a lecture and this has raised questions about whether or not simply recording a lecture is useful (Mooney, 2012). There has been a hidden assumption that if we could provide something "similar" to what already exists in face-to-face, but re-shape this into a digital environment, then those participating would be able to learn in a similar ("tried-and-tested") way. This particular approach is based on how to harness the right kind of digital environment to enable this transition. Underlining this is the assumption that what we provide and achieve in a digital environment is best when it can model the previous face-to-face environment most closely. In a very broad way, educators were introduced to digital platforms that could best mimic what would "normally" happen in a classroom face-to-face learning discussion.

Alongside these general ideologies in teaching and learning, some studies began to emerge that looked at specific aspects of what was happening in a collaborative learning environment, and a popular focus of attention was to compare face-to-face with digital learning. Siampou, Komis, & Tselios (2014) give an interesting (though early) account of a number of studies from 2001 to 2011 that examined the capacity of participants to solve problems, the number of messages generated, the types of interaction, amongst others, and concluded that "the specifics of the learning environment and tools used matters much" (Siampou et al., 2014: 370). In their conclusions to their study (which used a mathematical problem for the face-to-face and online tasks), they noted that the task-oriented and problem-solving aspects of learning were enhanced in a digital collaborative environment, while social interaction was used more in the face-to-face scenario. When it came to learning outcomes, in the online digital environment students had a higher learning gain between pre-test and post-test (Siampou et al., 2014: 375). Of interest is the distinction made by Siampou et al between collaboration and social interaction. While many studies link collaboration with social and interpersonal skills, these can (as in the Siampou et al study) be shown to have distinctive characteristics. Noting development of social or interpersonal skills does not automatically mean that the task outcome is either of higher quality or demonstrates more learning ability achieved. This kind of early digital study started to question the idea that if only we could mimic what already happens, and we can show that the digital version is "better", then it would be worthwhile changing to digital.

In an experimental study of this era, with a focus on social annotation tools, Reid (2014) considered the forms of interaction between readers of the same text, where they were assigned to a group to either read the text as well as annotate the text, or read the text with the annotations that had been created by the first group (and did not add or change the existing annotations), or read the text with no access to the annotations. Of the three groups in the study, the group who were able to interact with each other and exchange

annotations gained a significant difference in the measure of academic achievement used, their motivation, and the value they put on the mental activity in which they had engaged. The study suggested that engagement in collaborative, social annotation is worthy of further research as a means to improve academic focus, achievement, and cognitive ability. It should be noted, though, that Reid also commented that there could have been an influence from the level of persuasion that engagement with new media (the novelty factor) provided, and this alone can increase motivation. This is an aspect noted by Carnegie (2009), who showed that the use of new (digital) new media can be persuasive because readers/users are already disposed to thinking of it as valuable simply because it is innovative.

Alongside these arguments promoting collaboration and open, social writing, there are very real anxieties about how individuals can safely contribute to any kind of open, social dialogue. This has existed for some time in academic life, but the digital potential for the sharing of information means that it has become a prominent feature "not just in the enormous weight placed upon the quantified outcomes of our writing within academic systems of reward, but in the very nature of authorship as we have constructed it in western culture" (Fitzpatrick, 2011: 2). Fitzpatrick is arguing about how and where authority is placed when used in digital platforms such as blogs and web pages; she also argues that one of the most striking differences between print and digital authorship is that many digital texts not only change and are updated but in many places are actually required to change – such as in Wikipedia, where new information is expected to be continually added. Yet changing the text with new (presumably improved information) necessitates that older information is changed or deleted, making the process appear to be ephemeral. It does not entirely disappear, however, as the "digital footprint" can be traced, and indeed is sometimes used to demonstrate that changes have been made to online texts (Stokel-Walker, 2020). The anxieties surrounding the use of Wikipedia in these early days has subsided to some extent, but questions of authorship, plagiarism and intellectual property have continued to be a concern (Kergel & Heidkamp, 2018) even leading to searches for novel ways to investigate possible infringements (Schneider, Bernstein, Brocke, Damevski, & Shepherd, 2018).

There has also been a continued increase in the number of ways in which the technology has developed to support more than one individual working on a text. The use of wikis for collaborative text creation has now become familiar and no longer seems an unusual way to manage and contribute to texts. This type of contribution is limited to one person being able to edit the text at one time. While comments can be added and "watching" (setting an automatic notification) the wiki can create automated responses when the text has been altered, the system is more akin to a series of changes rather than several changes happening at the same time. The most well-known wiki is the hosted pages that make up "Wikipedia" originally in English, but now available in several languages (Wikimedia Foundation, Inc., 2022). While Wikipedia is not the only online encyclopaedia, or the only

site that allows an infinite number of users to contribute, it is one of the oldest and is a useful site to examine in relation to how digital texts can be altered, added to, and deleted by multiple users, and how it is valued as academic practice.

Wikipedia was first launched in January 2001 as a version of an encyclopaedia. It was considered with extreme caution by the academic world at first, with the view that a non-peer-reviewed publication could not be in any way reliable. In his book (based on an ethnographic study of using Wikipedia), Jemielniak (2014) argues that the value of Wikipedia for academics is not the reputation for scholarly publications but "recognition is built and career developed mainly within and for the community and not for the outside world" (Jemielniak, 2014: 3). In this way, Jemielniak moves from the question of the authority of the information to a stance that has more of a focus on the authority of the person who is making the Wikipedia entry or note. This is a stance based on the fundamentally philosophical question of personal epistemology as a way of "knowing". Paradoxically, users and writers on Wikipedia can be anonymous, or use a pseudonym, and so the "real" authorship is hidden. This means that the reader has to accept the addition or change to the entry without knowing if the author is an expert in the field or not. This could be seen to be a positive aspect as it forces the reader to consider the idea critically, not simply accepting it on the merit of who the author is, although it is, of course, possible to read critically even knowing the author

In his analysis of the way Wikipedia works, Leitch (2014) suggests that it forces us to rethink the question of how we accept authority when deciding if we agree or disagree with ideas. He points out that although the ability to add or change an entry in Wikipedia is open to everyone, it can also be changed in an instant by someone anywhere on the globe – and indeed this happens almost instantaneously on entries that are current and controversial. Equally, changes that don't conform to the Wikipedia rules about verification will also be reverted in an instant; and there are Wikipedia authors who will keep watch for any changes to controversial entries. He considers that this means that sites such as Wikipedia are at the same time both fundamentally democratic but also anonymously powerful, as the designated "watchers" can instantly change the entry without discussion with the other author trying to make the changes. Leitch mentions as an anecdote that a colleague tried to change an entry about himself, but was unable to do so as there wasn't already present the verifiable third-party reference or other indications from published sources (changes the colleague made about his own life were immediately rejected). Leitch uses this as an argument to show that although verifying entries is valuable, the possibility of not being able to meet those standards means that the truth (in this case, a person's own knowledge of their own life) could be considered as not having enough evidence to support it. In this way, Leitch is able to make a statement about authority and democracy and he applies this to Wikipedia entries as mimicking political systems:

> "The people as a mass may be the most powerful force in any democracy, but they are not necessarily the most intelligent. Indeed the whole presumption of representative democracies is that the people need more than simply access to the workings of government and an active voice in its operation; they need leadership from representatives who advocate for their views but also proceed with greater deliberation and wisdom than a mob would" (Leitch, 2014: 36).

This is a highly political statement that could be unpicked in many ways, but for the purposes of this thesis I am focussing on the aspects related to how digital technologies have enabled more social and collaborative sharing of ideas but at the same time have brought into the open questions about how to consider the ideas when the obvious authority is unknown. This "greater deliberation and wisdom" noted by Leitch could, in this context, be re-phrased as the process of critical thinking as a social and collaborative act. This is outlined by Moon (2008) as an "active and deliberate" process to "generate knowledge" of a "complex" idea, with a "sense of direction", that includes ideas or evidence being "assessed or evaluated" and that "implies that there are some potential ramifications of the subject matter, such as alternative viewpoints or opinions, and that it is desirable to take those into account" (Moon, 2008: 26). In the case of Wikipedia this initial distrust centred around the radical idea that "ordinary people" (or the pejorative alternative description of "the mob") could be equipped with the ability to know suitable information, but the checks that have been put in place have reduced these fears to some extent. It is now very common to use Wikipedia as a resource for academic ideas, and the University of Edinburgh has been running workshops in how to edit Wikipedia (McAndrew, 2018). It is still the case, though, that citing Wikipedia in academic writing is considered suspect as it doesn't have the required authority, and students are often advised not to use Wikipedia as a source in their assessed work (Oeberst, von der Beck, D. Back, Cress, & Nestler, 2018).

There are also other sites which use a similar approach to digital collaboration and annotation and these are considered to be acceptable in the academic community. One such resource is the growing website developed by the LitLong project, which has moved into using Wikipedia entries as part of the way the website shares knowledge about literature related to the city of Edinburgh (School of Literatures, 2017; University of Edinburgh, 2015). The site has a map of Edinburgh, and links to literary works connected to Edinburgh either by the author or by the work. Clicking on "more information" about the author will take the user to a Wikipedia entry about that author. The site is engineered to make use of a large database and also the input from literary scholars:

> LitLong uses natural language processing technology informed by literary scholars' input in order to text mine literary works set in Edinburgh and to visualise the results in accessible ways … We have created a very large database of place-name mentions in more than 600 books that use Edinburgh as a setting. We have then extracted

the sentences immediately surrounding each mention and included those as an excerpt in our database (University of Edinburgh, 2015)

The project has therefore developed the use of annotations in linked and augmented texts, made possible by the digital technology that can identify items in text as well as georeferenced map locations. The description of the project on the website acknowledges that there could be mistakes in links and in the text itself, but that this is not only inevitable but also adds to the exploratory nature of a project like this.

The LitLong project, along with other online projects that use similar methods to digitally extract information, acknowledges that there could be errors and inaccuracies in the results, stemming from either human error (the name for one author is confused for another, for example) or that the algorithm has captured the wrong details. This is not seen by the LitLong project group as a failure in the project, but rather as an interesting set of possibilities to explore:

> "There are also some Edinburgh places – like the Parliament – that have moved over time, and which our gazetteer might therefore have put on the wrong spot. You could call these embarrassing mistakes. But we prefer to think of them as wormholes – points where the literary topography of contemporary Edinburgh touches other times or places through the coincidence of a name. They make our maps a bit like a grand and literary game of snakes and ladders, which doesn't seem entirely like a bad thing" (University of Edinburgh, 2015: np).

While this approach may not be used by other websites, it is interesting that the potential errors in an online page of information has been tackled not in a standard editorial apology for any errors, but as an integral part of the nature of how sites like this are constructed and maintained.

Not only is there the potential for errors in collaborative online notes like this, but there is also, as demonstrated in the article by Oeberst et al (2018) strong evidence of "hindsight bias" in the reporting of events over time as well: "hindsight bias is likely shared among all individual authors but unlikely detected and reduced by their collaboration" (Oeberst, von der Beck, D. Back, Cress, & Nestler, 2018: 1013). Before a particular outcome is known, contributors have a more open approach to different possibilities, but as soon as one of the contributors shares an outcome of point of view, there can be a strong tendency for others to accept this. With digital annotations in collaborative scenarios, this would argue that more range of ideas and greater variety of approaches are possible before collaborators see the work of others. In pedagogical contexts this would point to sequences (in some types of learning activities where the range of possible outcomes is a positive feature) preventing the immediate use of collaboration until individuals have explored their own ideas.

There may still be suspicion over the use of websites such as Wikipedia for academic discussion, but this has changed considerably. There is an acknowledgement that unknown sources could provide material for critical investigation, for example, the ability to develop critical thinking skills. An example of this use of Wikipedia in a study of chemistry students concludes that it is "beneficial to the students while demonstrating how to analyze [sic], understand, and write a contribution to Wikipedia" (Martineau & Boisvert, 2011: 769). More recently, during the Covid-19 pandemic, a project for the National Library of Scotland created one of the largest ever collaborations in the correction of transcriptions of Scottish texts. This project also helped to consolidate how to work with Wikisource texts, providing staff in the library with much greater understanding of how to work with collaborative digital texts (Willshaw, 2021).

This use of technology has developed a popular aura of desirability in processes such as crowdsourcing, as shown in Wikipedia and the LitLong project. This is a direct appeal to the knowledge of "the crowd", here used with positive semantic prosody. Semantic prosody is when the meaning of a word is understood to have a positive or negative association, and has emerged from the study of language enabled by corpus linguistics; possible synonyms can be shown to have different "shadings of meaning that the word possesses, as revealed by the most common collocations with which it is found" (Louw & Milojkovic, 2015). In the example of "crowdsourcing", the understanding / knowledge of "the crowd" is seen as having a positive value and is therefore accepted as being a worthwhile way to increase knowledge of the text. In crowdsourcing the credentials of the contributor are possibly not known, and are not considered to be an important indication of the value attached to the comment / contribution; the implication is therefore that it is scrutiny of the contribution itself that is valued. Examples of ways to use and organise crowdsourcing can be found on the website of the Board of Innovation, a business design firm (Board of Innovation, 2020), and the website uses a range of words all with positive associations: "innovation", "strategy", "assets", "strengths".

Crowdsourcing has also been used in academic research, although this has been treated with suspicion by some academics (Dunn & Hedges, 2013). The semantic use of "the crowd" can be used as a way of distinguishing between "us" and "them" in the sense of the academic inner knowledge circle and "others". In their early study of this growing trend, Dunn and Hedges (2013) note that it will only be "engaged" members of the public who will take part, and that there are a wide range of reasons for collaborating in a project in this way (as well as a wide range of outcomes possible). They suggest that of the many reasons for setting up a crowdsourcing project and taking part in one, a strong motivator for participation is the sense of task involved. In their conclusion, Dunn and Hedges note that while it could be possible that some academics consider the use of crowdsourcing to be a cheap way to involve participants in research, it rarely turns out to be cost effective.

Other studies of the use of crowdsourcing in academic work focus less on the "amateur" status of potential contributors and more on the legitimacy of "independent public researchers with profiles and communities of their own, completely outside conventional academic or institutional organizations" (Hedges & Dunn, 2018: 148).

Depending on the platform and the ways in which contributors can annotate, there is a range of levels of participatory contributions that are technically possible, but of interest to this thesis is the transformation from suspicion to acceptance of the sharing of knowledge using a digital platform with digital annotations. It does also suggest that an investigation of digital annotations is not focussed on solely a private and personal study routine, but has implications for a wider range of ways in which knowledge is created. Raising questions about how and why digital annotations are created and shared has become an integral part of understanding knowledge creation in our digital world, and should therefore not be ignored as a "personal preference".

2.2.3 Pedagogical uses of digital annotation

In the previous section, I considered developments in the use of digital annotations in social and collaborative modes, and some of the ways in which this has become part of our lived digital experiences. In pedagogical contexts such as schools and Higher education, digital technologies have been incorporated into more and more parts of teaching and learning. The concept of "blended learning", where digital technologies are used alongside more familiar teaching practices, has become synonymous with "modern" teaching and learning (Ellis, Goodyear, Prosser, & O'Hara, 2006; Paul, 2019). During the Covid-19 pandemic many institutions moved to teaching and learning modes which used digital technologies instead of face-to-face classrooms (Green et al., 2020). In this section I will consider how digital annotations have become part of this movement, although not always recognised as a fundamental part of learning processes.

The rise of "flipped learning" (Brewer & Movahedazarhouligh, 2019; Fisher, LaFerriere, & Rixon, 2020) as an alternative to more conventional approaches to university teaching (using a lecture as an introduction to the learning topics and materials, for example) has encouraged tutors to consider ways to help students engage with the materials outside a class meeting or lecture. The flipped learning model is essentially a pedagogical approach that uses digital technologies to support it. "In the flipped learning model, there is a deliberate shift from an instructor-centered [sic] classroom to a student-centered [sic] approach where in-class time is spent exploring topics in greater depth and creating richer learning opportunities" (Brewer & Movahedazarhouligh, 2019). Examples (not an exhaustive list) of how flipped learning could incorporate digital annotations typically in a lecture scenario include forms such as reading and then noting answers to specific questions prior to the lecture, sending a text (such as a journal article) with instructions to look for an annotate specific ideas, and also reading a text with annotated tutor questions and comments. Similarly, in preparation for a seminar or group discussion the tutor could also

present a set of questions to consider but one advantage of annotated texts like this is that the precise word or phrase in the text can be identified and therefore brought to the attention of the students. The text in this case comprises the original text (which could be a journal article, for example) with digital annotations that are linked to the text, creating an "exploded" text that could also (if wanted) include hyperlinks to yet more texts. A pre-digital form of this has been common in one of the courses in literacy development for Early Primary school teachers that I have taught on for a number of years: a reading text is prepared using sticky-notes with questions and comments that are then referred to as the class reading of the book unfolds.

Although the technology for preparation for a face-to-face lecture or seminar could involve digitally annotating a text with questions by the tutor and no extra technology is required to do this, in my experience (both myself and colleagues with whom I have had informal conversations) this has not been a popular way to present texts for discussion in a lecture or seminar class. The prevailing use of digital annotations on a text for a lecture or seminar discussion has been during the session to encourage students to take notes, or after the session for reviewing the important points (perhaps with preparation for a further session), for stimulating ideas, or encouraging students to engage further with the text as a follow-up to the lecture or seminar. Taking notes during lectures has been common practice in universities for a very long time, as noted by Lynch (1998) in his study of listening skills in various contexts and with different text-types. It is, however, likely that the reasons for taking notes, the form in which notes are taken, and the perceived value of the notes can vary considerably (Badger, White, Sutherland, & Haggis, 2001: 407).

In a more recent (2020) study in the USA, the purposes for note-taking during a lecture were, again, suggested as being either encoding or reviewing after the event (Flanigan & Titsworth, 2020). The study by Flanigan and Titsworth was investigating the potential for distraction while in a lecture. In a quasi-experimental setting, some students were asked to bring laptops and/or mobile phones to be able to compare results in distraction. Of relevance to this thesis, in their study was the assumption that writing long-hand or typing (often trying to be verbatim) was the note-taking style that was advocated, and there were no indications in the study that alternative (e.g. possibly multimodal) forms of making notes was considered a "normal" mode for taking notes until in the discussion they comment:

> longhand note takers—whether distracted or undistracted—held the advantage over laptop users when storing lecture-related images into their notes… although undistracted laptop users are more successful at storing complete text-based lecture ideas into their notes, the functionality of popular word processing programs makes it hard for laptop users to capture lecture-related images into their notes … apparent inability of laptop users to capture lecture-relevant images into their notes could potentially place laptop users as a

disadvantage during image-heavy lectures (Flanigan & Titsworth, 2020: 518)

Despite the multitude of digital apps and alternatives available, it was considered reasonable for this study that longhand versus laptop typing was standard practice for a Higher education lecture. Although it was not the intention of the article to focus on a variety of modes in lecture practice, it is rather disappointing that studies like this demonstrate that in Higher education practice there is enough worry about the distractions of mobile devices to warrant trying to find evidence for or against technologies in this way.

Another area of pedagogical practice that has seen the introduction of digital technologies is the ways in which feedback can be given to students, and how students work with the feedback on their work. Using a large number of studies (in the context of the Australian Higher education system) to support their argument, Ryan, Henderson, & Phillips (2019) suggest that "there is mounting evidence that feedback is best supported when the comments are detailed, personalised and usable" (Ryan et al., 2019: 1508) and their study considers a variety of modes to compare "learners' perceptions of personalisation, detail, and usability of feedback comments across different modes, including handwritten comments, electronic annotations, digital recordings (i.e., audio, video, screencasts), marking sheets/rubrics and face-to-face conversations" (Ryan et al., 2019: 1509). The study revealed that when one mode of feedback is given, either digital annotations or digital recordings gave the possibility of the most detailed and personalised feedback (although there can be constraints on practical concerns such as time needed to prepare these comments). There were also interesting results from comparing a single mode of feedback with multiple modes of feedback, and the conclusions (although tentative given some limitations) were that more than one mode of feedback that included at least digital annotations and/or digital recordings were valued most by the students. They caution that simply including different modes of feedback will not in itself produce the desired learning outcomes, but "it is highly likely that the different modes facilitate certain kinds of information exchange, relationship development and pedagogical designs" (Ryan et al., 2019: 2018).

Studies like this indicate that there are various technologies and approaches in education that are possible, but are possibly not in main-stream use; the Ryan et al study does not address the possible effect of "novelty value" – where students rate as valuable types of feedback because the fact that it seems different, unexpected and therefore more personalised. Following this through, there is the argument that given time and familiarity, some modes may seem to be not as helpful for either tutors or students. That remains to be seen with future studies.

These two studies (Flanigan & Titsworth, 2020; T. Ryan et al., 2019) are also of interest in this thesis as examples of ways in which digital technologies create frameworks to investigate educational practice. Where there are "tried and set" practices it can be difficult

to see beyond what is conventional or expected (whether by staff or by institutions). The affordances of digital technologies offer a platform or framework in which to investigate what is perhaps accepted as practice. Of course, much of education research is doing precisely this – questioning practice and accepted norms within the institutional boundaries. Where digital technologies offer an alternative, professionals in education are forced to re-think what the underlying values are in practice. Alternative modes of offering feedback, for example, require not just comparison or "mapping on" to existing modes of feedback, but a re-thinking of the fundamentals of what feedback is and should be doing for staff and students. The outcome of this investigation may be that the digital technologies offer an alternative that is worthwhile, or they may also indicate that the current system or practices are indeed fulfilling their intention.

In pedagogical uses of digital technologies, one idea that has become very prominent in discussions is the commonly-used phrase "digital natives". This is a notion popularised by Prensky (2001) in the article entitled *Digital Natives, Digital Immigrants*, that suggests that there are young people born into an era where using digital technologies is so commonplace that they cannot think of living in a world where digital technologies are not used. Generally, the idea is that this refers to young people born since the mid-1980s (although Prensky did not refer to an actual date). These are the people who are now in Higher education or beyond, and have tutors who also fit this profile. It was an extremely influential and well-publicised approach – so much so that the term "digital natives" is continually used in both theoretical and practical educational publications. Almost as soon as it was published, there were a number of studies conducted to demonstrate that the idea of "digital natives" was questionable. Prensky was focussing on how teaching and learning in a digital age should take into account how and why students would incorporate technologies into their lives. In a later publication, Prensky (2010) emphasised this area of the "digital natives" debate, and in chapter 3 discusses differentiation of pupils and how we should not treat students in a classroom as a "class", but rather as individuals; Prensky discusses a number of practical ways to use "partnering" to facilitate learning. At the time of publication (2010), the suggestion that classroom learning in schools and Higher education would become fully online learning was not a possibility and so the methods espoused in the book are following what would now be called a blended learning model. I find it problematic that Prensky explicitly states that "… teachers should never use the tools for students – and are not required to use the tools themselves …it is important that partnering teachers know what tools exist, understand what each of the tools can do, and, to the extent that the tools are available in the school make them available to students and encourage their use" (Prensky, 2010: 98). While I would welcome approaches that emphasise individual learning and differentiation in classroom learning, it is odd to suggest that teachers should not engage with digital tools and apps themselves.

The distinction between so-called "digital natives" and others who have not had that opportunity doesn't stand up to scrutiny; so much so that some would call for this

terminology to cease as it is so binary and also based on political motivations (Bayne et al., 2020). In the intervening time since the publication of *Teaching Digital Natives: Partnering for Real Learning* (Prensky, 2010) the number of technologies has of course increased dramatically and the "digital natives" are now the main populace of Higher education. Yet studies continue into how digital technologies are being used, demonstrating that although these individuals have had digital technologies surrounding their lives, this has not given them comprehensive success in using them appropriately. In Higher education now there is also a focus on the tension between individuals making choices about their own preferences in using technologies and the requirements of Higher education and the systems and technologies that are fundamental to teaching, student learning, and learning management in that context (Gourlay, 2014). There is also a tension between the requirements by institutional management to have consistency in digital technologies that are used and this can take precedence over the pedagogical potential of apps and software (Blayone, 2019; Kaatrakoski, Littlejohn, & Hood, 2017). Similarly, there can be preferences by staff in using particular platforms (for example, the university requirement that Blackboard Learn is the teaching platform and staff are not able to use Moodle if they prefer). The constraints can come from various areas such as management support, staff supported learning opportunities, and a desire to have consistency for students

2.3 Text, reader and writer

The previous section considered some of the ways in which digital annotations can be used to supplement or expand a text; in this section I will consider what is understood by a "text". This discussion considers that the users of digital annotations are starting with a text and are also contributing to different kinds of texts – the new text that has the digital annotation alongside the original text, and in the context of this study they are talking about their creation of texts.

2.3.1 Understanding and creating texts

If we consider the question "what is a text?" there is a historical perspective that is related to books and literature. There are two broad ways the study of "texts" has been pondered: focus on the writer/author, and focus on the text and the reader/listener of the text, taking the view that a text only exists in the way that it is understood. Literary criticism in the 19th century focussed on exploring the content of the text as a narrative with plot and characters, and examining the text in relation to other texts of a similar genre, or comparison with works by the same author. The rise of Chomskyan linguistics in the mid-20th century caused a change in consideration of the connections between linguistics and the study of literature (Stockwell & Whiteley, 2014) and In the second half of the 20th century this moved away from study of the works of particular authors to concentrate more on study of the text and its linguistic features (Busse & McIntyre, 2010). There are a number of approaches that have been taken to examine or interrogate the text being studied (examples of this are shown in the range of studies in Verdonk & Weber, 1995). Some approaches are based primarily on linguistic elements and focus entirely on the written

words in the text. The meaning of "text" in mid-20th century approaches to textual analysis is generally a semiotic understanding of written words – the use of the symbols on the page to convey linguistic meaning. The mode of communication was paper and texts were compiled in books; as this was in a pre-digital era there was no discussion of texts in a digital format. A "normal" text was always considered to be paper and books. Also, no distinction was made between text on glossy or matte paper, or in a hardbacked book as opposed to a paperback; these were all "text". The term "literate" meant the ability to decipher the written text, and so literacy was considered to be strongly related to written texts. Other approaches such as reader-response theory consider the experience of the reader (Stockwell, 2008), such as considering the ways foregrounding, defamiliarization and metaphor communicate meaning to the reader (Miall, 2018). These traditions have been long-established (Habib, 2005), and the legacy of these approaches has been transitioned to continue examination of digital texts with features such as hypertext links as well as more traditional linear print texts available as digital texts.

The use of digital texts in academia and also for pleasure is becoming a fast-growing current area of academic investigation (Ensslin, 2014; Park, Kim, & Vorobel, 2020). The reading of digital texts can contain many similarities to the reading of more traditional linear print texts, but there are also particular distinctions. Digital texts can develop into multi-layered reading experiences that can be a heavy load on cognitive ability (Ensslin, 2004). There are also arguments that the neurological paths are different and that we should be careful about losing the ability to sustain reading as a process because digital texts can encourage skimming and less reflection (Wolf, 2018). Other research into the effects of a digital text on reading ability considers how digital texts could change the approach to reading as well as the learning outcomes (C.-M. Chen & Chen, 2014). Results from studies like this are not always positive in favour of digital texts. One of the factors is the screen reading that is involved. Chen & Chen (2014) note that Carr (2010) "argued that screen reading and the fragmentary nature of hypertext reduce sustained reading and result in shallow reading" and Liu (2005) "also indicated that most of the time spent reading text on a screen reading is used for browsing and scanning, keyword spotting, one-time reading, non-linear reading, and reading selectively. Compared to paper-based reading, less time is spent on in-depth reading and concentrated reading" (Chen & Chen, 2014: 67). The study by Liu also notes that while reading print text it is common practice to highlight on the hard copy or to annotate the text, but this is not common in digital texts (Liu, 2005). Since 2005, however, there have been innovations and other changes in apps and software that have made many processes such as highlighting and annotating much easier. There have also been changes in the approach taken to digital texts which challenge some of the assumptions of these earlier studies (Moro, 2018). These studies suggest, however, that preference for hard copy over digital texts might not simply based on familiarity with the mode, but there could be differences in reading approach.

2.3.2 Multimodality

In the previous section the idea of a "text" has been discussed and mainly focussed on written texts. Where the written text is accompanied by a voice reading it, or a picture representing the ideas, more than one mode is being used to add to the meaning that the text is communicating. Wherever more than one mode (visual, aural, gestural, written, linguistic, spatial) is being used at the same time, the communication can be said to be a multimodal text. Likewise, interacting with a text by using annotations can also be multimodal as it could use more than one mode. This could be at a very simple level, such as using a highlighter pen on a written text; this employs the visual mode as the pen uses colour to add meaning to the reading of the text ("this bit is important"). With the use of digital technologies the multimodal potential increases (consider the use of a touch screen to highlight the text); however, although there are far greater possibilities for creating and understanding texts by using multiple modes, this does not mean that these will always be used, or that they will be employed to their full potential (Gibson, 2014).

An investigation of multimodal practice will inevitably lead to consideration of social semiotics. This is an area of research which follows work done by Saussure[6] (Bouissac, 2004) on semiotics as a system of signs and meanings; and systemic functional linguistics proposed by Halliday (Halliday, 1994; Kilpert, 2003). It is most closely associated with Gunther Kress and his discussions of the relevance of language, semiotics and society in a digital world (Kress, 2010):

> "... signifiers and signs carry, in their make-up, the traces of long histories of practices. The meanings of these practices are present in the signifiers as a potential for meaning and are carried "forward" in constantly transformed fashion into new signs, remade in the light of the resources that (re)-makers of signs bring with them. In signs, sign-makers mediate their own social history, their present social position, their sense of their social environment in the process of communication; and this becomes tangible in the reshaping of the cultural resources used in representation and communication." (Kress, 2010: 69)

The meanings carried in the multimodal elements in a text are of crucial relevance in a study of how readers engage with digital texts; it is also relevant to consider on what levels users use signs and symbols to extract meaning from the text.

One approach is to consider digital multi-modal texts as "augmented" texts. By considering a text to be augmented would necessitate the existence of a non-augmented text – a "normal" text, or a "text without extras". This view would assume that there is a form of text that does not include multi-modal elements. However, Kress (2010) argues convincingly that we use multimodality in most human communication, and that we commonly

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[6] Saussure's most influential work, the *Course in General Linguistics* was published posthumously in 1916 as Saussure did not publish much in this lifetime

understand the layers of meaning as these modes are used in our lives every day. The example he gives is of a road sign, which uses words, image and colour (Kress, 2010). This social semiotic approach, Kress would argue, accounts for both making meaning and interpreting meaning. Following this through, we could argue that if multimodality is *normal* in human communication, then the stripped-down versions of communication that rely on written symbols only are actually *odd.* If multimodal texts are actually the normal mode of communication of meaning, then multimodal digital texts are not a new development in literacy, and we could consider them to be something more akin to normal communication; non-multimodal styles of texts are actually the "abnormal" ones.

When there is a focus on education and on literacy development in particular, there continues to be a general view amongst both public and some professional circles that a difference can be made between the more "legitimate" development of reading words in a print-based text and the "lesser" development of other modes, such as would be found in a multimodal text. An example would be the attitude that persuading a child to read a comic is a step towards "real" reading, i.e. reading words in a print-based text without the pictures. Of course, this view is not upheld by many professionals in education and literacy development, and studies have shown how multimodal texts are just as legitimate as print-based texts: some examples include a study of representations and maths education (Radford, 2014), and ways in which mindmapping can support memory development (Zarzo, 2015).

Mindmapping and sketchnotes are two examples of ways in which multimodal texts can be incorporated into learning and literacy development by using visual representations. Although both exist in paper-based forms, they can also be used in digital form, and there are quite a lot of apps that support creation of these. In her article about sketchnotes, Norgaard (2010) suggests that this form of multimodal literacy is useful not just for design students but also for all students as a way of visually enhancing their ability to focus and to learn. Proponents have considered the effects on thinking (Dimeo, 2012). "Literacy in schools is dominated by print-based literacies even though children live in a multimodal visual world … Yet, children can encode and decode meaning easily from pictures without being taught … Think of the students who feel anxious when words fail them" (Alexis, 2016: 15). The visual aspects of multimedia notetaking is thought to promote creativity (Messenger, 2016) and therefore helps to develop ideas.

In his article about media and cognition, de la Fosse (2013) suggests that there is a strong connection between visual representations of thought and the actual thought structures. He develops his argument from McLuhan's famous statement "the medium is the message" (McLuhan, 1964) and suggests that the visual elements of non-linear texts has a profound effect on our thought processes. This does appeal to me personally, as I have found in my own writing that being able to use visual expressions of thought such as mindmapping or sketchnotes is particularly useful and one of the aspects of this that appeals to me is the

escape from a forced linear thinking that comes from using MS Word or MS PowerPoint. However, I am also aware (from discussions with academic colleagues) that this is a view that is not shared by all academics; I have some colleagues who abhor mindmaps! An example of a successful use of a mindmap for making notes is one I developed for a student who was in the MA Primary undergraduate programme and who found that the linear outline of the suggested lesson plan was difficult for her to use because of her dyslexia needs. By changing the linear outline to a mindmap format using the Inspiration app (Diagramming Apps LLC, n.d.) I was able to provide her with a useful tool that she could access much more successfully, and the app allowed for transfer to a linear Word document without any further alterations, giving her the ability to submit the lesson plan in the "approved" format.

In academic research, we have for some time used graphs and charts that are able to be created in programmes such as MS Word, and the use of spreadsheets can also create graphs and charts that are visually helpful in understanding relationships, for example in statistical information. Further developments in the digital technologies have allowed for increased ways to interpret the data, for example using 3D graphs that can communicate the content both visually and over time, such as the statistics on the "developing world" created by Hans Rosling (Rosling, 2006). These, and other innovative ways to reveal information in a visual or hypertext way, are still in development and although there is huge potential for understanding meaning in academic practices there remains an issue with whether or not these multimodal practices are acceptable across academic endeavours. One of the reasons for this is that student writing or submissions are currently often required to be processed by software to detect potential plagiarism. The visual multimodal elements (including graphs and charts) are often not able to be processed, and for this reason students can be advised that they should not try to include them. This is noted by McKenna and Hughes (2013): "Indeed, potentially, the growing popularity and internalizing of these detection practices might inhibit the use of multimodal forms in academic scholarship at the very moment such new genres have become possible" (McKenna & Hughes, 2013: 21).

An example of how large-scale multimodal annotations can be used is the Edinburgh "Palimpsest Project" (University of Edinburgh, 2014), now launched under the title "LitLong" (University of Edinburgh, 2015)[7]. This project uses geomapping techniques to create a database of landmarks and location references that are used by Scottish literary writers. The original literary texts are augmented by multimodal annotations comprised of visual-spatial modes (maps) and aural modes (voices). This use of technology provides analysis of elements and devices in literary texts that would otherwise have been incredibly complicated to link manually. Patterns of use can be coded and mapped, and then these can

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[7] This has expanded to various projects, listed on
https://www.research.ed.ac.uk/en/publications/palimpsestlitlong-mining-and-mapping-literary-edinburgh/publications/

be compared across other texts and writers in the database ("Alliance of Digital Humanities Organizations," n.d.). One such project was conducted to map locations used by writers who referred to places in the Lake District (Cooper & Gregory, 2011). A useful list of applications and software that supports geo-location activities is provided by Greig (2015).

The use of technology to create geographical and historical patterns to map points of interest in a literary text has the potential of engaging the reader with texts and writers in ways that would not have been possible before the relevant digital technologies were developed. The developments in digital study techniques have also included the use of corpus analysis to show linguistic and language patterns and usage which are also of interest to readers and those studying texts. The Bank of English (University of Birmingham, 2020), for example, was one of the early systems (developed in the 1980s) to use a collection of texts to provide analysis of language use (both written and spoken) and also to redesign the items in the COBUILD dictionary (Collins, 2019) as authors were able to use the large corpus to evidence common use of words. The idea of having annotations to aid the understanding of literature (annotations that could include explanations of vocabulary, for example) is not new, but the potential for annotated notes using computing technology has enabled this to include multi-layers of multi-modal, embedded and linked notes (Ganascia, Glaudes, & Del Lungo, 2014). These aspects of the interface between literature and technology show how the development of multi-modal, multi-linked texts can contribute to the understanding of texts (Pagnucci & Mauriello, 2008). It is possible to trace developments like this in the emergence of new technologies, and thus also trace potential for multi-modal annotations as one exemplar of the ways in which digital technologies can facilitate creation of texts, and therefore reveal meaning, that were previously not possible.

When working with texts for study, there is similar potential to extract and create meaning by the use of different modes, and by linking digital texts using hyperlinks and annotations. This potential use of annotations could be involved in both the creation of multimodal texts and the interpretation of multimodal texts. At the point of linking and appropriating texts, though, there can be practical considerations that have implications for the types of text that are considered suitable for academic endeavours, particularly where these could be used for assessments. One response to this could be to recognise all the multimodal elements as they come together, "holistically considering the combined effects of all the different resources within an assignment rather than attempting to examine the merit of each mode in isolation. This approach aligns with one of the cornerstones of multimodality, where the meaning depends on the combined effects of the full range of resources within a representational act" (Bayne et al., 2020: 64). This raises important questions about intellectual property and what it means to appropriate ideas from others.

2.3.3 Authorship in digital annotations
Questions about author and ownership of ideas or texts is most often flagged up in Higher education as issues related to plagiarism. In a very simplistic way, the more texts are

available in a digital format and can be re-used easily, the more potential there is for misappropriation of the text or idea. However, in practice there are many concerns for both tutors and students. When considering collaborative annotating, this can be a contentious area also, including philosophical understanding about where ideas come from, and how different contributors are recognised (Fitzpatrick, 2011). Like many colleagues (McKeever, 2006), I have found that there is considerable anxiety amongst students over how to avoid plagiarism, partly arising from an erroneous view that we should expect students from different cultural and educational contexts to consider authorship of ideas and text differently and that this will be difficult for them to master (Le Ha, 2006). One outcome from this is that within our teaching programmes we create the expectation that some students are "passive, dependent, surface/rote learners prone to plagiarism and lacking critical thinking" (J. Ryan & Louie, 2007: 406). However, a study conducted in a Canadian university concluded that much of the literature and institutional policy documents about plagiarism was "more about avoiding plagiarism than responding creatively to the ideas of others. Focused on plagiarism avoidance, the documents provided little information on the rhetorical uses of prior texts in the collaborative act of knowledge construction" (Abasi & Graves, 2008). Their study highlighted the way in which policy focusses on potential wrong-doing rather than actively demonstrating study practices that encourage supportive and helpful collaboration.

To understand the potential tensions in linking to multimodal texts or using collaborative texts the study process of how meaning is developed can be traced. The basic outline followed is reading/listening, (input of ideas), annotating (using links to other texts, or collaborating), reviewing, and writing. In conceptualising this, the parts that are most visible to tutor and student are the initial "inputs" of ideas or texts – whether in a lecture or reading a text – and the "output" of a student producing an assignment or piece or work, or taking part orally in a seminar discussion. A simple diagram can show that the stages where annotating and then using the annotations can often be kept private:
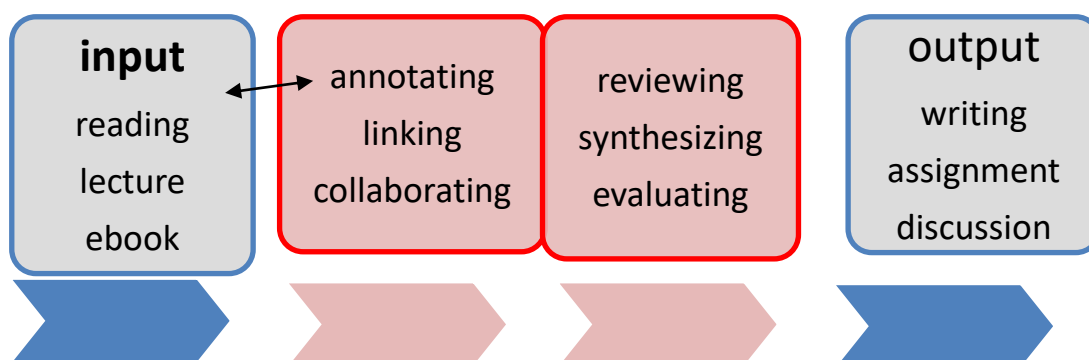
Figure 4: diagram showing the potential stages in developing meaning

There is a link shown between input and annotating, as in many cases this happens at what would appear to be the same time (although it is fractionally after, as for example listening in a lecture the information is spoken and the note or annotation is made). Reasons for unacceptably using sources more complex than this diagram would show, however (Abasi & Graves, 2008). In their study, Abasi and Graves conclude that it is the "situated and distributed nature of learning mediated by the cultural artifacts and practices of a community" (Abasi & Graves, 2008: 222) that there are problems for students learning how to use academic sources. It is in the relatively "hidden" area of using sources and then annotating, developing thinking and making notes that a student has to work through ideas while adhering to academic practices in knowledge creation and attribution, and this can be the place where mistakes are made that can lead to erroneous claims to ideas. The distributed nature of using digital technologies to assist in the making of annotations could potentially cause some of these problems. In this view of learning, digital technologies are used as a tool in the process of thinking, in much the same way as thinking is an interaction between the person and other cultural tools (Shaffer & Clinton, 2006). The appropriation of the tools for annotation could be mediated – the technology or the specific app is one of the choice of tools, and using it is supportive and helpful. It could also be distributed – the use of digital annotations become part of the way to do the thinking and making meaning, as a form of extension of the thinking processes. In addition, students face the task of negotiating the ways they are expected to use social and collaborative learning practices but are still expected to produce "original work" (Johnson-Eilola & Selber, 2007).

One of the practices in writing and using digital annotations is in the area of intertextuality. This is a concept generally attributed to Kristeva but also drawing on concepts from Saussure and Bakhtin (Allen, 2011). Bakhtin did not use the term "intertextuality" himself (Allen, 2011), but in his studies of literary works he proposed that all communication depends on previous communication and that any communication draws on this "interplay between different voices" (Sinclair & Macleod, 2016; drawing on Wegerif, 2012). In academic work, an individual is expected to draw on previous texts that they have encountered, and they use this knowledge to create new texts. In Bakhtin's conceptualisation of the process there is a dialogue between all texts and all users, so that intertextuality is fundamental to creating meaning. This is known as dialogism (Holquist, 2002). Intertextuality is used often in stylistics and other investigations of how a text draws on meanings created because of familiarity with other texts. In the study of literary works it is used to explain how understanding of the current text is possible only when the reader is also aware of other texts. This is seen, for example, in how a phrase from Shakespeare is used in a modern novel: the reader has to understand the reference to be able to appreciate the humour or relevance of the intertextual use. In a recent study on the use of citations in academic writing, Badenhorst (2019) concludes that there are expectations surrounding the correct way to cite literature but the intricacies of how to use literature and

she calls for pedagogy in universities to include "an *overt recognition of intertextuality*" and "examining citation use closely as it happens" (Badenhorst, 2019: 273; emphasis in original). I would argue that this includes the point of using a digital annotation to link to another text, and as a part of pedagogical practice should therefore be overtly included in any discussion of how to construct academic papers.

2.4 Literacy, language and digital technologies

2.4.1 Engagement with textual meaning

The question of how readers make sense of a text has been discussed extensively and from different standpoints (Brooks & Browne, 2012; Gourlay, 2009; Merchant, 2008), and one theory that has been used to explain this is "schema theory". Schema theory originated in 1931 as a psychology theory proposed by Bartlett, and became particularly popular during the 1970s (McVee, Dunsmore, & Gavelek, 2005). The theory suggests that we have built up in our cognitive processing a set of ideas that help us to interpret and make sense of new information. Although it originated in psychology, it was used as a concept by Piaget in his exploration of how people accommodate and assimilate ideas (Piaget, 1977). It is this ability to take some known information and use this to provide a basis for adding new information that has meant schema theory is frequently used in educational contexts. It is one of the attempts to explain how it is that we gain knowledge.

In her article, Jeffries (2001) discusses the proposal that engaging with a text "refreshes" existing schema, by forcing the reader to re-evaluate; other texts would instead reinforce different existing schema. Using an example of a non-literary text in the context of a university study programme, this would suggest that the reader would use existing schemata to first "activate" existing knowledge about the subject, and then use this familiar concept/theory to introduce other knowledge. The focus on the reader and the text in schema theory offers some useful ways to conceptualise the linguistic cognitive/mental activity that an individual is using to access meaning, but it stands firmly in the tradition of analysis of the individual and the text as having separate entities that we can consider interacting with each other. As such, it often fails to take into account the wider social context in which this engagement is taking place. It assumes that once an individual has engaged with a text, the schemata has been "activated" and used, and then this individual will continue to use this to make sense of this and other texts. In this process, there is little acknowledgement of the social context that could provide important aspects of meaning – particularly relevant with academic texts and knowledge creation.

While schema theory fits well with approaches that consider how an individual uses language, and how this knowledge of language and linguistic systems helps to make sense of text and discourse, this fails to encompass the range of social and cultural practices that surround the use of language(s) in making meaning. Schema theory became popular in the 1970s (McVee et al., 2005) and through the 1980s into the 1990s there was an increased recognition of the importance of sociocultural influences on our understanding of text and

meaning. While McVee et al., (2005) argued that schema theory continues to be a useful tool for teaching and learning, others (Krasny, Sadoski, & Paivio, 2007) point out that it is an abstract concept and there is very little argument to say that it can be embodied as a "social construction of knowledge, self and literacy" (Krasny et al., 2007: 241). It remains controversial but still used in literacy development.

Following Vygostsky (1978), the concept of language as a tool for thought by the individual is complemented by language as a cultural tool (Rojas-Drummond, Albarrán, & Littleton, 2008). This movement away from focussing only on the individual and his/her cognitive approaches has coincided with new developments in digital technology, a view that recognises that literacy is socially situated and the semiotics of literacy modes and practices includes digital technologies (Gourlay, 2015). This change of perspective necessitates changing the view of digital technologies from "tools" that are part of the literacy development process, to an integral part of the way we make meaning and understanding knowledge development.

As students gain more understanding of texts and ideas in the area of Higher education in which they are working, they create a shared and understood sense of belonging to a reality to which they now belong – their socio-cultural understanding, or the *habitus*, a concept used by Bourdieu (1977) to explain the connection between cultural and economic/political power, and the individual's experience of this. This is a particularly interesting concept to consider when working with students who have more than one language. As explained by Joseph (2016) this helps to explain the value of a first language and how " … my first language does not set limits on what I am capable of thinking or doing, but makes some things come more easily than others and makes certain inclinations more natural, while others require greater effort. To be a native speaker is a historical fact concerning the formation of one's habitus, the set of dispositions, schemata of action and perception that individuals acquire and incorporate through their social experience" (Joseph, 2016: 30). Considering the habitus for International students and their engagement with texts suggests that the power and authority of the institutional context where English language is prominent would have a strong effect on the perceived value of the relationship between the individual's previous language(s) and English. Following this through, there is a possibility that students would reproduce social practices in using English language where it is visible and where there is contact with Others who hold power – staff in the institution; written practices that will be seen by others. However, where the written practice is consider private and will not be shared with others, the individual could use a more familiar habitus of language and culture.

The concept of *habitus* could explain why and how digital annotations, being less visible and possibly being not shared collaboratively, are possibly written using a language other than the dominant one in the institution (e.g. English). Notwithstanding a high level of English language proficiency, some would choose to utilise the language(s) they have previously

used for thinking and creating knowledge. These forms of annotation therefore become a private affair, used by the individual for their own learning practices because this is where they feel comfortable in the process of building knowledge and understanding. This is not necessarily consciously applied in a subversive way, deliberately trying to change the socially-accepted practices of the context, but could be done within the self-imposed limits of what is perceived to be acceptable, thus applying their own constraints by accepting the perceived power of the dominant language.

2.4.2 Language and translanguaging practices
In the late 20th and early 21st centuries there has been a surge in interest in identities and how particular readers use their personal, cultural and social practices to not only assume but also to create online identities (Black, 2006). In their edited volume of 2006, Omoniyi and White note that " … the sociolinguistics of identity focuses on the ways in which people position or construct themselves and are positioned or constructed by others in socio-cultural situations through the instrumentality of language and with reference to all of those variables that are identity markers for each society in the speech of its members" (Omoniyi & White, 2006: 1). They go on to note that in their studies and compilation of research articles they would consider that there are six common positions that help to give coherence to thoughts about identity:

1. That identity is not fixed
2. That identity is constructed within established contexts and may vary from one context to another
3. That these contexts are moderated and defined by intervening social variables and expressed through language(s)
4. That identity is a salient factor in every communicative context whether given prominence or not
5. That identity informs social relationships and therefore also informs the communicative exchanges that characterize them
6. That more than one identity may be articulated in a given context in which case there will be a dynamic of identities management

(Omoniyi & White, 2006: 2)

With digital social media gaining more and more use in our daily lives, the desire to shape our own part of that media has helped to create a very public view of who we are, or who we like to present ourselves as being. This is illustrated in the way a story on social media gains dozens of comments from readers, who not only talk about the content but also discuss the accuracy of the post and the meaning created from the post (Weinberger, 2007). More recently, a study on the ways in which girls create their public social media persona concludes that it can be both highly performative and manipulative (Maguire, 2018). This public creation of identities (which could be more than one identity for an individual, as he/she negotiates belonging to different social groups online) can potentially use

multimodal texts: not only are posts written in linguistic forms but often they are accompanied by photos ("selfies" to show "where I've been") and/or video and audio clips. In academia there are similar questions about how we present ourselves online, with studies such as one considering use of Twitter [8]showing that what we choose to share is selective and premeditated, partly because it could create risks for professional identity (Jordan, 2020)

Alongside this increasingly public view of who we are and how we identify ourselves, there is a realisation that we also have a *private* identity – one that we prefer to keep shielded from the public social creation. Playing with identities and working through how we show ourselves to others is not a new development with digital and social media, but the constraints and potential risks of online identities have definitely changed; for example, in research into the verification of identity when there is published fake news (Wang, Pang, & Pavlou, 2021). For adolescents, the typical "identity crisis" and the development of ideas about who I am and what is my place in the world, is now shaped by perceived identities in social media (Code, 2013). In Higher education, the role of creating learning environments can be viewed as yet another forum in which to create, shape, and modify the personal identity we wish to show the world (Ellaway, Begg, Dewhurst, & MacLeod, 2006; Jordan, 2020).

This view of how we create our identities in various social settings can be seen to have a relationship to the media and modes used. Seen in this way, language is one part of the way we choose to create and modify what we want others to see:

> " … language, along with other social practices, is used to constitute identities, rather than being a reflection of social identities, … We can only understand what a single variable feature means by investigating how it is used in identity construction. This also means that a linguistic variable need not always have the same meaning and, equally, that a change in someone's identity may result in a change in someone's (linguistic) practice" (Drummond & Schleef, 2016: 54).

In creating an identity that is "acceptable" in the social context (for example in the academic context of a Higher education institution in the UK) there may be multiple ways an individual would choose particular features to demonstrate their desired public identity. This could include reference to particular academic practices, for example. It could also include alignment with a particular linguistic choice, such as which language is used for communication in social practices. This would suggest that a person with more than one language has a degree of choice over which language would be appropriate to use, and how that person wishes to be identified in the social event.

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[8] Twitter is an online news and social networking site which uses short messages called tweets
https://twitter.com/

I have had the privilege of teaching English as a foreign language (in Peru and in South Korea), English as a second language (in Malaysia) and also English language for literacy development in the early years (in the MA Primary Education undergraduate degree programme, in Scotland). In each of these teaching and learning contexts I have found that the relationship between spoken and written language has been a topic for debate and discussion, for different reasons, and with different terminology. Likewise, the debate about the use of the first language (L1) in a language-learning classroom has been hotly discussed since the 1970s, with current practice moving back to a position of acceptance of use of L1 for specific learning moments.

In the area of first language literacy development, I share the concerns of Goodfellow and Lea (2013) that "the absence of a critical social perspective on the digital in post-compulsory education is due to a more general side-lining of the issue of literacy at this level. This may be because many associate the concept with the development of print-based reading and writing skills in primary and secondary education, and view the emergence of digital modes of communication at tertiary level as a different (and perhaps more fashionably up-to-date) issue" (Goodfellow & Lea, 2013: 2). There is an understanding that to reach the standard of university education, students must have become "literate", and a focus on literacy development at this level of education tends therefore towards any "unusual" or distinctive aspects of literacy (such as the conventions of academic writing, for example). The expectation is that general literacy is of a sufficient level, this can be "improved" to reach literacy at academic level, and where literacy was originally in another language, there will be a cross-over to academic literacy proficiency in the language of the institution. What is shown in this summary is the absence of academic literacy development in other languages, or the recognition that other languages could play a part in this literacy development.

It is common in the literature about second/foreign language learning to find arguments about the role of first language literacy and how that affects learning another language; it is also common to find discussions about whether or not using the first language in the language-learning classroom is useful or a hindrance to learning. Carvalho (2017: 1) gives a list of studies including Auerbach, 2000, 2016; Cummins, 2007; García & Seltzer, 2016; Macaro, 2005; Meyer, 2008; Tan, 2015. What is less often studied is the extent to which multi-language users are able to tap into their unique (and often personal) resources to make meaning from text and discourse that has the effect of ideologically opening up the understanding of texts. This view of language and meaning is illustrated by a relatively small news episode in Peru in the 1980s: a mathematician discovered that Quechua (one of the ancient languages of the Peruvian indigenous people, related to the Aymara language group) was an excellent language to use for understanding the way computing language translation worked, and therefore could be used to write code that would use an Aymara language as an intermediary language (Simons, 1984). At this time, the 1980s, the dominant discussions about bilingualism and the use of more than one language focussed on the modes of transition from one language to another. In language learning, this was

exemplified by approaches that guided the teacher to identify instances such as where there were "false friends" (cases of similar vocabulary in the learner's first and second language but the meaning was not related) and help the learner to correct mistakes made; or where the vocabulary in the two languages could help the translation, for example. These approaches had in common the understanding that the learner had to choose between the use of one language or the other. "Immersion" in the target language was a very popular approach (following the example of immersion programmes in Canada). The language learner could develop a good (potentially similar to a "native speaker") use of the target language and the ideal was to be able to function fully in that language. There was little consideration of how the first (or other) language(s) could be used alongside the target language; the learner was expected to be able to choose one or the other, according to the social and cultural context. This focus is clear in the account of the Aymara language study from the 1980s: according to Guzman, there was a problem in the way the language was being "corrupted" by the use of Spanish by the native speakers of Quechua and the report has no comment on how individuals who had both languages would be able to make use of that potential (apart from being able to keep the languages separate).

In academia it is also necessary to negotiate meaning around views of language, culture and identity (Baxter, 2016). To have pedagogical conversations with colleagues in a teacher-training college in Malaysia, for example, required both shared understanding of the language we were using in coursework (forms of English) but also shared understanding of the context in which it was being used. Staff in the college in Malaysia comprised both Malaysian staff and UK university staff from five different UK institutions, one of which was in Scotland and the others in England. This meant traversing educational experiences from different systems (Malaysian, Scottish, English) as well as our shared understanding of what it means to be a teacher within in the context of teaching in schools in Malaysia, which had language, cultural and political implications. Defining what was acceptable as an assignment from a student, as a very explicit example, required us to discuss not only the levels of language in the assignment but also the standards set by the Ministry of Education; we had to work out our agreed set of principles across various Malaysian and UK institutional policies as well as our own personal approaches. At that time (the 1990s) the dominant approach to language learning was aspiring to a "native speaker" standard (Freiermuth, 2001; Schwienhorst, 2004). Although the named language that was used throughout the college in Malaysia was English, there were also various languages used by staff/colleagues and students, including Malay, Indian and Chinese variations. Malaysia has a unique linguistic and cultural landscape, but the issues raised by this negotiation of languages are not unique (Pennycook, 2020); globalisation and internationalisation have contributed to recognition of prevailing post-colonial attitudes about language and linguistic studies that suggest it is possible to investigate language as a linguistic entity (following Saussure) without being aware of the cultural context (Branson & Miller, 2007).

Internationalisation of education is seen as an important contribution to knowledge (Bonacina-Pugh, Barakos, & Chen, 2020; Larsen, 2016), while also having political and business implications (Salö, 2020). Studies have focussed on policy and practice in institutions in countries where English has been adopted as the medium for instruction, and while policy is not as often scrutinised in "at home" English speaking institutions, this has been identified as an important aspect of globalisation and marketing of education: "'internationalisation at home' which consists of transforming the curriculum and more broadly the teaching and learning environments of all students to make Higher education more responsive to the new demands of a globalised world" (Bonacina-Pugh et al., 2020: 2). Within these broad policy frameworks of globalisation and internationalisation, individuals are using languages in different ways, and consideration of their individual practices is one way to investigate how they manage their contributions. These practices have been labelled "plurilingualism" by the Council of Europe (Beacco, 2005; García & Otheguy, 2020), and also "translingual practice" by researchers, emphasising a move away from dominance of labelled "languages" towards more focus on the range of communicative experiences by different individuals: "Firstly, communication transcends individual languages. Secondly, communication transcends words and involves diverse semiotic resources and ecological affordances" (Canagarajah, 2013: 6). The concept of translingual practice in the classroom has given rise to the term "translanguaging", meaning "the manner in which bilinguals intentionally communicate and make meaning using all their linguistic repertoires" " (Canals, 2021: 649).

One of the proponents of translanguaging, Ofelia Garcia, summarises this as an approach that "points to three innovative aspects in considering language on the one hand, and education on the other" (García & Wei, 2014: 2). The aspects mentioned by Garcia and Wei are:

- Referring to a trans-system and trans-spaces; that is, to fluid practices that go between and beyond socially constructed language and educational systems, structures and practices to engage diverse students' multiple meaning-making systems and subjectivities.

- Referring to its trans-formative nature; that is, as new configurations of language practices and education are generated, old understandings and structures are released, thus transforming not only subjectivities, but also cognitive and social structures. In so doing, orders of discourses shift and the voices of Others come to the forefront, relating then translanguaging to criticality, critical pedagogy, social justice and the linguistic human rights agenda.

- Referring to the trans-disciplinary consequences of the languaging and education analysis, providing a tool for understanding not only language practices on the one hand

and education on the other, but also human sociality, human cognition and learning, social relations and social structures. (García & Wei, 2014: 2)

The concept of translanguaging recognises that bilinguals or language learners are individuals who have access to a transformative system: the suggestion that multi-lingual users can go "beyond socially constructed systems" and have the opportunity and capacity for "multiple meaning-making systems". Translanguaging has more of a focus on the internal, cognitive processes, rather than code-switching, which is looking at the language used by an individual in an "external" focus: "code-switching is external it's an external viewpoint of languages; translanguaging is internal; translanguaging has to do with what the child has their resources the communicative resources that children have to make meaning to learn and that teachers can then leverage in order to teach" (García, 2015). While the emphasis by Garcia here is on the teaching/learning classroom and children, the concept is also useful in considering the suggestion of the number of resources that an individual has available. What can appear to someone else as a mix-up of different languages can actually be a series of "delicate shifts in (identity) 'footing', alignment between speakers and changes in the participant framework. Needless to say that current social media usage displays a phenomenal amount of such forms of languaging in new forms of graphic" (Blommaert, 2018: 31). The argument is that having multiple languages offers more possibilities for creating identities in the choices for the individual when using digital platforms or social media.

In many aspects of Higher education we continue to demonstrate a fundamental attitude that is colonial in origin (Branson & Miller, 2007): the idea that the dominant power can provide an excellent education and that "others" come to benefit from this unique provision that we care to share with them. The inclusion of international students in our universities is not entirely a business proposition, but the economic factors are definitely relevant in the advertising of university places and the push to have more international students (Bonacina-Pugh et al., 2020). What is often overlooked is the potential for students with more than one language and cultural background to contribute to the broader aims of education. Typically, research on how students use online discussion and sharing forums has a focus on "the amount of student participation, the linguistic characteristics of interaction, and the impact of CACD [computer assisted classroom discussion] use on students' writing" (Warschauer, 2007: 908). The prevalence of digital forums for discussion, along with familiarity with social media practices, has legitimised the engagement in these types of online activities. At the same time, many groups of students have their own "secret" social media forums, where they discuss class and learning topics as well as keeping up with news and informal topics, and these are apart from the academic-approved and tutor-moderated forums (Shields & Peruta, 2019). Sharing digital annotations fall into both of these categories – either tutor-led and "approved" forums, or social media student-led forums. On the one hand, note making and collaborative discussion are considered legitimate and

academically-supported forms of learning. On the other hand, there is the ogre of potential plagiarism behind the suggestion that notes could be shared and used in assessments.

2.4.3 Constructivism in learning and digital humanities

In Higher education programmes, where there are sessions that concentrate on the development of skills and understanding these often draw extensively on the theory of constructivism (Moreno, Gonzalez, Castilla, Gonzalez, & Sigut, 2007; Tsai, 2001). Constructivism is a cognitive-based theory with a focus on the ways in which an individual will make sense of the text, and this in turn depends on the reader being able to use existing knowledge, integrate it into the new knowledge that is in the text, and make the choice about what is of interest and of use to themselves (Ensslin, 2004). Constructivism conceptualises a reader as an agent who can use various aspects of prior knowledge to make sense of the text, and the text is conceptualised as an "object" that contains ideas and knowledge that this reader can harness and use. The emphasis in literacy development pedagogy, for example, is on how to support the reader – how there can be difficulties in the ways in which a reader can access the text, or how this reader can explain the knowledge gained from the text. Much of the time spent in initial sessions teaching this theory to students who would become primary school teachers is focussed on the reader – how to support this reader, and how to notice (as a teacher) when extra support is needed.

Fundamental to the constructivist theory of learning, scaffolding is when guidance and support comes from a source that has more knowledge and uses the "zone of proximal development" (ZPD) to boost what they could achieve by themselves to a higher level that is achieved with this support (Lee, 2009). Scaffolding and the ZPD do not have to be provided by a teacher; this can be other individuals and can also make use of other resources. Using this as a theoretical basis for practice, the development of scaffolding in literacy learning can take various forms, one of which (as an example) is providing annotated texts to groups of pupils to then explore by sharing within the group. This does not necessarily involve digital technologies: as part of a series of literacy learning and teaching in the MA Primary degree programme, a task developed by Peter Tarrant used the book *Voices in the Park* (Browne, 1998) to provide scaffolded support in the form of pages from the book alongside "sticky note" annotations to enable interrogation of the text by groups.

As well as invoking scaffolding, this type of learning support also uses dialogue in the sense used by Bakhtin (1984), where he distinguishes between the idea of discourse as a subject of linguistics and dialogue in metalinguistics:

> "Yet this dialogic angle is precisely what cannot be measured by purely linguistic criteria, because dialogic relationships, although belonging to the realm of the word, do not belong to the realm of its purely linguistic study. Dialogic relationships (including the dialogic relationships of a speaker to his own discourse) are the subject of metalinguistics … Language lives only in the dialogic interaction of those who make use of it" (Bakhtin, 1984:182).

Although Bakhtin was not discussing digital technologies, there is potential for digital multi-modal texts to provide similar support for learning. This is precisely the kind of learning through scaffolding and dialogue that was supported in an online literacy task I developed for the MA Primary: an online information "quest" that involved groups finding specific information following guided (scaffolded) websites, sharing and questioning information with the group (dialogue), and then using the digital annotated notes to produce a collaborative classroom artefact. The "dialogic space" (Sinclair & Macleod, 2016; Wegerif, 2012) in this activity was made more visible by the use of digital annotations that were part of the group collaboratively-created spaces. One aspect of this dialogue takes the form of encouraging the participants to re-use the terminology and phrasing that is provided by the teacher. Learning and making meaning therefore takes the form of, amongst other aspects, the use of words in a meaningful context. The words are presented (by the teacher, as an annotation to the original text), read in the annotation, used in the discussion, and further repeated in the whole-class plenary discourse at the end of the task as they explain how and why they created the final group artefact.

When considering the relationship between language and discourse, a constructivist view of language is that it is both cultural and psychological – relating to both society and the individual (Rojas-Drummond et al., 2008). In this perspective, the use of language is not confined to aspects of social interaction, but it is also essential in the development of cognitive processes. This is a common feature not only in literacy learning but also in language learning classrooms, where the tutor will create a discussion around a topic to enable the language learners to interact and negotiate meaning (Goldstein & Conrad, 1990). It is, however, not limited to language learning. In our MA Primary literacy development sessions we demonstrate activities that will encourage the same kind of negotiated discourse to support meaning-making. A constructivist approach suggests that through interactions like this, the language is "appropriated and re-constructed as internal speech … which contribute significantly to problem-solving, knowledge construction and self-regulation, among other central psychological functions" (Rojas-Drummond, Albarrán, & Littleton, 2008: 179).

As an approach to researching the development of digital technology in education, constructivism can be seen as an alternative to either an essentialist approach where the technology is seen as a tool that provides the conditions for learning (and therefore correct harnessing of the tool will result in learning), or an instrumentalist approach, where the pre-set goals of learning are established and then the technology is linked to these. In contrast, a constructivist approach to the use of digital technology would place the emphasis back on the social context and the ability of the users to influence the technologies that they are expected to appropriate. This approach therefore blends the technology with society and users:

Constructivist scholarship abandons essentialist and instrumentalist views and instead crafts analyses that trace the blending of the social and the technical in the development of a variety of technologically-mediated processes. Technology is not independent of society, as essentialism claims, but develops as a concrete response to social interests, claims and values. But neither is technology merely a set of passive tools, as instrumentalism insists – rather, it structures human activity in ways that are not entirely in the control of users (Hamilton & Friesen, 2013: 3)

Hamilton and Friesen (2013) note that taking an essentialist or instrumentalist stance to the use of technology can result in setting up a binary, where pre-digital practices are seen to be the standard by which any technological modifications are tested, or the decisions about the uses of technologies are separate from the experiences of the users. I have seen this play out myself in discussions about the possibility of adopting a particular technology or software – there is an assumption that the existing practices have no issues and any adoption of digital practices have to be tested against this existing "norm". This presumption can lead to complacency in examining the pre-digital practice; the question of whether or not to adopt an approach that involves digital practice can in fact open up the discussion and bring to the fore the questions and issues that have been hidden simply by being "the way we do things". An example of this is when considering using digital technology for examinations: often the possibility of some people being disadvantaged by potential difficulties in using the technology is cited as a reason to have no change; however, difficulties faced by those sitting examinations under the current practice (physical or mental health issues) are overlooked.

2.5 Summary

This review of relevant research, theories and approaches has covered a number of multi-disciplinary areas. My approach has been to move beyond trying to find one particular theory or concept that will explain all the parts of the study. Instead, I have taken a view that to make sense of the processes involved, a number of views could be considered. This creates the possibility of a complex mix of different approaches that can seem to have little relevance to each other. To bring these together in some kind of coherent discussion for data analysis, an Activity Theory model was used. Activity Theory developed from studies of how human activities have relationships with culture and society and are not just individual actions (Kaatrakoski et al., 2017), and it is used to help to determine the factors that shape how someone, or a business structure, reaches a particular goal. The Activity Theory framework is useful in helping to identify where there might be tensions and constraints (Kaatrakoski et al., 2017). It is typically represented by a series of inter-connected triangles:
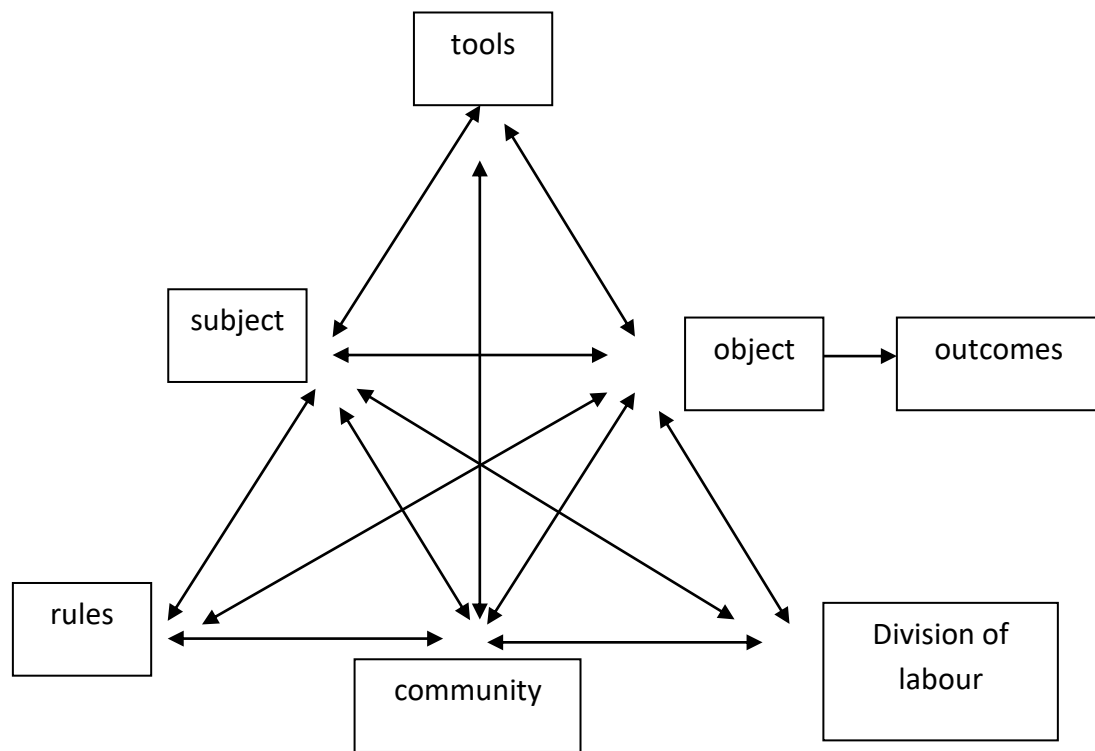
Figure 5: Activity Theory model, adapted from Engestrom (2000)

I will present the theoretical aspects of Activity Theory in section 3.2. Here, I will use it to summarise the different tensions that could be part of the process of using digital annotations to reach a particular goal. In this chapter I have considered:

- Tools: the affordances that digital apps and software have for supporting the creation of annotations; digital annotation systems; multimodality; languaging practices (although this could also be conceptualised as part of the community contribution). Studies are often based on the use of one particular app and examination of how users appropriate and manipulate the app for particular purposes. Although the idea of taking notes and using annotations is not new, as digital annotation systems have developed there has been relatively little development in scrutinising the way digital systems may work differently. As part of academic practice, the ability to make notes and create annotations is often overlooked as it is expected that students/academics have reached sufficient literacy levels to appropriate the technology. Constructivist approaches such as scaffolding are espoused as part of learning processes, but in the decisions about which digital technologies to use, and how an individual can appropriate them successfully, can be overlooked. The distributed nature of using digital technologies for annotations can mean the user appropriates annotation systems to be able to store ideas for later work; this changes the emphasis from understanding at the time of making the

annotations to being able to successfully retrieve them. Digital annotation systems offer a wide range of multimodal potential.

- Rules: the constraints brought by academic and university policy, particularly related to authorship, plagiarism and understanding a personal contribution to knowledge; the pedagogical uses of digital annotations; the constraints of language requirements. One of the main tensions in questions of authorship is when collaborative annotations are recommended. There is also a tension in the use of private annotations, where the user has to negotiate taking information from a source and then later using this to develop knowledge and meaning. This can be overlooked as part of study practices, as the emphasis is often more on the final output and whether it conforms to scholarship rules about plagiarism.

- Community: the interaction created when social and collaborative annotations are used; how social, cultural and language experiences influence choices. In UK Higher education institutions it is expected that students will develop adequate English language skills to participate fully, while affordances from previous cultural and language experiences are not fully exploited. There remain remnants of colonial attitudes towards the use of other languages, often overlooking the ways these can be important factors in creating meaning for individuals.

In the following chapters I will consider the data, and how this relates to these tensions. This will answer the research questions, which I will discuss in chapter 7: Conclusions and implications.

3 Methodology

3.1 Platforms, apps and software used in this study

In preparation for the study, many apps and software packages were examined. These included Kindle ebooks, Inkling ebooks, Bluefire reader, Adobe Digital editions, as well as web-based readers such as Hypoothes.is, and library ebooks. There are many apps and software packages that could be used in a study like this, but giving a review of all the possibilities that were investigated would run the risk of having descriptions about apps being the main focus of the study. Instead, having looked at some possibilities, Kindle ebooks were initially selected primarily because of their ease of use and relative popularity. After the initial study, Kindle ebooks were dropped from the study (reasons for this are given below) and instead the data gathered from this was used as a pilot study. Subsequently, two other platforms were used: Mendeley and MS OneNote. The platforms used for the study give different aspects of ways to use digital notes and annotations, but in both the survey and the conversations, participants could also talk about other platforms and apps that they had used themselves. By choosing a limited number of platforms the focus can remain on the ways in which users talk about their use of apps without becoming a comparative study of the pros and cons of particular apps. The relevance of the platform/context and how that relates to use will also be discussed, and this will also illuminate the reasons for the choices of these apps.

When defining the terminology used in this thesis, there are a number of ways to describe items depending on whether the focus is the computing system/design on which the package runs (and different companies can use different terminology, creating the necessity for users to follow the company preferences), which can be labelled the "user interface" or UI, and the purposes of the user(s), which can be labelled "user experience" or UX. Thus terms such as "software package", "application" (often shortened to "app"), "digital platform" (where the focus is on the range of technologies that work together), and other variations, are used in precise ways for companies and digital service support groups, such as is common in universities now. However, different users (whether students or staff) can use descriptions and terminology in different ways so that one writer could be discussing "software package" and another could use "application" but they are discussing the same item/product; in this instance the differences could possibly be explained by "software" being an older term used in computing while "application" came into use with the onset of wide use of tablets and mobile phones, mainly following the introduction of the Apple App Store in 2008 (Quiller Media Inc, 2021). Of course, in many disciplines the varying use of terminology can be an issue; this is exacerbated in the digital humanities by the rate of change and the influence of digital technologies being used in daily life and not just in academic contexts.

This study is focussed more on the ways in which users make choices for their own purposes, rather than on the precise nature of the computing item or analysis of design

features, and so the terms "software", "app", package", and "platform" are used interchangeably. In the analysis of data, the participants in the study also used different terminology for the same item, and for this reason also it is not useful for the argument to pursue variations in the terminology and what this might mean for users and participants.

The choice of the software / apps for the project was based on an understanding of the context in which the participants would use them, and also on the view that engagement in the project would depend on the participants seeing the relevance for their own use. The chosen software applications (Mendeley and OneNote) are primarily intended for school or academic use rather than leisure activities or games. I am not aware of any relevance for Mendeley outside academic practices as it functions as a way to store a library of pdf texts and create citations and bibliographies with this. Although I know of a number of academic colleagues who use Mendeley, the university supports and gives guidance on the use of the citation manager EndNote rather than Mendeley. However, in addition to this function of Mendeley, it also provides the use of highlighting text, adding notes and annotations, and these (as well as the original text) are fully searchable in the users library. EndNote does not include these extra functions.

OneNote has been used extensively in primary and secondary schools, and is mentioned in the software lists provided by the university attended by the participants in this study (note that this list is restricted access and so cannot be referenced here), but is not at the time of writing available for software guidance sessions and is not actively promoted for use by staff. However, a number of colleagues have used it in classes to different levels of success. It is particularly useful to students who are preparing for teaching in Scottish schools to know about this software as it has become extremely popular for school use. Likewise, I have used it for several different University degree courses although while one group used it enthusiastically, another group resented "having to learn yet another app".

I considered that these were useful apps to have in this study as they were being used within the university (and other academic) settings but were not at the forefront of use, as my intention was not to create a situation where I was appearing to be simply promoting a standard set of apps and software that the university advocates. I needed to find apps that were mainstream enough to be considered useful in the setting for the participants, but are also sitting outside the power and hierarchy of university-supported systems, and therefore have the element of choice for the users rather than a defined expectation from the university. I also considered that I could use these apps with the understanding that my participants would be gaining useful support for their academic processes, should they choose to continue using them, thus supporting their engagement with the project.

In the following sections I will give a brief outline of the software packages OneNote and Mendeley, and in 3.4.1 Pilot of platforms used I will give more details about why these platforms were selected for the study.

3.1.1 OneNote (Microsoft)

Microsoft OneNote was initially released in 2003 and was later developed to include "class notebooks" (Microsoft, 2015). These are marketed (by Microsoft) as a solution to the way teachers can provide notes for classes, and also allow collaborative work on a shared project. The software programme now comes bundled with Office 365 and there is also a mobile app which can synchronise with a user's computer-based notebooks. The online guides indicate that the primary market is school teachers, but I have been exploring the use of OneNote for my group of personal tutees. The class notebook (screenshots in appendix 8) setup enables inclusion of different types of texts: documents that are read-only, documents that can be annotated in real time by multiple users, and a private space for the individual user. Annotations can be done by typing (using a keyboard on a laptop, computer, or mobile device) or by handwriting. Handwriting can be achieved if the device used has a touch-sensitive screen, and the user utilises a stylus to write on the screen. The software includes recognition of handwriting to convert to typed text, known as "ink to text". To facilitate both writing and reading, the screen image size can be changed. This means that when using a stylus on a touch-sensitive screen handwriting can be created at different sizes, which is helpful for different users and especially those who would need a larger screen resolution. OneNote recognises a number of different scripts and languages (although this is constantly changing as they add more to the Office Suite) and at the time of the data collection for this study all the languages used by participants were compatible with ink to text conversion.

3.1.2 Mendeley

Mendeley is a free online platform (with the possibility of purchasing more storage) that enables a user to save pdf documents, create lists of references, highlight and make notes, add citations to a document, prepare bibliographies, and share certain features with other users of Mendeley. It was created by digital enthusiasts who wanted to provide a platform that worked for academics in the same way as iTunes works for music, by using metadata to create bibliographic information. It is marketed as:

> Revolutionizing the way you do research; *For individual researchers, teams and groups.* Mendeley is a **free reference manager** and an academic **social network**. Manage your research, showcase your work, connect and collaborate with over five million researchers worldwide ("Mendeley," n.d., emphasis in original)

I have been using Mendeley for a number of years, having started using it while still in Beta, and so am familiar with how to use the functions (and I also run presentations to introduce PG students to how to use it as I joined the company as a "Mendeley Advisor", an unpaid and voluntary position but one that allows communication with developers and gives extra storage gratis). At the time of gathering the research data for this study, Mendeley also offered a desktop version that can be accessed from any computer, and also a mobile/tablet version with the use of an app; all the software synchronises to keep an individual's library

continually updated. Since then, however, the mobile application has been removed and users have to synchronise their library using the desktop version and so have to be connected to Wi-Fi at this point in use.

The features that are emphasised in the marketing materials focus on both the individual and his/her academic practice, and on social aspects of the academic community. Users are encouraged to consider themselves to be part of a larger group of interested individuals, who have common aims and who are therefore "expected" to be willing to collaborate with others. The collaboration is suggested to be on different levels – with your own groups, with unknown "others" who may be interested in your ideas, and with academic/researchers "worldwide" who have common academic interests.

As with many digital applications, Mendeley is one of a number of packages that can help with writing digital text and managing citations. At the beginning of this study, I was aware that many members of staff and students were currently using EndNote, a package that will offer the ability to keep a list of references and create a bibliography (University of Edinburgh (Information Services), 2017). When I started using Mendeley, I discovered that it provided a similar range of reference support but in addition it offered the ability to keep a personal library of pdf documents, which could then also be annotated (screenshots of highlighting and annotation in appendix 8). I considered, therefore, that Mendeley offered more than a text organisation tool but also offered study support. As it keeps a personal library on a cloud server, it is possible to access your library from any computer. There was (until 2020) also an app for mobile use ("Download Mendeley desktop," n.d.), and this also synchronised with the cloud library; I was able to use this during the data collection with the participants. Since then, this app is not supported and all synchronisation has to be done with the could-based library of the user.

3.2 Overview, project development, and research questions

This section gives a re-statement of the main research questions as well as a summary overview of the methods and methodologies used in the study. The remainder of the chapter gives the theoretical and philosophical frameworks, and the methods used to gather and analyse the data.

The research questions in this study grew out of practical teaching experience and developed as an enquiry into a specific part of one of the areas of current practice: how are new digital technologies being used; and specifically, how digital annotations are being developed and used. To pursue these issues, I considered a quantitative methodology to find out the most popular uses of digital notes and annotations. There would be value in collecting statistical accounts of, for example, how many platforms/apps are used, which ones are the most popular, how many students and members of staff use particular platforms for designated tasks, and so on. These would be helpful insights into the current use of digital applications. In turn, this could inform decisions about the value of digital support and how to provide this. This would give a valuable information about

developments and uses at a particular time, which could be used to predict, for example, approaches to changes in technology use for an institution. An investigation of this type would have to keep in mind that during an investigation the technologies that are popular are constantly changing and within a short space of even just a few years the technologies can change dramatically. However, although this kind of study would give evidence for the types of technologies being used, it would not enable an investigation into the deeper issues and the complex ways of seeing reality that participants use to make sense of their relationship with technologies (Holliday, 2002).

Another approach would be to use the presence of digital technologies to illuminate broader issues in literacy and language that are revealed by the use of the technologies. A more qualitative approach of this kind would focus on the values and perceptions of the participants, giving insights into the context in which the technologies are being used.

The focus of the study developed, therefore, into analysis of the complex intertwining of personal attitudes and approaches and how these affect an individual's valuation of digital text and their own contributions to that. The research questions have both practical and theoretical stances, and are predominantly interpretative in nature.

This study investigates the following overarching research questions:

1. How do users evaluate , use, and contribute to digital annotations in digital texts?
2. What perceived value is placed on modified texts following the creation of digital annotations?

Over a number of years, I have collected various types of data related to the research questions. While being involved in teaching and learning with various groups of students, I collected information about how they were using digital technologies. These were predominantly used to make decisions about teaching materials at the time. However, as I reviewed my notes I was able to see patterns and similarities. I began, therefore, with a very typical Action Research model, or possibly more an "accidental ethnography" approach, as discussed by Levitan et al: "AccE [accidental ethnography] takes an historical approach to action research practice, and utilizes data that were not originally intended for research. Therefore, AccE expands on the terrain of PAR [Participatory Action Research] and action research because the researcher is a practitioner first, and then engages in research post hoc" (Levitan, Carr-Chellman, & Carr-Chellman, 2017: 4). Emerging themes and patterns that came out of this phase included:

- Several colleagues distrusted the digital approach to online materials or recordings of lectures, but were prepared to use personal communications with students for teaching/learning outside set classes and seminars

- While some students who attended lectures tried to write down as much as possible that was said, others were prepared to mainly listen but take photos of slides and information on the lecture screen
- Many of my students would fit into the so-called "digital natives" era (Bennett, Maton, & Kervin, 2008) yet many of them did not consider the digital choice as their first or main choice, prompting interrogation of this concept
- Students attending one-to-one sessions for Master's dissertation support would often confide that they liked to copy and paste sections from journal articles but they continually worried about the process related to possibly "committing plagiarism"

To examine these and other related areas, I have conducted <u>a literature review focussed on several questions/areas (chapter 2),</u> used field notes from previous teaching/learning experiences, implemented an online survey, and had conversations with participants about their use of digital annotations.

3.3 Theoretical and philosophical underpinnings

My background in working with language teaching in various countries has given me opportunities to live and work in various contrasting cultures and linguistic groups. This has shaped my understanding of what it means "to be human" and how difficult it can be to separate culture, social norms, language, attitudes, and identity. In examining my own approach to this study I will attempt here to establish the framework I have used, and the philosophical choices I have made.

There are several different ways to categorise ontological belief in research design, and this research would fall into what is described as "relativist" (Cohen, Manion, & Morrison, 2018). That is to say, there is a world that exists, but the experience of that reality is shaped and understood differently by different individuals. As the focus of the study is on the reality as perceived by the participants, there is an ethnographic dimension, even though it is not a longitudinal ethnographic study (Pole & Morrison, 2003).

The use of narrative analysis is a popular research methodology that complements an ethnographic approach (Cortazzi, 2001). At the outset of this project, it was intended that participants would be allowed to share their experiences, thus building up a picture of how they interpret and explain their use of digital notes and annotations. I am familiar with this aspect of narrative enquiry through studies in literacy development (Honan, 2008) and also through my interest in literary stylistics (Labov, 2013; Toolan, 2021). As the project developed, I realised that a second aspect of narrative enquiry was emerging: "to reveal crucial, but probably generally unappreciated, personal and professional qualities involved in many occupations and professions" (Cortazzi, 2001: 5). Narrative enquiry functions as one of the means of making sense of the world around us, and thus making sense of our place in that world. As technology advances and new or changed apps appear for learning purposes, it is important to be able to review the different ways these are appropriated by users.

Statistics about the ways in which university-supported software is used can be identified by technicians, but this is only part of the development. It is also important to understand why and how users make choices to be able to make educational decisions for both educators and students. It was therefore appropriate that this study would create a platform for these stories to be told.

The project started with this focus on understanding more about the meaning created by users of the technology. As it developed, inevitably the picture created became more complex, as is common with interpretive studies. Emerging from this, it became apparent that there was also meaning from the relationship between the users, the technologies and the contexts they were working in. A theoretical view of this relationship in digital humanities that has become popular is the use of Activity Theory: "activity theory redirects our gaze from what is going on inside the individual to what happens between human beings, their objects, and their instruments when they pursue and change their purposeful collective activities" (Sannino & Engeström, 2018: 44). The use of the framework given by Activity Theory was a useful tool in the analysis of the data from the conversations, as it helped to guide the creation of coding related to specific influences.

As the project developed, the initial codings were refined as further aspects the use of digital notes and annotations became apparent. While examining the context of the participants, the use of language(s) in their experiences started to emerge as a pertinent topic in the choices they made. The approach therefore developed as topics and themes emerged from the data.

3.4 Pilot studies

3.4.1 Pilot of annotations using ebooks
The intention of the investigation was to have guided use of digital annotations and to work with participants collaboratively. To explore the ways readers use digital annotations, I first considered a literary text in a format that enabled digital annotations. As a popular platform for digital texts, I considered Kindle ebooks, as these can be purchased for the bespoke Kindle platform but can also be purchased to use with an app that can be accessed on any computer or mobile device. However, this was subsequently not used for the study, and instead two other platforms were selected. The progression of selecting platforms is given below. In 2016 I initiated a study and contacted 8 participants who were interested in taking part in a study focussed on using ebooks. These participants were all members of staff of Higher education institutions. Three were staff in the university where I was working, and they were contacted through informal discussions about a study in literary texts. Two were associated with the same university through being external examiners for different programmes, but were based in other UK institutions. Three were colleagues in other institutions – two in UK and one in India – who were known to me through publications and conferences in literary stylistics. All participants agreed that they would purchase their own

copy of the Kindle ebook, and would read chapter 1, and make notes and annotations using the Kindle ebook digital facility.

Kindle ebooks formats have changed in the time during which this study has been in progress, and it is very possible that it will change again. In 2016 I set up a study project using a Kindle ebook (available from Amazon). The text chosen was the novel *Under The Skin* (Faber, 2000) and those involved in the pilot were asked to read at least chapter 1 and make digital annotations/notes as they read. Kindle ebooks allow a reader to use digital features to highlight text, create "bookmarks", and add personal notes. At that point in time, Kindle ebooks also had a feature known as "public annotations"; this has more recently changed to notes and comments being available on "GoodReads", although the functionality for an individual user remains similar. In addition to the "public annotations" feature, ebooks in Kindle (and also on other ebook platforms) suggest to readers that they should create public reviews of books. This is also an interesting format to be able to see common practice and understanding among readers, as it is possible to note that there are "30 other people have highlighted this phrase", for example. I discovered that there was a flaw in the "public annotations" feature: once published, a Kindle ebook can have some updates (these are often spelling or formatting errors); a new version is produced when these have been corrected but any annotations are not transferred to a new version. A "version" is different from an edition: when purchasing a Kindle book it is possible to see which edition is being sold, but a version is not marked in any way. This means that someone can purchase a particular version, and another person can purchase what looks like the same book, and the same edition of the book, but as it is a different version the public/shared annotations are not seen. Once purchased, a reader has the option to update to the new version if wanted, but in the knowledge that any previously created public or private annotations will not be transferred to the new version (i.e. they are lost).

In my initial study I discovered that I could not access all the public annotations in a chosen ebook publication as there were several versions of the ebook available. It was not possible to purchase more than one version of the ebook (Amazon restricted this), and so the annotations that were visible to me were not the same as those visible to everyone reading the ebook. It is also not possible to foresee which ebooks might have different versions created. Although I did manage to make contact with Amazon representatives, they could not provide any way to manage all the annotations from all the versions, and they were reluctant to pursue any improvements in the features that would make this possible. For this reason, after saving the annotations, notes and comments that were visible to me from those participating, I realised that it would not be possible to continue to use this type of annotation for my study. This also highlighted an issue with modifications of digital apps that become familiar to us but can change without warning.

Nevertheless, the annotations that had been visible to me produced some valuable information about how readers view their use of digital annotations in ebooks.

Unfortunately, the technical flaw with the ebook version meant that it was not possible for me to see all the notes and annotations that had been created, and only four of the original eight contributions were available. This therefore became a pilot study which informed the next stage of the study, which was the creation of the survey. There were several points from the ebook pilot that were subsequently used (alongside understanding from research of other studies) in the creation of the survey:

- Two respondents noted that they found it curious to make notes when reading for pleasure; they associated taking notes with some form of study of the text, and this was commented on as being different from "enjoyment". This prompted questions in the survey that asked for views on using digital texts for enjoyment and for study
- Three respondents noted that they didn't like using the ebook format for reading a book for pleasure. The implication was that the mode (hard copy or digital) was chosen according to the purpose being either pleasure or study. This prompted questions in the survey related to choices in mode depending on the context and purpose.
- One respondent noted that they would take more time to create an annotation if they thought it was going to be seen by others. This prompted questions about public and private annotations, and what differences in use they would attribute to these.

Having already used several platforms and apps in teaching, I considered which would offer the potential for use as providers of digital annotations, and two platforms that fitted this requirement were Mendeley and OneNote. The study used these as a basis for discussion as these as they are commonly available and have been in use by myself for a number of years so I am familiar with the ways they can support learning. It is also clear that rather than using only one platform, the two different platforms gave different approaches and affordances. Mendeley is a platform that has academic features (and thus provides the "gravitas" of annotations in relation to study) and also allows for a certain type of annotation as well as collaborative sharing of annotations. It is free to download and use. OneNote is part of the Microsoft Office suite that is provided free for students and staff via the university product provision. It offers the potential to create layered multimodal annotations using pictures/photos and audio texts as well as providing both private and collaborative learning spaces.

3.4.2 Survey and conversation pilots

The online survey was piloted in March 2017 with two members of staff and three students. These were found by personal contact. I asked colleagues who were interested in digital technologies if they would consider taking part in my study. For student participation in a pilot, I offered an open and voluntary session on using Mendeley to students on two Masters programmes, and asked for volunteers to take part in my study. Following the pilot, some adjustments were made:

- The original survey attempted to leave as many open questions as possible, but feedback by all pilot participants was that they preferred more listed choices, even if they were not able to have a wide choice themselves due to not being aware of different platforms and applications.
- They all agreed that having the survey online was appropriate and they did not have any difficulties in accessing it online.
- Two questions required clarification of the terminology as they had difficulty in understanding what was expected, and this was rectified.

Following participation in the online survey pilot, these participants were invited to take part in a pilot of phase 2 of the project, the conversations. Only one of the pilot members agreed to do this, one of the students. The pilot was arranged to take place in my office, and was recorded so that conditions were similar to the later conversations. For the pilot, a set of semi-structured questions was created as listed in section 3.5.5. with the exception of question 8, The participant in the pilot did not suggest any changes or alterations to the questions but agreed that it was good to have the option to talk more about topics if these proved interesting to her. During the pilot conversation, the participant commented on the use of different languages for different purposes, and this prompted the inclusion of question 8: Which language do you use when you make notes or annotations?

One further change following this pilot was that the invitation was changed from "attending an interview" to "take part in a conversation". The pilot member suggested that this "felt less intimidating" and made this suggestion based on other research she had been involved in. After consideration of the implications, I made this change and further research on the implications (noted in section 3.5.5) confirmed to me that this was justified and served to underpin the conceptual processes of the study.

3.5 Methods

3.5.1 Outline of the research stages
To pursue the answers to the research questions, the sequence of investigations in outline was:

1. Initial survey
2. Conversations using annotations

Initial survey: the survey was distributed online in during 2017 and 2018, and 29 participants responded. Respondents were all voluntary participants from various Higher education (University) sectors, including staff and students. Data was collected online using Bristol Online Surveys (BOS). The results from the survey were analysed as a set of data, and also used for analysis along with the recorded conversations, to enable further investigation of the ways participants identified as being readers and users of technology. I was very keen to explore any differences in use of digital technology by participants who were aware of

accessibility needs (in relation to literacy development) and contacted the University Disability Office to pursue this; following GDPR guidelines I was able to make contact with one participant who was receiving support for dyslexia needs. The survey included an invitation to take part in further research.

Conversations: Following results from the survey, all participants who gave their permission to be contacted were sent an email with an invitation to take part in guided conversations about the use of digital annotations. Eight individuals responded to this invitation; this included one member of staff, and students who were pursuing either undergraduate or postgraduate degrees; one of these later withdrew from the project for personal reasons. Some were self-identifying native English speakers and some did not have English as their first language; the latter are known to have a high degree of English language proficiency as they must obtain an English language IELTS score of 6.5 minimum (entry requirements to programmes of study; a TOEFL score is also accepted for entry requirements). One individual identified as bilingual in English and Welsh. Participants were asked to take part in a conversation involving the use of digital annotations; they were asked to create and read annotations on texts provided. The conversation included asking them to comment on the annotations they have made and to comment on their reasons for the choices made. They were also asked to comment on their preferences for types of annotation, systems used, and the value they place on the annotations. The conversations were audio recorded.

3.5.2 Ethics

Before embarking on the data collection, the research proposal was submitted to the Ethics committee (School Research and Knowledge Exchange), and approval was granted. The project followed the research integrity guidelines (The University of Edinburgh, n.d.).

Participants were fully informed of the study aims, methods and types of data used. As part of this informed consent, a fundamental aspect of research (Denzin & Lincoln, 1998) was sought for both the survey and the conversations. Participants gave their informed consent by completing a consent form for the survey and a second consent form for the conversations (appendices 1 and 2). These consent forms had almost identical wording but as there was a gap in time from completing the survey to taking part in the conversations, giving the second form made sure that all participants were fully informed of their status as participants and the ethical standards for the research. The consent included an approach to opt in to the second phase (rather than "opt out") by giving their contact details with a statement that they could still opt out of any future research. The consent form also stated the right to withdraw from the research at any time (which included the possibility that any data they had given could also be removed from the research). To be able to keep track of any withdrawal of data, the online survey included a reference number. Participants were assured that although there was this need to provide some details, in any use of the data their participation would be confidential; this meant that they were aware that although anonymity at the point of providing the data was not possible, any use of their data would

seek to protect their identity both directly, by not naming them, and indirectly, by not mentioning aspects of their work or studies that could indicate who they are (Fleming & Zegwaard, 2018). My details as the researcher were included so that they could contact me at any time, including if they had any complaints or needed more information about the research. They were also informed that the project was authorised by the University of Edinburgh and so if there were any concerns about the project they could contact the University Office.

Data from the survey was created using Bristol Online Surveys, and was stored digitally using the University drive to ensure safe storage. Artefacts were uploaded to an nVivo project which was located on the University system. The conversations were recorded at the time and each participant was invited to view/listen to the recordings privately as this was done using MS OneNote (hosted and stored by the University). The recordings were also uploaded onto the nVivo project, and so also stored using the University systems.

3.5.3 Participants

To identify potential participants in the project, I negotiated with course organisers to allow the URL of the online survey to be distributed. Course organisers (members of staff) were also invited to participate. Student participants were recruited from personal contact by myself, and in addition one participant was recruited via an open student forum for students with accessibility needs following my request for volunteers (the Disability Office was unable to give any contact details due to data protection).

I contacted the disability office in order to pursue the possibility of students who required accessibility support to take part in the project. Ethical guidelines did not allow me to have any contact details for potential participants from this avenue, but I was able to advertise the project by placing an advert in the accessibility forum to which they directed me. I was aware of potential issues of power and trust while conducting the project, as participants were aware of my position as a lecturer in the university (Cohen et al., 2018).

The participants for the study were all involved in Higher education, and were all associated with the University of Edinburgh. All participants had expressed an interest in digital technologies in some way. Their history and involvement with digital notes/annotations was varied, and this has given the research project a strong qualitative slant rather than the possibility of creating generalisations. Participants could also be categorised as individuals who are familiar to some extent with the use of ICT in teaching and learning (Krause, 2006), although part of the study involved finding out how much use they make of their knowledge of digital texts for their own purposes and not exclusively for work or study practices.

Participants in the survey were students on several programmes of study: on the Master's degree in Language Education or Master's degree in Teaching English to Speakers of Other Languages (TESOL); PGDE (Primary) degree; MA Primary (undergraduate) degree; MA Science (undergraduate) degree.

One participant was also a member of University staff (currently involved in studying a post-graduate degree). Other members of staff also completed the survey, but for analysis these results were not used; only the member of staff who was also involved in study at the time volunteered to take part in the conversations and this survey data was the only one used.

Conversation participants identified by letter	Current Study status: Post-graduate of Masters	Current study status: PG dip	Current study status: U/G	Employment status	highest level of education (including current status)?
A	Pg/M			p/t	Pg/M/PhD
C	Pg/M			f/t	Ug and PG Dip
H	Pg/M				Pg/M/PhD
L	Pg/M				Pg/M/PhD
Li	Pg/M				Ug
M	Pg/M				Pg/M/PhD
S		PG Dip	U/G		Pg/M/PhD
Others:	11	1	7		
Total numbers:	18	2	8		

Figure 6: table of participants

3.5.4 Initial survey

The first phase of the project involved participation in an online initial survey focussed on current perceptions and use of digital notes and annotations. This survey was conducted in 2017 and also in 2018, with different participants. The survey was not intended to be a large scale survey to allow generalisations, but instead to be used as a guide to indicate some possible topics to include in the conversations that would follow at a later date. All the participants who took part in the conversations also completed the initial survey, and so this also allowed review and comparison of their survey answers in the conversations, as well as the possibility of recalling their answers as part of the conversations. This potential for recall allowed the participants to clarify answers given previously in the survey, if they wished, and also enabled them to expand on topics or ideas from the survey. The survey was conducted using Bristol Online Surveys, a platform supported by the University and so allowing for safe storing of the survey results. The project has a focus on use of digital technologies, so it was appropriate to use an online survey as the expectation was that all participants would be comfortable with using online digital technologies, although to varying extents. The survey was constructed to find out ways in which notes and annotations were used, and the survey questions used both terms interchangeably. The intention was that in the conversations, the distinction would be clarified.

The survey included questions about the way they access, understand and interact with digital, multi-modal texts.

This initial survey enabled an overall view of the extent to which multi-modal annotations are being used, and the ways in which they are used by different individuals; the survey also

enabled some demographic information to be collated. The survey revealed the variety of texts used by participants as well as the ways in which they would take notes; this therefore gave an overview of the reading patterns of the participants, not only when they are reading literature but also with other texts as there could be a cross-over of reading methods/approaches that they would not automatically employ when they encounter literary texts.

3.5.5 Conversations about the creation and use of digital annotations

The individual conversations with participants formed the main part of the data collection for this project. Following the survey, participants were invited to take part in the second phase of the project, which involved conversations about the use of digital notes and annotations. All participants in the survey were given the option of volunteering for phase 2 of the project, and all those who did this were asked to participate in a conversation about their use of digital notes and annotations for both work and personal enjoyment. Participants were invited to come to my office in the university, and this was the location for all but two of the conversations. One participant took part in an initial conversation in my office but then re-located to a different country and took part in a conversation via Skype. One participant was located on a different University campus and to facilitate participation I met with this participant in a location on that campus. An overview of the conversations is given in appendix 7.

Participants were introduced to software (available on computer and iPad/tablet) that provides for digital annotations either by typing or by handwriting (using a stylus). The platforms chosen are explained in 3.3 Platforms, apps and software used in this study. Participants were also asked to comment on their own preferred methods of making digital annotations. Participants were asked for their permission to record the conversations, and each participant was invited to the OneNote project where they could also listen to their own recording (kept private from other participants). All the participants who took part in the conversations agreed to this. The OneNote notebook was stored on the University drive.

There are several reasons for choosing to title this data collection "conversations". In many ways, the interaction could be classed as a semi-structured interview because it involved a researcher with a participant and there was an agenda on the part of the researcher. A semi-structured interview allows for expansion of ideas, re-casts of ideas, development of responses, and clarification by both the researcher and the participant (Silverman, 1997). With a common theme and topic areas to explore, both the researcher and the participant are able to follow lines of thought. There is a difference between a standard interview and a "conversational interview" (B. T. West, Conrad, Kreuter, & Mittereder, 2018) where the standard interview requires the interviewer to have a set list of questions asked in a set sequence, while a conversational or semi-structured interview has a similar set sequence of questions but allows for follow-up questions or extra clarification of the question. In my investigation of research methods, I have concluded that the use of the term "semi-

structured" is more common in UK research articles, while "conversational interviews" is describing the same approach but is used more often in USA-based publications. These differences (structured vs semi-structured/conversational) in approach are related to the purpose of the interview, where the main purpose is to be able to compare the answers given as part of the data analysis (Welsh, 2002; B. T. West et al., 2018). Structured and semi-structured/conversational interviews can be contrasted with "unstructured" or "open-ended" interviews, where the emphasis is less on being able to compare responses from different participants, and more on engaging with individual participants' descriptions of their reality or cultural experiences (Silverman, 2005).

However, in the pilot conversations I discovered that when I referred to this phase of the project as "interviews", the participants took the role of waiting to be asked questions rather than expanding on their own ideas.

The use of the term "conversations" is also helpful in decisions about the type of analysis I have used. In the process of having a conversation, there is usually a minimum of two participants (although it is feasible to have a conversation with oneself, but this is usually stated and so it is recognised that this would be a marked difference to "normal" conversation). A conversation would also include the concept of dialogue, and during the time spent on this study this became an important conceptual point. In power and hierarchy relationships, a conversation tends to point to a relationship of equals, while an interview suggests more power and control of the event in the hands of the person conducting the interview. Given the existing relationship with several of the participants (where I am a tutor on the programme in which they are studying) this is perhaps not possible to shape, and it is likely that there are some aspects of the data collection which have been shaped by this relationship.

The conversations took place in three different contexts, owing to practical considerations for the participants. One of the participants was keen to continue involvement in the project, although she was no longer physically in Edinburgh. In this case, Skype was used to try to match as far as possible similar conditions as face-to-face conversations with other participants: both researcher and participant could see each other, and the recording device was placed so that it did not intrude. This allowed for participation without the need to travel, and still maintained the ability to have a conversation (Iacono, Symonds, & Brown, 2016). One participant was mainly attending classes on a different campus and so I travelled to meet there, as it was not possible for this participant to come to my own campus. I was able to take my laptop computer and my iPad to this conversation, and the participant also provided their own laptop. All other participants came to my office on campus, where I could use my desktop computer, my laptop, and my iPad, and all participants who did this also brought their own laptop computer. The office desktop PC computer was used to demonstrate some aspects of the software as and when this was useful in the conversations. My iPad was used for recording the conversation and also to demonstrate

how the software could be viewed on different platforms. This was useful, for example, for demonstrating how MS OneNote updates in real time. Participants were able to review any notes and the recordings of the conversations as they happened in real time. This also facilitated answering any questions they might have about their participation in the project as they were guided through how to review all parts of their contributions. My laptop with touch-sensitive screen was also used for demonstrating the use of the software. The participants also brought their own laptops and used these while the conversation was taking place. All participants were aware of the conversations being recorded and agreed to this (both initially as part of the ethics agreement form, and again at the time of the conversation taking place).

At the start of the conversations, participants were reminded (as information about this was also in the online survey) that the intention of the project was to explore digital notes and annotations as an aspect of digital technology and open up conversations about the ways we use digital texts. They were also told that it was hoped that they would discover some useful aspects of digital technologies for exploring texts, and that this would be helpful to them as they study, build research notes, teach, and collaborate. In addition, they were told that the online survey data (which they had all previously completed) would be used in conjunction with the conversations to build a picture of the variety of ways people currently make use of digital texts and digital notes/annotations.

Preparation for the conversations included questions for a semi-structured approach. Questions included:

1. Do you remember taking part in the online questionnaire? Do you have any comments about that?
2. Tell me about the ways you make notes or add annotations.
3. Tell me about a time digital notes or annotations worked well for you / not so well for you
4. (Using OneNote / Mendeley) What sorts of things might you find this useful for?
5. Tell me about other ways you make digital notes or annotations
6. Do you ever share your notes or annotations with others? Why (not)?
7. Have you found any ways you wish digital notes or annotations could work better?
8. Which language do you use when you make notes or annotations?

These questions were included in the conversations, although sometimes paraphrased and not always in this order. Participants were also encouraged to give free responses, by asking "tell me more about …" and/or "can you think of an example of when you did …"

3.6 Analysis of the data

3.6.1 Analysis and preliminary findings from the survey

Results from the survey were transferred to an excel Spreadsheet and also uploaded to nVivo for analysis and cross-referencing with other project artefacts, to enable qualitative analysis of all the artefacts produced from both the survey and the conversation parts of the project. The total number of surveys returned (29) was very small and so did not merit quantitative analysis leading to generalisations or statistical analysis. The initial analysis using a spreadsheet provided useful topics that could be further investigated, and using nVivo software enabled topics and themes to be connected to items in the conversations while also allowing for revisiting the specific survey as completed by participants in the conversations. The survey was constructed to give insights into the ways participants evaluate, use, and contribute to digital notes and annotations, and the intention was to be able to follow this up with further comments and explanations in the conversations. Consequently, in this section I will make comments on the analysis and results from the survey and further comments are made in the chapters on findings as they connect to topics in the analysis of the conversations.

Although the small number of participants in the survey would not warrant any generalisations, the survey allowed for the development of themes about the ways users evaluate and use digital notes and annotations. These themes emerged from previous research and studies on the ways notes and annotations are used, and these are discussed in the literature review. The survey provided this initial exploration into the use of digital notes and annotations, and then pertinent themes and issues from this could be expanded in the conversations. The themes and issues identified from the survey included:

- Most participants responded positively as readers of books for pleasure

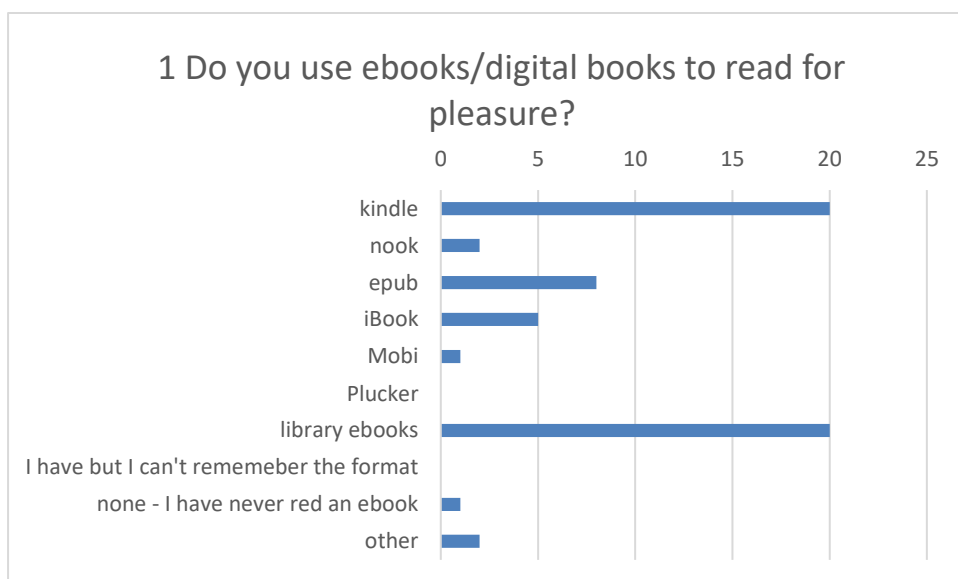- Kindle books and library ebooks were the most popular

1 Do you use ebooks/digital books to read for pleasure?

- In this group, the general trend was that hard copy was used for reading for pleasure; digital texts (and pdfs) were used for study; preference for hard copy or digital text was very close to 50-50%
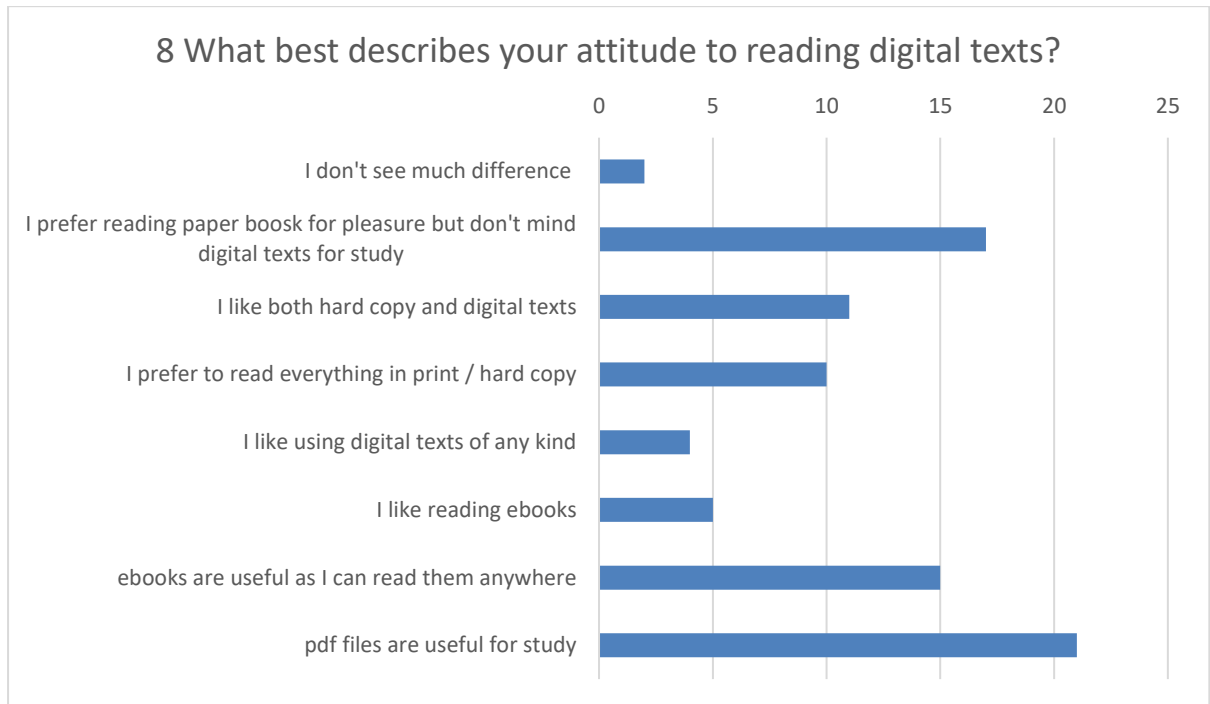
8 What best describes your attitude to reading digital texts?

Category	
I don't see much difference	
I prefer reading paper boosk for pleasure but don't mind digital texts for study	
I like both hard copy and digital texts	
I prefer to read everything in print / hard copy	
I like using digital texts of any kind	
I like reading ebooks	
ebooks are useful as I can read them anywhere	
pdf files are useful for study	

Figure 8: Attitude to reding digital texts

- Taking notes on online ebooks was not a popular choice

2b Do you make online notes using the ebooks site?

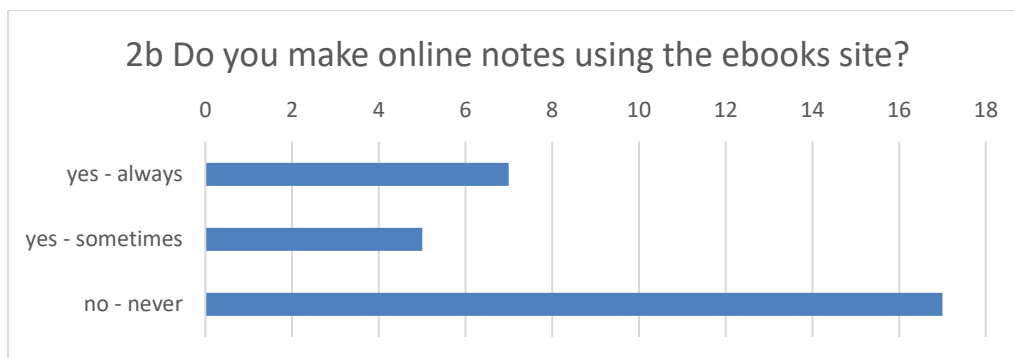| Category	
yes - always	
yes - sometimes	
no - never	

Figure 9: Making online notes using ebooks site

- There was a strong preference to download and store digital files (pdf files or other texts)
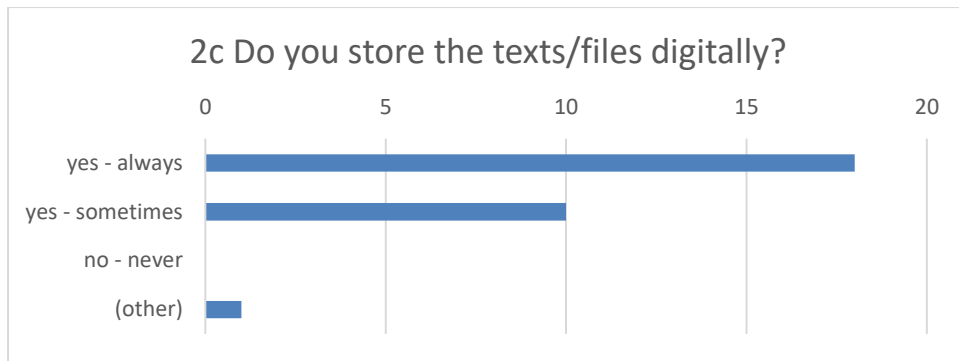
Figure 10: Storing digital files

- There was variety in ways to take notes during lectures but a general trend was that the dominant mode is to use hard copy / handwritten notes. The graph below shows the preferred options chosen in question 4:
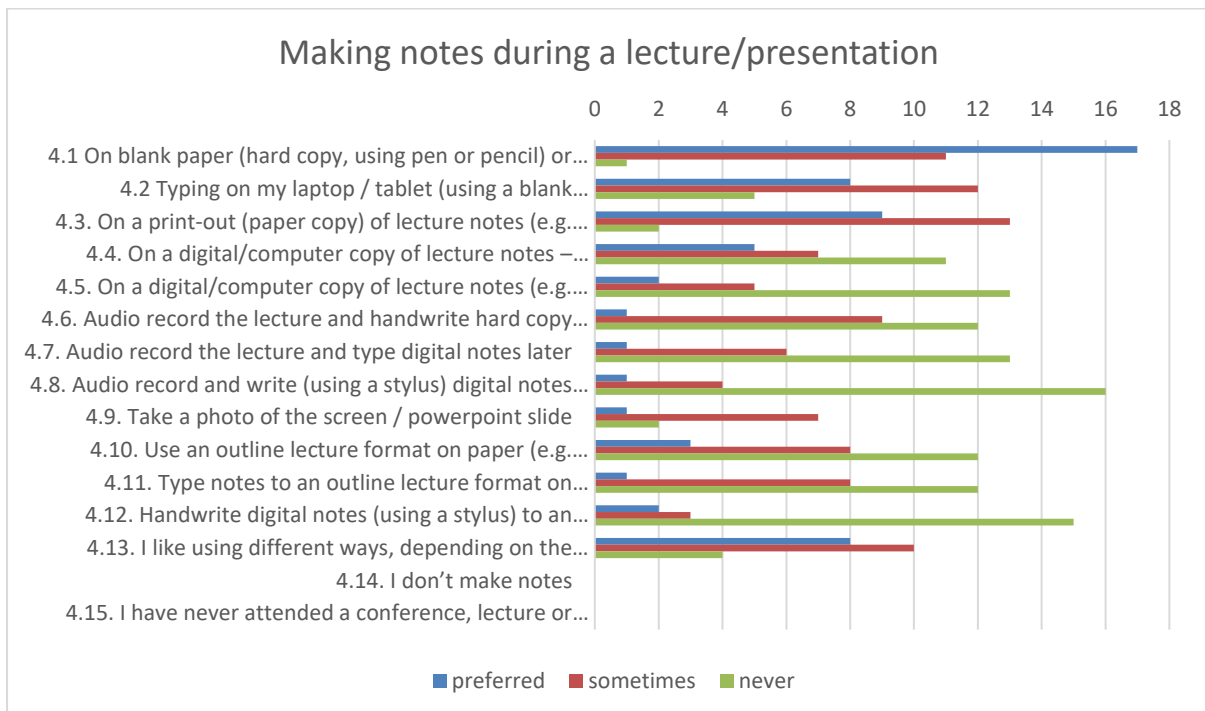

Figure 11: preferred choices for making notes during lectures or presentations

Results show that for these participants, notes were always made in these contexts, but the strong preference was for handwritten notes on hard copy.

When asked (question 6) about making notes or annotations during a meeting, seminar or workshop, the strong preference was again for using hard copy.

6 Which best describes the way you like to make notes during a meeting, seminar or workshop?
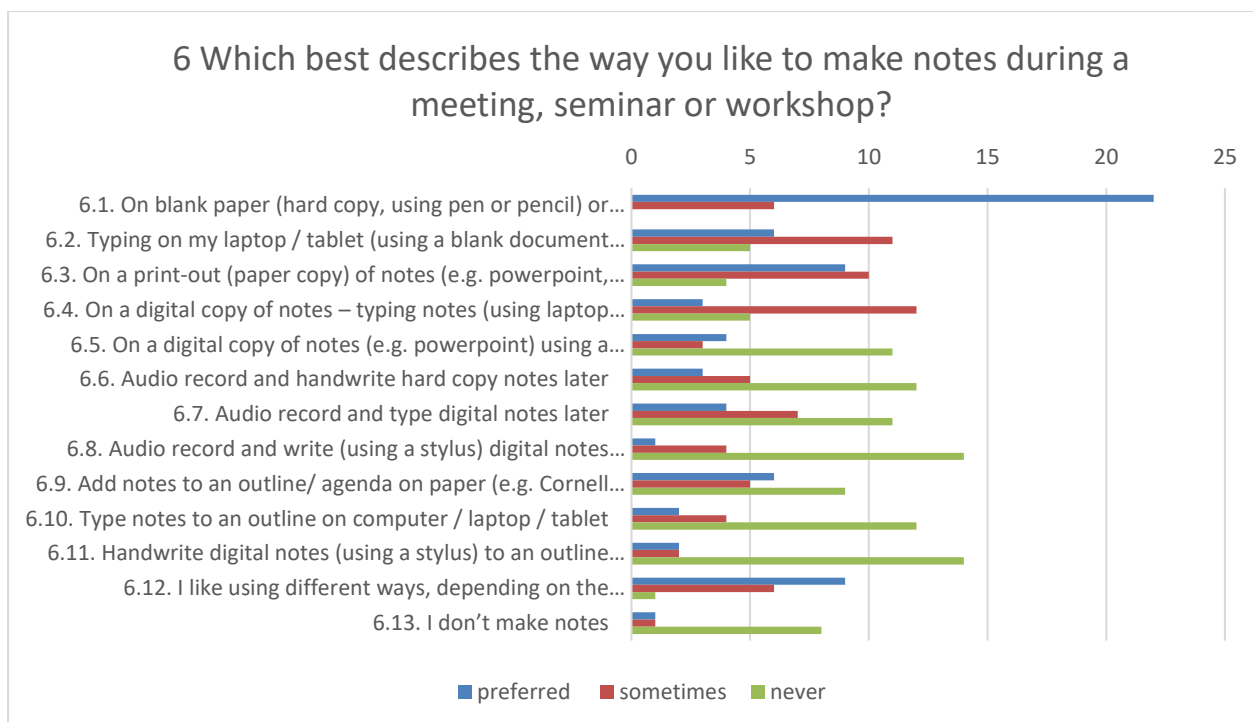
Figure 12: Preferences for notes during meeting or seminar

These themes from the survey data were noted and then incorporated into the coding for the conversations (other coding was also used in analysis of the conversations). The full list of coding in given in appendix 6. When deciding on these categories there is a level of interpretation by the researcher, and categories can, of course, overlap or have vague boundaries (Benson, 2013).

In the survey, participants were given the opportunity to add extra comments about using digital notes in a conference, lecture or presentation. Most respondents did not add extra comments or notes, or use the "other" option in the survey. Of the participants who continued with the project to the second (conversations) phase, most gave extra comments (only 2 out of the seven in this group did not to this in the survey).

The survey question which generated the most extra comments was question 5: Are there other ways you like to make digital notes? This question was coded using two categories – use and evaluate. The reason for the double coding is that the question asks for "ways to do …" as well as "you like", thus allowing for responses which could include either or both of these. Participants who responded to this question with an extra comment frequently also added an extra comment to another question (of the 7 who responded, 5 of them also gave other extra comments). Two of the comments were focussed on the technical use of tools to make digital annotations:

- *I use the echo 3 smart pen to regarded the lectures and make a digital copy of my notes later (this was the only "extra comment" made by participant G who continued to take part in the conversations)*

- *I use a Bamboo Slate to digitise my handwritten notes: https://www.wacom.com/en-es/products/smartpads/bamboo-slate (this was one of two "extra comments" made by a survey participant who did not take part in the conversations; the other comment made by this participant was a reiteration of the bamboo-slate website)*

There were two further comments made by participants who continued to the next phase of the project – taking part in the conversations. These comments included elements of using the digital tools alongside elements of evaluation of the process(es) they were using.

- *I used to noting with handwringing* [sic – as written in the survey comments; clearly "handwriting" was intended]*, but it could be inefficient when there are many content on the slide and you can't write down everything in time, so it's a good idea to make notes just on the slide. But there is disadvantage for digital note taking that is I could've lost thoughts or missed lecturer's speech while typing. (this comment was made by participant B who took part in the conversations; this participant gave two other comments, to question 1 and question 8)*
- *I sometimes do a bit of cut and pasting from ebooks or journal articles - ie I select a sentence or two to copy and paste onto a blank document, which I later use as a direct citation or paraphrase, or simply keep on my document to remind me of the exact wording, while I formulate my discussion around it. Then I delete it. (this comment was made by participant C who took part in the conversations; this participant was the member of staff)*

Points from these comments were used in the conversations to explore the issues, both with the participants who made the comments and with other participants.

Comments were also made by participants who did not take part in the conversations[9]. One participant noted:

- *sometimes i take a picture of a PowerPoint presentation on my phone during a lecture/conference/presentation when i don't have a digital copy of the lecture*

This process was also included in survey question 4, where it was one of the options. This participant was clearly clarifying that taking a photo was used as a replacement for not having a digital copy. Survey question 4 included questions about using audio and taking photos

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[9] I have not included one further extra comment for question 5, which was one word: "no". This was clearly a clarification of the first part of the sentence rather than an extra comment
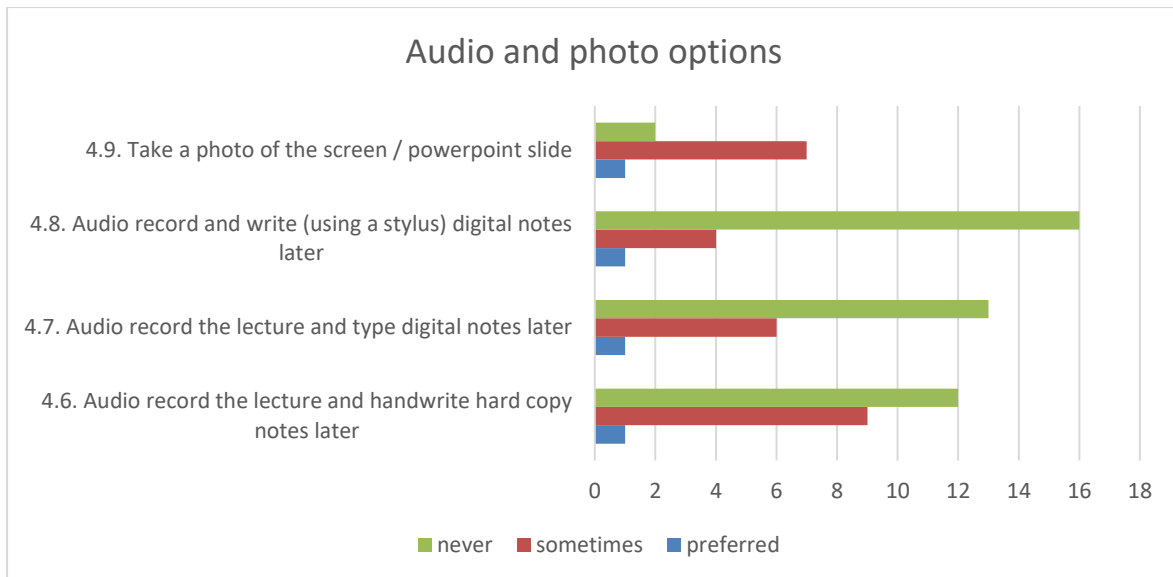
Figure 13: Question 4 audio and photo options

These responses to multimodal uses indicate that for very few of the participants it was the preferred mode of taking notes in a lecture.

Question 13 also asked for comments on the use of special fonts, colours or other means to support reading digital texts. There were two extra comments given:

- *I also have an Audible account and read books this why* [sic] *wherever possible. If reading for study I also add notes to these*

This comment mentions the use of Audible, a company owned by Amazon, which produces digital audio books (Amazon, 1997). It is unclear from the comment here whether this participant writes notes (either hard copy or digitally) or uses the "clips" feature that comes with Audible – while listening to a text (on a mobile phone, for example), it is possible to tap "add clip", which will insert a "bookmark", and then there is also an option to add a digital note. However, this feature has some multimodal elements as it is used either way. Unfortunately, this participant did not continue to the second phase (conversations) of the project, so it was not possible to clarify the particular use of the feature. No other participants mentioned using Audible books with notes.
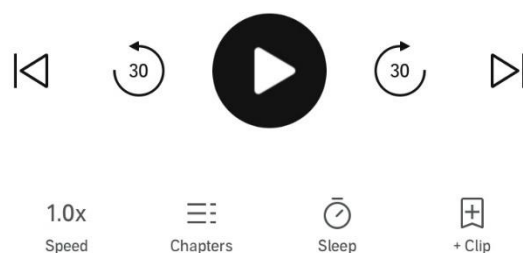
This participant also noted the difference between reading for pleasure and reading for study – the multimodal digital notes were added only when engaged in the latter.

A further comment (from a different participant) refers to a digital process that has been appropriated from a previously analogue process – using a highlighter pen:

- *I usually color the keywords that can remind me of the general idea of the paragraph, so that I don't have to scan the text again to get the meaning.*

This comment illustrates the use of a process that was already familiar in hard copy study processes, the cognitive process of reading and identifying keywords, the appropriation of "scanning" as a way to describe part of the process, and the outcome of "getting the meaning".

In response to question 4 in the survey (Which best describes the way you like to make notes during a lecture or conference presentation?) two further comments were given:

- *The truth is that for me digital notes are difficult... I only use them when correcting my essays adding comments, but when taking notes I prefer to use pencil and paper.*
- *i only take digital notes when i do research / read for class, not in the lectures.*

These comments note that taking digital notes is "difficult" and is the preferred option only in certain circumstances; also "using" digital notes seems to indicate that this is one part of a longer process, while "taking notes" appears to be an end in itself.

These observations from the survey were followed up in the conversations to explore them more fully. In summary, the topics or themes that were indicated by analysis of the surveys were:

1. there is a distinction made between hard copy notes and annotations being used in certain contexts, and digital notes and annotations being used in other contexts. The survey partly made this distinction by asking participants to distinguish between contexts where they would be more passive or active, but the extra comments revealed that it was possibly the distinction between public and private uses of notes and annotations that was a strong factor. The conversations explored these preferences.
2. The choice of tools or technologies for making notes and annotations seemed to be strongly linked to the processes involved, and the conversations could explore further the reasons for these choices.
3. The use of multimodal practices for the use of notes and annotations was very limited. However, where they were employed (e.g. the use of highlights) there

appeared to be a connection to previous (analogue or hard copy) uses. The conversations could explore this relationship further

The further exploration of these themes in the conversations also indicated that the method of analysis would have to take into account a complex, rich intertwining of the individual, the requirements of the context (the Higher education systems), the tools/technologies they are using, the social context (public vs private, and social vs individual), the processes involved, and the expected outcomes. The survey questions separated these areas, but the extra comments in particular indicated that these are not easily examined individually.

3.6.2 Analysis of the conversations

The conversations were audio recorded with permission from the participants, and they also had access to their recordings. The recordings were uploaded to nVivo to assist with coding and analysis. The conversations averaged 37 minutes long, and were listened to for analysis many times. NVivo was chosen as a suitable platform for collecting and analysing the data because it offers integration with all the data artefacts that were used (text-based pdfs, audio files, excel spreadsheets) as well as also allowing integration with the platforms used in this study (OneNote and Mendeley). This meant that there was potential for all the artefacts to be linked in analysis.
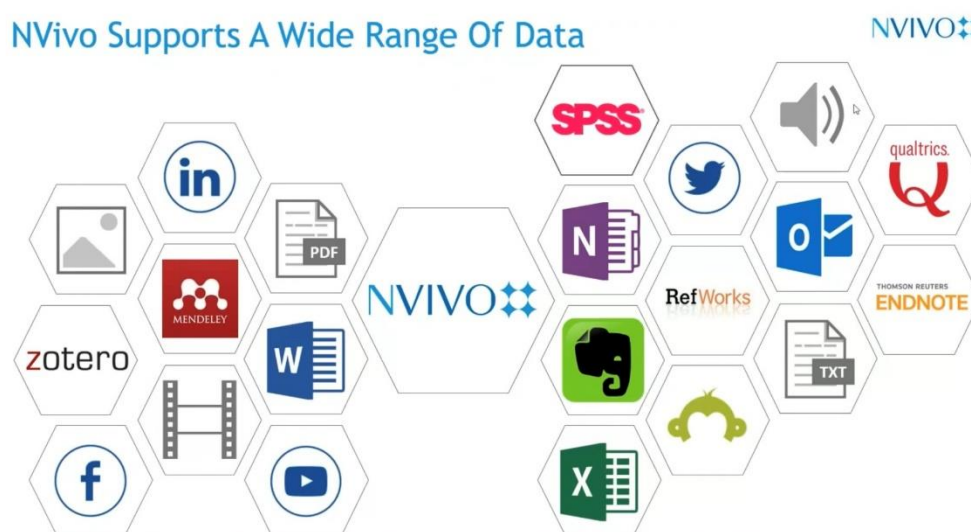
Figure 15: visualisation of nVivo integrations (Penna, 2020)

In addition, by using the tools such as coding and automatic coding in nVivo, it is possible to explore themes, links and connections that the data holds but would possibly not be obvious to the researcher.

There were three different ways in which the data was scrutinised, following an approach used by Yamagata-Lynch (2010), which also used thematic analysis and Activity Theory:

1. Each individual recording was listened to alongside the same individual's survey responses. This enabled any points in the survey that the participant mentioned as clarification to be noted.
2. All the conversations were coded, to examine common themes and topics. The coding used for this was developed from examination of themes that emerged from the literature, the themes that were continued from the survey into the conversations, and also from narrative analysis and close reading of the texts
3. Activity Theory was used as a framework to examine the tensions emerging from the coding

The conversations included guided use of two specific technologies as well as allowing participants to talk about other technologies they also used. The conversations were purposefully flexible. During the conversations, I demonstrated the technologies and they participated in using them. I also encouraged participants to talk about their thoughts, ideas and reactions to using different annotation techniques, as well as adding comments about topics that were part of the initial survey. This enabled consideration of the ways in which the participants categorise their experiences while doing the annotation tasks, to give insight into cognitive processes by asking participants to recall their thinking at a later time (Yinger, 1986). This generated data that is more focussed on the ways in which they explain their thinking rather than trying to re-enact the thinking at the time of making the annotations – making sense of the choices and decisions they have already used. "By prompting explanation and justification of practices, it elicits [teachers'] implicit theories and otherwise tacit beliefs" (Barton, 2015: 196). The focus is therefore on the ways in which they explain their thoughts and actions, not on verification of whether or not this was actually what took place at the time. It is the talking about their ideas which generated the most useful data for this study, and setting it up in this way enhanced their "ability to elaborate on their own conceptions of the world, rather than limiting them to categories derived from theory or previous research" (Barton, 2015: 179).

The theoretical approach taken in analysis of the conversations started with the very broad categories that were used for developing the survey. Analysis of the survey revealed further themes that were incorporated into the conversations. The conversations were audio-recorded, and these recordings uploaded to nVivo, then coded using these categories and themes. NVivo allows for audio files to be tagged and categorised, thus providing tools to interrogate the data. This analysis included narrative inquiry techniques (Holligan & Wilson, 2015) that also draw on analysis of stylistic elements in the narratives created by the participants (Lugmayr et al., 2017).

Within literary studies of fiction, the narrative is often referred to as the "plot" but using stylistics analysis methods the choices made by the voice of the narrator can be analysed to show how grammar and semantics contribute to the reader's appreciation of not just the story but the way the story is told – the style of the story-teller. As Labov (2013) points out,

at the heart of narrative is the re-telling of past events, and linguistically this is signalled by the use of verbs, particularly past tense verbs; however, the clause containing the verbs can be constructed in different ways, the most obvious of which is the use of dependent and independent clauses to show how events relate to each other (Labov, 2013: 14). While oral narratives are characterised typically by a succession of independent clauses, where dependent clauses occur they are often signalled by the use of a conjunction such as *after, before, because, when, while* and others (Labov, 2013). The relationship between the clauses is thus directly given by the speaker/narrator, and this in turn indicates a level of interpretation by the narrator, as the narrator could be indicating an interpretation of cause and effect, or justification for actions, for example. Retelling events is therefore subject to a level of interpretation by the speaker. Similarly, examination of the prepositions used by a writer/speaker can indicate the spatial positioning that person is considering (Zwarts, 2017). This could indicate a physical perspective (as in "he ran onto the road", which indicates directionality both for the "he" in the sentence and the speaker, where the movement is away from the speaker). It could also indicate a metaphorical positioning ("I'm on top of it", showing the perceived relationship between metaphorical objects as conquering).

In the analysis and coding of the conversations, I used this understanding of narratives to identify places where the participants "told a story". Having identified these sections, I could then consider the linguistic elements that would reveal the perspective that they were giving to the story they were telling.

In addition to this close reading of the texts, I needed a theory that could account for the relationship between users, technology and context. Activity Theory provided this, and it recognises that these relationships are fraught with tensions. The framework of Activity Theory has been successfully used to illuminate the tensions and contradictions in the ways teachers approach the use of digital technologies (Karasavvidis, 2009), the ways students use appropriate supports for their studies (Hammond, 2021), and the ways Higher education systems appropriate blended learning (Gedera, 2016; Paul, 2019)

4 Findings: values given to features and use of digital notes/annotations

4.1 Introduction to findings

The findings in this and the following chapters have been presented thematically, which is a natural progression from the thematic data analysis. The preliminary findings from the survey have been presented in 3.6.1 Analysis and preliminary findings from the survey, but where relevant to the broader discussion including the conversations, they have also been included in these chapters.

It is not surprising that the participants in this study showed interest in developing their uses of digital technologies, as the consent form indicated:

> The intention of the project is to explore this aspect of digital technology and open up conversations about the new ways we use digital texts. Participants will have the opportunity to learn about some recent developments, and consider the issues related to adopting digital means to explore texts, to study, to build research notes, and to collaborate.

This study therefore cannot draw conclusions about levels of interest in new developments, and the interpretivist nature of the study also precludes any generalisations about current attitudes towards digital texts. Nevertheless, the study provides a snap-shot of a particular use of digital technologies for a group of users who are involved in Higher education .

This chapter will focus on and explore the specific areas related to the ways in which participants talked about and demonstrated the values they attributed to the notes/annotations made by themselves and by others. These are firstly the ways they discussed the integration with previous apps or prior, non-digital methods and modes. The second area, closely related to the first, is the value of being familiar with using a specific digital app. A third area is the ways in which individual talked about their interactions with the apps or software they were using. As explained in section 3.3, two apps (MS OneNote and Mendeley) were used as a focus for the conversations, but the semi-structured nature of the conversations meant that it was possible for participants to comment on other apps that they had used (and they were encouraged to do so) and also apps that they might use in the future. In this way, the conversations could explore the ways in which users indicate the values they give to an of the digital technologies they are using or could use.

The first of these thematic areas is a focus on the ways in which the participants used different tools and technologies to produce or use their notes and annotations. This would correspond to an area that has been the topic of research particularly in the area of making decisions about which technologies are the most useful, either for an individual or for an institution. It can be characterised, using Activity Theory, as an analysis of the ways the

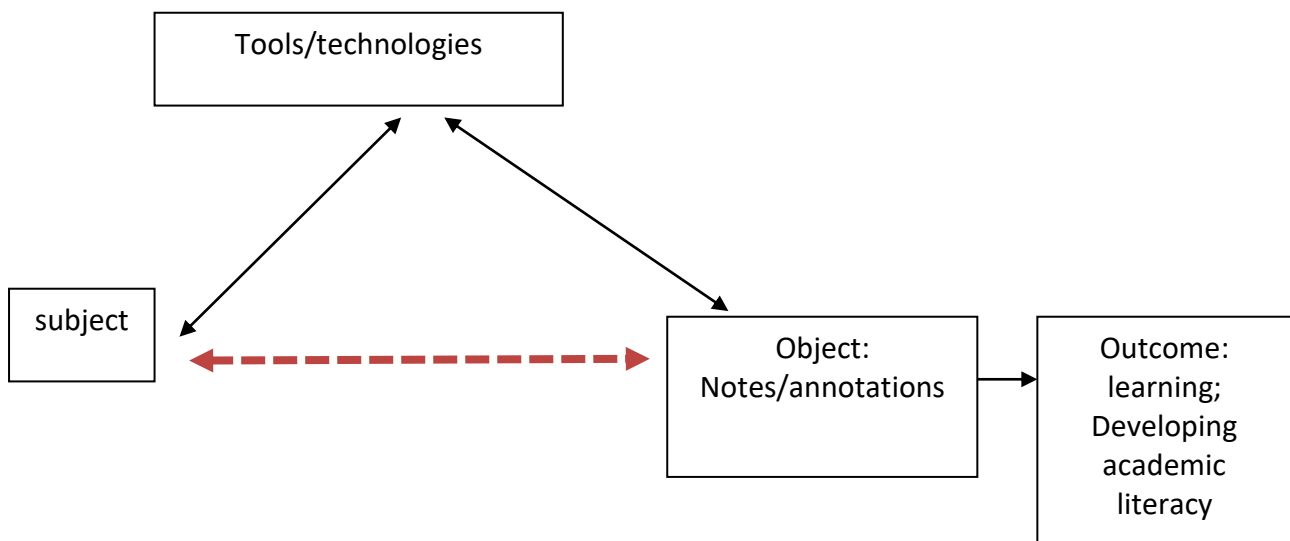individual works towards achieving an outcome, and this process is mediated by the use of the technologies:

Figure 16: modified use of technologies to achieve an outcome

In this visualisation, which outlines Vygotsky's mediated-action model (Blayone, 2019) the intention for the individual (the subject) is to achieve the outcome (shown here by the dotted red line) but where digital technologies are introduced these could be seen as either smoothing the process, or hampering it.

This chapter explores the experiences and perceptions related to the personal decision that the use of an app for digital annotations is not viable unless it can integrate with other apps, or it works in a way that is recognisably similar to a non-digital use. This is only part of the more complex development of academic literacy or knowledge/understanding for an individual, as can be seen by the use of Activity Theoryto identify other aspects. It might seem logical to expect that in order to reach understanding quickly, an individual would appropriate the technologies that cause the least amount of learning about how to use the technology, allowing a focus on other aspects of the issues rather than spending crucial time working with new technology. Similarly, we might expect that an individual would use and adapt approaches that have worked well in the past for the individual. Where these assumptions could be problematic is either when the new app or technology is enticing enough to take the focus away from the current objective, or when a very new or different app or innovation is not considered because it does not offer the perceived similar approaches and strategies as before. "Problematic" here is not referring to a block in the process, but more like "missing out" on possible technologies that could work in ways not encountered previously: adopting the new app could mean also adopting a shift in

approach, or spending valuable time becoming familiar with a new app rather than appropriating it quickly for the objective at the time.

4.2 Integration with previous use and other apps

In the analysis of the conversations, coding was used to identify points where participants mentioned specific apps or software packages. These included PowerPoint (Microsoft), Notability, X-mind, Mindmaps, and also OneNote and Mendeley (used in the conversations). The conversation participants also noted in the survey that they used different forms of e-books:

	Noted in survey (conversation participants only)	Mentioned in conversations
	1. Do you use ebooks/digital books to read for pleasure? Please select those you have used, even if only once (assume "Kindle", "Nook", etc includes specifically the device and also the app on another device):	use of apps (not including OneNote and Mendeley; PP=PowerPoint)
A	Kindle,Mobi,library ebooks	X-mind, PP
C	Kindle,library ebooks	PP
H	library ebooks	PP
L	Kindle,Nook,library ebooks	PP
Li	Kindle,Other	Notability, PP
M	epub, library ebooks	
S	Kindle	Smart pen[10]; YouTube; Excel; LinkedIn

Figure 17: Table of participants' use of ebooks and apps

In much of the university guidance for staff and students, it is expected that MS PowerPoint is the "normal" application/software to use for presentations, whether these are face-to-face or as recorded lectures. It is not surprising, then, that most participants referred to "the PowerPoint" at some point in the conversation. Participants in this study showed an expectation that a lecture would be accompanied by a PowerPoint presentation:

> A: I'm very appreciative of the teachers that send out the PowerPoint, either
> the morning or before, or the afternoon after it happens , sometimes you
> know I just want to look ahead, and they, you know, they have a
> narrative and they don't want you to jump ahead … but having it

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[10] There are a number of companies who produce Smart pens that allow digitization of handwriting: Moleskin, Wacom, Rocketbook

afterwards is really good, either going on to the computer or filling in little notes. Usually I would go to the PowerPoint and create a separate file for myself that had you know like my notes and certain little things

It can be seen here that "the PowerPoint" is using the definite article to denote the technology and the specific use of it, but in our conversation this indicates that *A* expects that I (the other participant in the conversation) will understand the referent. In terms of a cognitive linguistic analysis of this use (Croft & Cruse, 2012), *A* is creating a conceptual space where *A* expects that the other participant (myself as researcher in the conversation) will understand the existence of a PowerPoint presentation for a lecture as being a normal part of university studies. In the reality of *A*, shared in this conversation, the cognitive domain of a sequence of events involving pre- during and post- a lecture, includes the existence of the technology as an expected part of this reality (Epstein, 2002). Given the strong representation used here, with the conceptual framing of how learning in this context is performed and the expectation of the shared cognitive domain, it would be surprising if *A* were to question the use of a PowerPoint presentation as a legitimate and expected technology for learning.

In this quotation from A, a further use of the spatial representation of "sending out" this artefact is considered by A to not need explanation although it is metaphorical; the shared context and conceptual representations we have in this conversation allow *A* to assume that "sending out a PowerPoint" means sending an email with an attachment that is a file made using the PowerPoint software, and that I will understand this meaning. In our shared conceptual space of the academic teaching/learning routine, *A* recognises that we both accept the use of MS PowerPoint as a basic structure in a lecture, but that the revealed content by the tutor can vary, depending on the tutor and the material. *A* constructs a narrative about a sequence of events involving tutor, PowerPoint, lecture, computer and digital notes/annotations. Each of these elements are semantically unmarked, showing the expectation that these are considered normal by *A* and also that *A* expects that in our conversation I will understand both the elements and the relevance they have for his learning practices.

This is in contrast to the way *A* explains the use of a different technology:

A: there's a programme that I use called x-mind, which is quite good, I've been using it for years, so it's kind of intuitive to me now, so what I like about it is that I can have like a main page that's the main ideas and I can have like eight branches. I can click on that and go in and in there, there's another mind map that has pictures and it has ideas on it

Here A explains reasons for using this particular programme, and introduces the idea of it being "kind of intuitive to me". He explains that through length of time ("using it for years") in using the app he is able to access the features of the app as "intuitive". This suggestion of

something being "intuitive" is an aspect of design that is considered by many technologists and falls in the technology design literature as "user experience design" (Hussain et al., 2018). It is recognised that this is essential in gaining and retaining users of apps, although it has developed in many other design areas and not just in digital applications. Examples of intuitive uses of digital technologies could be the way a website is created to read from left to write (when the main language is structured that way) and when a hyperlink is identified by the use of a colour difference the user knows that using a mouse-click will lead to more information or an extended train of thought. However, it is notoriously difficult to identify features that are intuitive to the user for the precise reason that being intuitive the user doesn't have to think about how/why they use it. In the case of A and this app, the identification of it being noticed points therefore to a level of personal satisfaction that A has reached a level that they have mastered the app to the extent where under typical conditions for this user, it is not necessary to be consciously thinking about using an app.

This concept of an app being "intuitive" is based on theory from user experience design (Canziba, 2018; Hussain et al., 2018). Understanding design in this way is based on the idea that an individual has cultural and physical knowledge and experience, and these can be different for different users. Changes or developments in design of digital tools have to take into account that different users will have different experiences, but globally-popular existing designs can be analysed to find out which features appeal to the greatest number of users (if a business development model is sought). This leads to the conclusion that it is user experience that is more important than the usability of the app (Kivijärvi & Pärnänen, 2021). A company could, hypothetically, create a design that has features that work exceptionally well, but if this is alien to the users it is unlikely to become a popular app. In a theoretical sense, this means that "people act through technology, rather than interact with it" (Kivijärvi & Pärnänen, 2021: 3).

In the conversations, several participants gave indicated that they considered features within apps were useful if they could relate this to previous use of hard copy methods or other digital apps. This extended to the importance of the possibility of being able to integrate any new software with ones with which they are already used; this often made the difference between the willingness to consider using the software or not.

Three of the participants indicated that they had previous experience of the use of a highlighter pen – used to annotate hard copies. They were also familiar with the possibility of using MS Word to digitally highlight text in a similar way. This familiarity continued to the extent that for some participants hard copy highlighting and digital highlighting were commented on without invoking the need for clarification about which was being used.

This was not the case for all of the participants, though. When asked to clarify her text highlighting, one of the participants expressed surprise that she needed to explain that it was digital and not hard copy, and emphasised that it was "online":

> *C: when I'm correcting my MSc assignments … I'm talking about online, you*
> *know … when I'm correcting, students see and it's clear*

The participants had different levels of familiarity with applications and varied in the number of applications they were comfortable using. With this particular group of study participants, the youngest was also the most adept at using a number of apps, but in this instance this could also have been because of the learning support needs, which meant that this participant had engaged with a number of digital technologies that had been recommended by the Disability Office. *C* was the oldest of the participants and was a member of staff. She is here referring to the ubiquitous use of annotations for feedback to students in a MS Word document. This facility enables a section of text to be highlighted and then a note (in the document margin) to be added, which could be used to explain the text/phrase in the highlight, ask a question, make a comment, or other type of feedback.

This use of highlighting was mentioned by several participants – often related to previous notetaking skills which involved using a highlighter pen or different colours of pens. Text in hard copy was annotated using different colours to a code that was usually created by the user (not an imposed code).

> *C: when I was writing my dissertation, I would colour different things in*
> *different colours*

> *A: right now what I do do, is I've got a physical notebook, a pen with four*
> *different highlights*

> *A: a lot of it is about colour coding for me, or making things obvious*

For these participants, the value of being able to highlight was related to the ease with which a previous (hard copy) use could be "translated" to a digital form of the same action. For one participant, though, the potential for digital highlighting was noted:

> *Li: Mendeley is good for highlighting, but can't export to other sources and*
> *retain the highlights*

In hard copy highlighting it is not possible to "export" the highlights. This participant had recognised that the facility to "export" information from one application to another was a useful potential in digital texts. This participant noted that if there is not this potential, then the feature is not so valuable.

In a similar way, another participant noted that highlighting in digital texts does not alter the original text in the same way as a pen on paper would (interestingly, in this comment A denotes the book as the ebook version and uses the phrase "actual book" to denote the hard copy version):

> *A: and I can go back and look through, and without having to flick through*
> *the entire book, so it's kind of better than an actual book, and I can think*
> *I'm going to highlight this and I don't have to think that I'm going to sell*
> *this book to someone else and I have to un-highlight it*

In these examples, the participants had used digital text highlighting and were commenting on the process from personal experience. Their evaluation of the uses and benefits of the digital possibilities here demonstrate their view of "highlighting" text as part of a process that involves a further action.

In a further part of this conversation, A mentions that he is willing to consider using new or different technologies, but the ability to use it is not sufficient. It has to have some kind of perceived value that makes adoption of the new technology worthwhile. In this instance, A gave an example of technology that would be considered worthwhile:

> *A: if I'm given the right technology, then I CAN use it. The thing that I run into*
> *an issue with is a lot of apps or programmes don't …. I want to be able to*
> *have a notebook that is also a tablet*

The examples given by A are illustrative of the perception of apps, programmes, notebooks and tablets all being grouped as "technology". The placing of himself as a user of these technologies, and the possible frustration of not having the right technologies, is within the frame of "myself versus the technology". This is in contrast to the narrative given in the example of using X-Mind, where he frames this experience as a process that blurs the boundaries of where he is thinking and creating with the processes involved in using the technology. Where the experience is perceived to be a positive or "intuitive" one, there is a greater sense of user satisfaction or appropriation of the technology; where the experience contains frustration, the technology is considered as separate from himself, or beyond a boundary that prevents an easy progression towards the object and learning goal. This can be characterised in a diagram using Activity Theory:
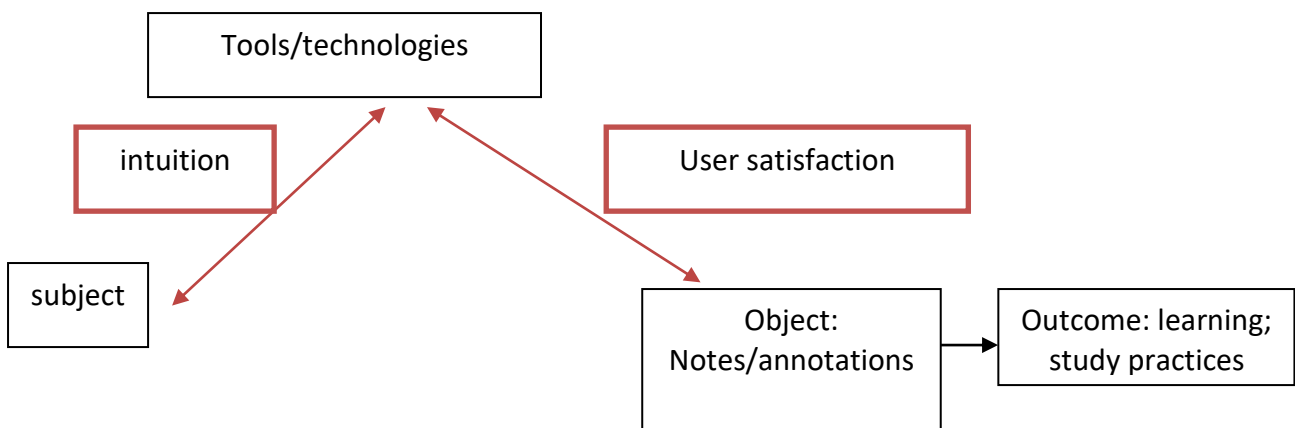
Participants varied in their reported approaches to whether or not to adopt new technologies. Li, for example, had explored a number of applications and was ready to make a personal judgement about how useful they were. In discussing the use of digital notes (in the context of making notes during a lecture), Li commented that she had started to use digital notes only when she started her degree programme:

> *Li: I first started to use notes in OneNote and it was suggested by one of my teachers when I was in undergraduate … actually I kind of mix up the applications with note-taking right now, with OneNote, and Mendeley, and Notability … among these three I like Notability best*

In this instance, it was the suggestion by the teacher that precipitated the use of OneNote, showing the importance of the influence of teachers / institutions in presenting the potential for using apps for study purposes. Participants responded to this aspect of the choice of apps in a number of ways:

> *A: If I, if I'm given the right, um, I guess technology, then I can use it*

> *C: you can have it but unless, unless you look there, you're not going to use it.*

> *L: [referring to the linked presentation notes in the course website] so that I can don't. I don't have to go find it when sitting in the lecture*

> *L: so I can get Onenote whilst we're doing my studies or I don't know afterwards … then I saw the price and it kind of put me off because I wasn't sure if you know yeah. If I didn't like it, then lots of money too.*

> *S: So, like we have like two types of lecturer really. There's like the chalk and talk lecturers. You can like we'll have like their sheet of notes and they'll be like, kind of talking to you and waiting at the same time. And so for those ones you can make notes like right along with them. Yeah. And then there's like the ones who use the lecture slides. And for those ones, I keep, I have a, I have like the I'm looking through the lecture, slides are published in advance and I'm looking through them. Like I can have the tablet usually. Yeah. It's usually a PowerPoint that I'll have like the PDF version of that PowerPoint on scrolling through. On the other side of the screen, I have a notes. Ah, I like taking notes of what the lecturer is saying. So for those, like some of the time, some of the equations I will write down, but if it's like because some of them are really, really long. Some of them, I just like, I can do like a screen grab and just bring them over into the notes*

The participants here mentioned that there is an expectation that the university will provide a certain type of software or technology that they can use as part of their studies: they mentioned being "given" the technology, the format of the notes given on the course website, the provision of software via the university licence (which in this case was not taken up as there was the realisation that after studies ended the payment would be significant), and the lecturer's style and the way it combined with the format of the notes provided. It can be seen that there are various factors, sometimes causing tension, in the expectations of the relationship between the user, the institution, and the apps/software. The participants here did not make a distinction between a simple longhand vs digital, as in Flanigan & Titsworth's (2020) study, but rather there is here a complex set of influences that different participants are using to make choices about how and why they might make annotations on texts in lectures. Decisions are made depending on:

- The format of the original texts given during or pre-lecture
- The availability of the app/software (provided or not provided by the institution)
- The long-term use envisaged with the app/software (no point in starting to use it, get familiar with it, and then have to pay later)
- The lecturer's style in presentation

At other points in the conversations, participants noted that it was also important for them to know how they might access their annotated notes for later study (this is discussed elsewhere in this thesis). This complex mix of issues indicates that although studies of digital annotations can be helpfully focussed on the use of one particular app (for example, studies by Brugman & Russel, 2004; Jan, Chen, & Huang, 2016; Ross, Pechenkina, Aeschliman, & Chase, 2017), it is entirely possible that in a given context the users will in fact make different choices, and the relationships between user and app choices involve the user, the institution provision, the previous expectations, the future expectations, the topic, and the style of the lecturer. The interactions and relationships here (within a social context) can be represented graphically using Activity Theory. However, this doesn't account for the decision made to invest in the app/software.
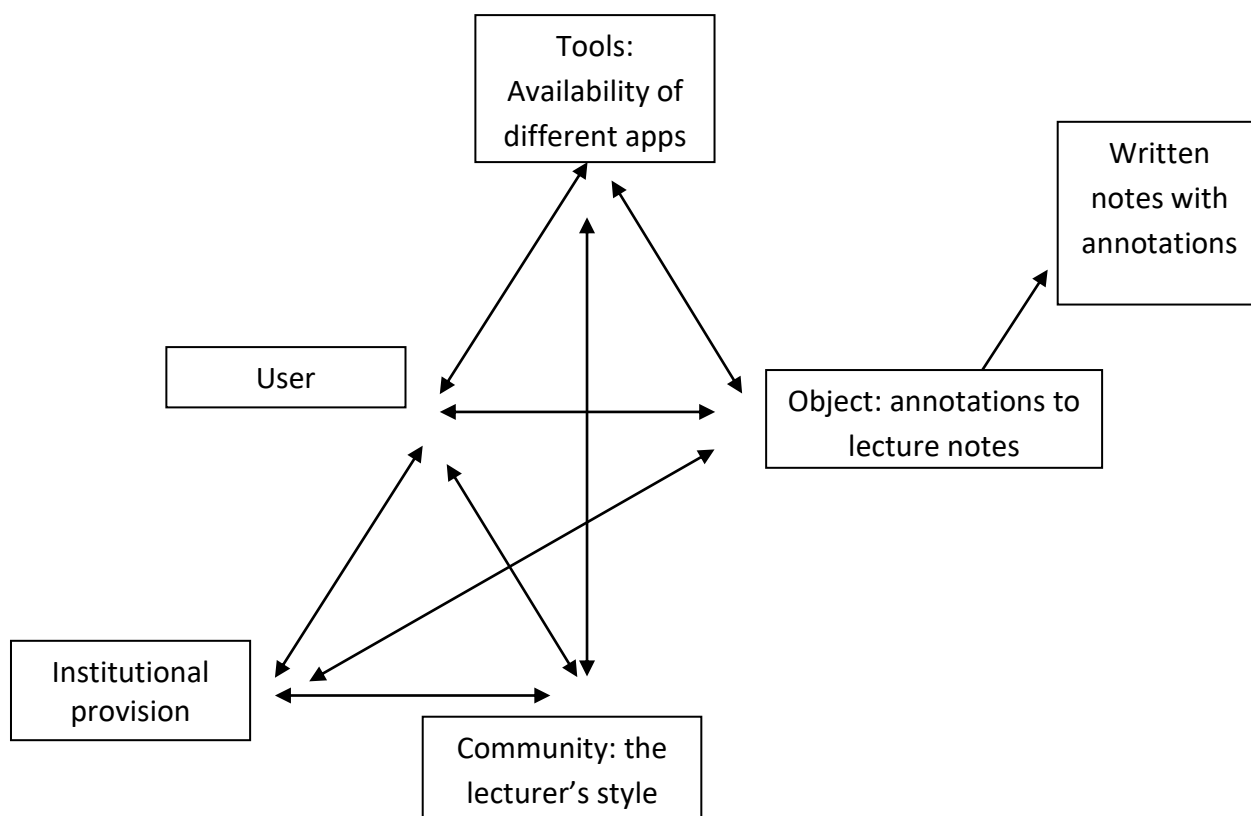
Figure 19: relationship between user, institution and apps

This type of analysis helps to analyse why the use of a different app/software by the institution has an effect on a range of other factors. It also shows that if a user decides to make the choice of a particular app/software, he/she has to take into account all the factors that will be directly (in this context) affected. From the point of view of the lecturer, there are also a number of factors that can affect the decision to present the lecture in a particular way. So it's not as simple as a lecturer or tutor finding an app that would appear to be particularly suited to the course or coursework. Reflecting on this, as a tutor in the university considering the implementation of a software app like OneNote, for example, I would need to take into account how this ties in with the institutional provision and what other lecturers are doing also.

When asked to clarify the reasons for liking the app Notability best, Li responded that it was the potential function of dual modes of recording and typing at the same time:

> *Li: using notability because it is possible to both record and take notes at the*
> *same time*

This multimodal function of Notability (Ginger Labs Inc, 2022) is one of the reasons it is recommended by the Disability Office in support for students who have difficulties with written-only text (for example, students who have issues with dyslexia). Li did not indicate

that dyslexia was the reason for adopting the application and she had not commented on this or noted this in the survey. She had also commented that when trying to take notes in a lecture or seminar she had abandoned handwriting:

> *Li: at first, I tried to write on the paper, to take notes, and it turned out not so effective … and also I'm not writing so fast, and typing is more fast, so …*

These comments indicate that for Li an important aspect of making notes in a lecture is to be able to write down as much as possible, and therefore the choice of how to make notes depended on which process/mode would enable that to work most efficiently. The conceptualisation of "effective" note-making here for this participant is the ability to have a record of as much of the lecturer's discourse as possible.

In this section I have noted that the preference by individuals for the use of particular technologies is constantly changing but there are some clear expectations of which technologies are now part of the "reality" of being in the context of Higher education. This is demonstrated by the analysis of some of the cognitive domains used by the participants in the conversations, and by the detail of explanation perceived to be required for particular applications or programmes.

4.3 Importance of familiarity / length of time / habit of using the app

As mentioned above, when they were given the opportunity to use a different technology participants did not immediately take on a new programme or app without considering whether it added value to what they were already using. In some instances, they recognised that the new app could do more, but this was weighed up against familiarity with existing apps, and also an understanding of the purpose. Put another way, there needed to be added value if a new app is to be used.

When introduced to OneNote, A commented that while there were similarities to apps already being used, there was not enough value in changing to using OneNote:

> *A (talking about mind maps) OneNote is kind of that, I can do similar things, but I'd like to find a kind of half way point*

> *A: (using OneNote as a portfolio for a course) I liked the concept, OneNote didn't feel that natural to me for what I wanted to do with it, I guess. It was good for bringing things in and organising them in a way, but it's not quite the same being able to show connections, and being able to show where these ideas originate from*

In explaining the process of getting to know an app, A commented:

> *A: there's some apps , there's some programmes that I can go in and I can play with and I can start to you know, tease apart, and I feel that there's just A LOT in OneNote that unless I'm looking up a tutorial or having*

> *someone teach me, I'm never going to find that nuanced thing, and sometimes it doesn't make certain, I guess, logical sense to me, the categories that are being used or why I would have to put them in a certain category to get to another*

In this comment, A explains the experience as "going in", "tease apart", and "playing". This experience is set against the perceived difficulties encountered in using OneNote – where the "categories" don't make sense. The use of "why I would have to …" indicates that there is a perceived power from the programme in indicating how it should be used, which A finds frustrating as he has indicated that he prefers to find out his own uses. Where an app is accessed by A in his own terms and for his own purposes, he indicates a "going in" to the app, or that the app becomes an extension of his own thinking. However, where he finds the use of the app not helpful he indicates this by giving the app a different

It was also the case for S (who was supported for dyslexia by having special notebooks provided) that the digital notetaking provision was more bulky and awkward than the standard way of taking notes:

> *S: [explaining how the technology works] 'cos it traps the movement of your pen, and then it will reproduce that as a digital version of your notes, and it can sync that to audio, so I was using that to, like, make digital notes. But the main problem with that is like I had to carry this special paper around … and it was also annoying … because then, like, I would have to carry a notebook around, for each individual … - I wanted to keep my notes … so like although I wanted to organise the digital notes I wanted to keep the physical notes ordered as well. So I had to use a separate notebook for each subject, which was kind of .. well, it basically meant that if I had three or four lectures a day then I was like carrying like … because they're really thick notebooks, cos obviously you can only use these notebooks, so I was carrying around like a good 5 kilograms of notebooks around, and it was unsustainable*

When talking about using Mendeley for references and for keeping notes, H commented that this was "not necessary" at the stage of Master's assignments, but on progression to the Master's dissertation this was helpful as a support:

> *H: I think that I tried to make use of Mendeley personally but it is quite useful, 'cos so I find some resources and I will put them into Mendeley and also I will highlight with notes and also so when I finish my dissertation I check the references and then I also input from Mendeley and I check my original references …so it's quite a help for me but helpful for me for the dissertation and I think Mendeley is useful for me. But I*

> *think that I present not full use of Mendeley. I think I can explore the*
> *expansion of Mendeley*

When I have introduced Mendeley to a whole class group at Master's level as an introductory session early in the semester, I have found that although one or two (out of a class of perhaps 100) decide to adopt it straight away, for the majority of the class it is not seen as necessary at that stage in their studies. On revisiting the use of Mendeley as they approach their dissertation, the majority then decide to start to use it. This "just in time" (Golhar & Stamm, 1991) approach is in contrast to comments by participants on how important it is to know the apps and to have been using them for some time to be comfortable with them.

This incongruity is not easily resolved. Also, it is not easy to predict how a particular individual or class group would engage with a programme or app.

4.4 Representations of interaction with the apps

Participants in the conversations about using digital annotations referred to their relationship to the text and the app, and one feature that demonstrated their stance was the use of prepositions to indicate the spatial representation of reader, text, idea/meaning and future reader. One of these features was that the apps "contained" the information and ideas:

> *A I'd like to be able to go onto my tablet, go into a file, and it has, say, the*
> *course that I'm on, there's a list of courses, and I can go into that, and a*
> *list of topics that we've covered*

> *A: and be able to have in there, like a physical file, which has a bunch of*
> *notes, it has the PowerPoint that teachers do, I could have handouts that*
> *they have*

In physical space, there is no actual physical movement of "going into" the digital space, but this is a mental representation of a visual physical feature, possibly a metaphorical association with earlier use of something physical like a filing cabinet or bookshelf as a place to store papers/books. Participant *A* refers to this idea by saying it is "like a physical file", and so makes this metaphorical representation of space more explicit and therefore more like an analogy.

The use of prepositions indicates the perceived relationship between the user and the app. Participants formulated a metaphorical use of "going into the app" or "going into the ideas", and participant A used this in several explanations of how he worked with different apps:

> *A: "going in to the information" –*

This was in the context of discussing the use of mindmaps and how they can "open up" to reveal more information. The language here indicates conceptual appropriation of the apps

to that they become an extension of the cognitive processing of the person. This continues with further examples of ways in which he interacts with the app as an integral part of the process of making meaning with the text:

> A: all set into one spot, and I can make notes on them

> A: I use a lot of mindmaps when I'm doing things, especially when I have a course, I'll have like the central idea, and then I'll have a bit that I can go into

> A: you click on it and it'll take you to … it's like it's a link within itself

> A; I click on that, and then I go in there, and you can see it's got these theorists, these books, and some of the things I need to look into and even further than that, then I can click on the papers and go Ok where's that, and I go in to the paper I've been reading

> A: you can use OneNote as kind of a storage place of ideas, for videos, or you know, for quotes, or whatever you want with it

Participant *A* frequently uses expressions that indicate "going in" or becoming part of the app as he works with it. In the mindmaps, with which he is comfortable and familiar, he continues this metaphor to include "looking into" things. There is a sense of movement indicated by the change from the mindmap "set into one spot" and then becoming an object that can "take" you somewhere, and then it's possible to "go in". This is in contrast to the expressions he uses when talking about OneNote. In this instance he describes OneNote as "a kind of storage place of ideas". Metaphorically, instead of the movement and change from an external object becoming something that you can enter, he uses an expression that puts the app as separate, and the metaphor of a "storage place" describes a location that is possible to access but remains an object that is separate cognitively.

This difference between the use of apps is most prominently and explicitly described by participant A, as in these examples, but other participants indicated similar fluctuations in describing the relationship as they interact with texts, tools, software and apps. L describes the difference between reading, writing and typing in relation to the thinking process:

> L: Whereas when I have to write with a pen, I have to sort of, um, I feel like there's more of a, I have to think and remember more perhaps instead of just seeing and typing without thinking much about it. I have to, it takes me a little bit longer. … I think I process, I take the time to process what I'm reading more.

In this case, the use of the keyboard to type is conceptualised as a way of "bypassing" the thinking process (L also commented that she could touch-type and so did not require to look at the keyboard). In this example, L suggests that the ease of using the keyboard means that

less effort in thinking is required and so she purposely, to complete some tasks, chooses handwriting as this entails greater cognitive processing. It could be argued that using the tool of a pen and paper requires less effort as it is a more familiar process, and compared with the relatively new use of a computer keyboard it should be an easier task. For this participant, though, the opposite is the case. In terms of Activity Theory, this could be described as reaching the object (making notes/annotations) while using the digital technology, yet being able to do this without the cognitive input. However, L implies that there is no learning in this connection; rather, the conscious use of the pen slows down the making of the notes but allows the processing of the information.
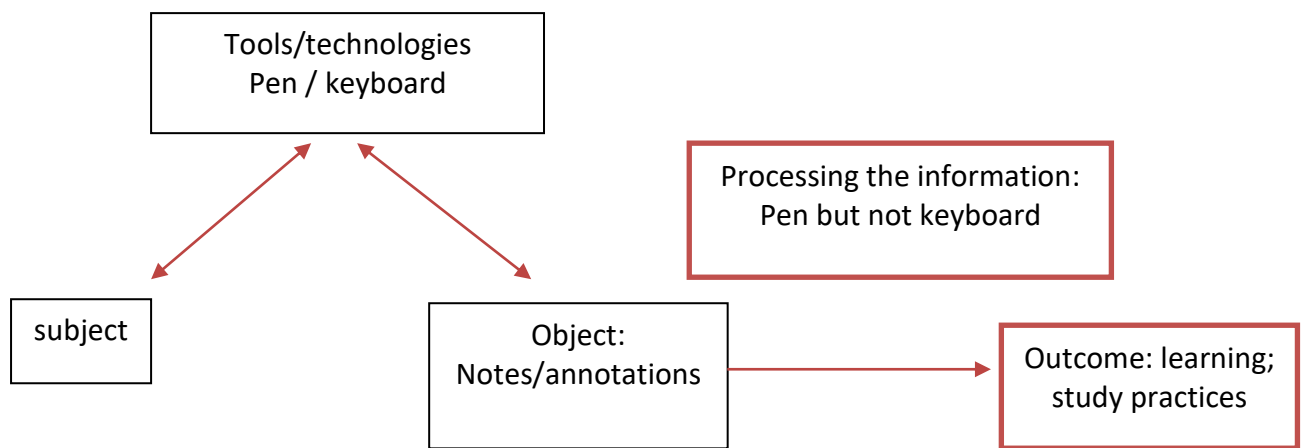
Figure 20: keyboard vs pen in making notes or annotations

L also suggests that this decision to use a pen for handwriting or a keyboard for typing notes is a deliberate choice: there are certain contexts where the processing of the information is important, and other contexts where it is not. This could be explained by the concept of automation – for participant L the use of the keyboard at one time a learned process, then became a process that did not need cognitive attention for her at the time of using it, allowing her to focus on other aspects of the process. These findings support the suggestion that our relationship with apps indicate our conceptualisation of certain apps having qualities that are extensions of our thinking and meaning-making to the extent that they blur the separation of human and computer (Gourlay, 2012).

5 Findings: multimodal practice and literacy

5.1 Multimodal practice and working with multimodal texts

In the conversations the use of multimodal texts was approached as one of the areas to consider, following the identification of this in the literature review as an aspect of digital technology that gives greater affordances than hard copy is able to provide. In the survey there were specific questions about the use of different modalities in notes and annotations, as it was expected that this would be popular: companies developing new software and apps often advertise that they include audio, pictures and videos as a marketing tool. In the analysis of the survey data in chapter 3, results indicated that multimodal choices were not the preferred option. Analysis of the conversations allowed the opportunity to explore this further, and also the opportunity to possibly find out why multimodal options are not being used as frequently as they could be.

The multimodal options that were mentioned in the conversations included:

- Taking a photo of the PowerPoint slide while viewing and listening to the lecture – visual and aural modes
- Digital highlighting – using visual colour coding on linguistic text
- Inserting/embedding pictures, graphics, videos or photos – adding visuals to linguistic documents
- Touch-screen computer or tablet with finger writing or drawing – visual and spatial modes
- Touch-screen writing or drawing with a stylus – visual (and linguistic) and spatial modes
- Audio notes with synchronised writing – aural and linguistic modes

Each of these required the technology (both hardware and software) to facilitate the multimodal functionality or interaction. The two packages chosen for the study – OneNote and Mendeley – both have the possibility of using certain multimodal features, and so this also created potential in the conversations to explore how and why different features would be considered or used. OneNote is more adaptable in this respect, and can support all the multimodal options listed above except the synchronisation of audio and writing. Mendeley is more limited in multimodal options, but allows highlighting of text to create annotations by the user; the highlighting can be in different colours (so a coding system can be used), and it is possible on a touch-screen computer or tablet to make these highlights with a finger or stylus.

Participant H noted that she already uses highlighting alongside making keyword annotations in Mendeley for two purposes: to remember keywords that have been highlighted and given an added annotation, and to be able to compare ideas because a search for highlighted text can be easily found:

H: Once you've done the highlight, you know, like, you know, maybe after several days and you cannot remember exactly what kind of information that you really need. And then you search in Mendeley, then you get the types of keywords or phrases and then they will appear, and then you can read it again, because then you can check if you're on the right lines and if these kinds of resources are reliable or if they are useful for you. I can compare like, you know, like, because I, I need. the sense that like in different contexts is the same, the same topics. If any research and context like different research, very such as has different sounded, uh, about the same topic in different contexts. Then if I use a keyword to find out now I can compare them so I can find the different, the findings so that I can analyse the data they have

In this example, H is using the affordances of Mendeley to be able to add both highlights and annotations, and then uses the search facility to make connections and synthesize ideas. She appropriates techniques that she has used before – highlighting and creating keywords – and that could be either digital or non-digital in their execution, but then she adds a further dimension of using the digital search potential to reach an outcome that is only possible because of the way the technology works. This is an example of successful appropriation of digital technologies to achieve a particular outcome. The multimodal elements of this process are not in isolation, but are part of a sequence of meaning-making that H has developed.

One of the potential uses of OneNote is to be able to use a stylus for handwriting. This is digitally recorded in the OneNote page as handwriting in form, but can also be changed to digital typed text on the page by the OneNote programme (labelled "ink to text conversion" by Microsoft). For the participants in the conversations, the choice between handwriting and typing was complex, with different participants having different preferences. One participant noted:

C: I wouldn't use handwriting, because it would be difficult to make it look legible, unless I've got time to take notes and then change it, unless I'm giving an example of how to take notes, and make notes on a text, you know,

In this example, C is commenting that one use of handwriting in a digital format would be to use that to demonstrate how to add annotations ("make notes on a text"). The distinction is made by this participant between handwriting for personal use, which does not require to be read by anyone else, and a demonstration of how an individual might make their own handwritten annotations on a text. In this example there is an implication that handwriting is a mode used for an individual and not for collaborative annotations.

As noted in the section discussing interacting with the apps, participant L made a distinction between using handwriting "for thinking" and typing for when the process involved recording information that did not involve thinking at the time. When discussing the use of digital handwriting, L did not suggest that there was any kind of social or collaborative aspect to this. In contrast, participant Li suggested that handwritten notes were useful for a social and collaborative use, while also being useful for her personal study. Participant Li noted that for her, using digital handwriting was something that was preferable in her first language:

> Li: it will take shorter time for us to read and easier for us to understand. Um, and also I can read Chinese. You can understand the meaning scanning it. You don't have to read it one, one word by word

These were shared digital notes for the study group, as they prepared for a seminar. This participant also commented on the difference between using Chinese script and English script when re-reading the article:

> Li: well first I will read my Chinese notes. And then, uh, usually I will highlight the key words, or references in the article. So I will first look at the notes and then the English article, but only the keywords. And sometimes if I don't understand it then I will read it again

The study group shared items using social media platforms because these could maintain the Chinese script and notes in this format were shared separately from the article. OneNote could not make the conversion from handwritten Chinese script to typed notes, and so digital handwriting was used only when it would remain as a handwritten script; this meant that for most purposes it was preferable to make a choice between handwriting (in Chinese) or typing (in English). This participant mentioned that she had used OneNote as an undergraduate student (she was currently doing a Master's degree), and had continued using it for her current studies; she had also used Mendeley, and another app, Notability.

Emerging from this analysis, it seems that for these participants the creation of digital annotations as digital handwriting (with finger or stylus) and typing can be useful for both individual or collaborative uses, but this preference is an individual choice depending on the social context and the purpose – whether encoding and recording for review or to extend thinking and perception of learning at the time of writing. In terms of semiotic theories of multimodality, the participants were making choices to appropriate modes in order to enhance the meaning (Jeff Bezemer & Kress, 2008)(J. Bezemer & Kress, 2008; Jewitt, 2005; O'Halloran, 2001). These choices were based on factors such as previous learning experience, social purpose, cultural experience, and crucially for participant Li on language features. This also demonstrates the ability shown by Li to harness multimodal practices while engaged in multilingual meaning-making (Canals, 2021).

This feature of multimodal practice has a focus on how participants are already using elements as they make notes and annotations. The conversations included introducing participants to other multimodal features that they could potentially try. Their responses to these suggestions offered some further data on the way they value multimodal digital practice.

On first using OneNote, participant C was very keen to find out exactly which applications of artefacts could be used; for example, the idea of having an embedded video:

> C: that's good, you don't have to go anywhere else. The video is just there

Similarly, C also noted that the ability of OneNote to be able to take screen clippings and place them anywhere on the page was helpful:

> C: [11:04] much, much easier than doing it on Word

In these examples, C reacts favourably to the features of the OneNote programme that Microsoft claims will facilitate multimodal practice. In doing this, she makes a comparison with her current practice, where videos and screen clippings are used but are not as easily accessible or cannot be integrated into the other modes that are being used (in the case of C, for teaching purposes). The possibility of being able to integrate various features in one location has appeal for this participant. This is similar to the often-used idea that a digital technology mirrors an existing mode or process, but in this instance the features are all digital. This is therefore an instance of "mash-up" or the potential to mix different technologies and bring them together. The appeal of mash-up is not only in the ease of using various technologies in one app, but there is also potential to innovate and create new uses (Hussain et al., 2018). The example of typing or handwriting with a stylus on a digital text above can be seen as another mash-up, where in OneNote an imported photo or screen clipping can have a handwritten or typed annotation. In the conversations, this was proposed by me as a potential use of OneNote, but although participants agreed that there was potential in the idea, none of them forwarded any instances of doing this.

The software "PowerPoint" by Microsoft is used throughout academia and the company provides information for the use of the software to make it accessible (Microsoft, 2022). There is also a requirement for universities to make sure that materials are accessible (Gov.uk, 2021). Participants were asked specifically to comment on some aspects of the use of PowerPoint as it related to taking notes and annotations. One of these features was the practice of taking a photograph of the PowerPoint slide during a lecture. The survey results indicated that although this was done by several participants, it was not a preferred choice. With the results of the survey, I presented a paper at the annual PALA (Poetics and Linguistics Association) conference and made this observation. Conference delegates at PALA are lecturers and professors from a wide range of International institutions. During my presentation, some attendees also (without prompting) took photos of my PowerPoint

slides, allowing me to observe that this was a strategy that was not limited to students in regular class lectures. When asked what they later did with the photos, the dominant response was "nothing". It seemed that the action of taking the photo was enough. In the conversations participants mentioned that they would use photos of the PowerPoint slides as a way of taking notes. When asked what they purpose of this was, the responses were similar:

> *A: I think ideally at the end of the day you go back through your photos and you see what were some important ideas, what were some key things, you know, that I thought of, but realistically I don't think that I've done that, out of every single picture that I've taken*

> *L: I don't really do that any more as I don't do anything with that*

> *S: [responding to the question of taking photos of PowerPoint slides] what I'm doing at the moment with that is, you know, the lectures going on, I have like in like a split screen, so I have half of it is the lecture slides, and then I'll make you my own notes. And then I couldn't theory, annotate, the lecture slides*

One possible explanation of this could be found in the suggestion that this multimodal practice, like other forms of physical effort to make a digital or hard copy record, enables the user to "forget":

> "The notion that cognition can be distributed – beyond the body and to the environment – is supported by evidence such as that produced by Betsy Sparrow and colleagues (2011), who found that if students expected to have easy access to information in the future, they were less likely to remember it. Rather than retaining knowledge itself, their efforts were directed at remembering how to access information." (Fawns, 2015: 50)

This notion is exemplified in a comment by A, where he reflects on his use of photos he takes of his hard copy notebook:

> *A: and so at the end of the day I would take pictures of these, so I could go back, see what was there, and I could look at it, um, in case I lost something*

A uses "I could go back" to explain the action of reviewing the photos taken of hard copy notes; these photos were therefore a digital artefact and a copy of something that already exists as part of A's meaning-making. The linguistic modality of "I could go back …" and "I could look …" have the pragmatic function of indicating potential or possibility, not ability (which would be a grammatical semantic reading). The phrasal verb "go back" indicates that this participant was recalling where and how to access the information. A is using the digital

photo as an extra element in being able to recall information, and stating that some important information could have been "lost" in the hard copy. As Fawns (2015, 2017) notes, there is a possibility that A is here collecting information in various types of format under the impression that simply having the information means that there is the feeling that somehow progress is being made in learning or making meaning. This could also be characterised as "surface learning", where it is contrasted with a "deep approach" that means the user is more engaged with the concepts and issues (Entwistle, 2000). The implication would therefore be that here A is not really engaging with the content as "surface" learning is inferior to "deeper" learning. However,

Another possibility is that A is here suggesting that in the photographic record of the same information, there is the potential for the information being presented in a way that reveals more information. This exploration of the hidden possibilities in the digital artefact could be explained as one of the ways in which the digital form of an existing hard copy is not simply the same record, but it is recognised that the mode can present different affordances (Gibson, 2014). In this case, A would be suggesting that simply re-reading the hard copy would not reveal extra information, but the digital photo of it might. Thus the digital format has both agency (it provides information for the user, rather than simply being a way to store information) and is used as "distributed cognition" – thinking and making meaning comes from an interaction between the person and the digital tools (Shaffer & Clinton, 2006).

These two possibilities of how and why digital artefacts are being used by A could be seen as paradoxical – on the one hand the digital is used in order for forget information at a particular point in time, to be retrieved later, and on the other hand the digital is being used purposely to extract more information than another mode (hard copy) might afford. However, these two possibilities both point to an increasing use of the digital as an essential part of the process of making meaning (Gourlay, 2012; Hayles, 1999). In this case, as in the photographing of the PowerPoint presentation slides, the visual mode of a photograph was used in particular contexts and alongside other social and cognitive processes.

As part of the conversations, participants were asked to hypothesise about how a new or different app might be useful for making digital annotations, and what improvements could be made to current apps. This type of question is often used as part of narrative enquiry to encourage the participant to present a narrative that illustrates the values they would place on particular features (Georgakopoulou, 2021). When asked if there were any added annotation features they would like to see in any apps they are currently using, the range of multimodal ideas was limited. One of the participants mentioned that rather than annotating across the page or writing on any multimodal artefacts, it would be preferable to have annotations in a contained area visually:

> *L: I think I'd personally like to see the comments, my comments on the side*
> *in a sense. If I was wanting to find something quickly that might be …*
> *I'm quite a visual person, so it helps me to see where things are*

Although this participant self-designated her style as "visual" the placing of the comments was not for artistic sense or for drawing attention to the specific feature in the multimodal artefact; in this instance she explained that the placing of the comments was to ease retrieval at a later date. Rather than layering text and annotation, she is suggesting that for her the comments relate to the original text but are also easily located for scanning for the information.

While taking digital photos of either PowerPoint slides or personal notebooks was seen as a self-contained purpose (with no follow-up action) in many instances, the textual comments this participant refers to would ideally be placed visually to enable focus on the comments separate from the other parts of the text. The visual placing on the page of information to make it possible for this participant to "find something quickly" also relates to the use of mindmaps, suggested by other participants. In mindmaps in addition to the visual placing of information, there is also the potential to show visually the relationships between ideas or categories.

5.2 Literacy and reflexivity

In the comment above, L notes that "I'm quite a visual person" as part of her explanation that the placing of the comments (annotations) on the page is important to her:

> *L: I think I'd personally like to see the comments, my comments on the side*
> *in a sense. If I was wanting to find something quickly that might be …*
> *I'm quite a visual person, so it helps me to see where things are*

Research in development of literacy includes consideration of the stage and ways in which the child develops metalinguistic awareness. This is characterised by the ability to move from knowing how to be able to perform a task, to being able to explain that performance of the task. This model of development is rooted in theories proposed by Piaget (1977), which did not directly include linguistic knowledge awareness but have been used by others to theorise how metalinguistic development occurs in children (Homer, 2009). It is reasonable to expect that by the stage of Higher education, a student would have some level of competency in metalinguistic awareness. If this is considered alongside the ability to employ reflexivity, I would expect to find evidence that my participants can comment on the actions they take when creating and using digital annotations, as well as being able to examine these from their world view.

In conversation with C, the discussion moved to talking about the differences between using typing and digital handwriting (using a stylus) and C commented:

> *C: and the reason is that it is easier to write rather than to type*

In commenting on how she used notetaking, L made a comparison between before and after writing her Master's dissertation. She noted:

> *L: before that [my dissertation] I'd always write everything as I found that*
> *was a better way for me when it came to learning. But I think for me it*
> *depends on the … em … type of reading I'm doing. If I read with the*
> *intention of learning something then I find that writing is better, but*
> *when I read to find information for writing then I tend to type them up*
> *as it's easier to find them afterwards. I can just hit control find and find*
> *them more easily*

Both participants were commenting on the difference between writing and typing, and the effect this had on their ability to think about what they were doing as well as the post-event ability to do something with the information afterwards. In the example above, L is distinguishing between the text, the reading of the text, learning from the text, handwriting about that text, and typing about that text. It is possible to examine the processing happening here from a cognitive neuroscience point of view (Petersson, Ingvar, & Reis, 2009) to investigate the ways L is using knowledge and developing our understanding of how literacy is as a skill is structured. This type of examination would reveal that different neural connections are being made when engaging different languages – a science that is often used in theories about language development and the relationship of multiple languages to cognitive skills. This is one of the current research areas promoted by advocates of bilingualism/multilingualism (for example, see the resources compiled by the Bilingualism Matters group, University of Edinburgh, 2020)

L frames the world she perceives in her reading and writing and reflects that for her there are different types of reading – reading for learning, and reading for finding information. In both instances, L is making annotations. Handwriting and typing are framed as methods for distinguishing between the purposes, with neither being inferior, but each connecting to cognitive meaning-making in a different way.

Another participant commented on the processing of previously-provided lecture notes:

> *S: I prefer to reference them and then make my own ones. I think … I find*
> *annotating other notes is too passive, and like if I'm doing that then I'm*
> *not actually reading or listening to what's going on so much, I'm just like*
> *listening to the lecture, like swapping to the notes, and a bit like circling*
> *a bit and I find that's a bit too passive for me personally*

Here, the participant uses the phrase "too passive", while in L's comment above she used the phrase "read with the intention of learning". Both participants are distinguishing between purposes in reading, although using different phrasing. If the participants were using their ability for reflexive examination of their actions to make a statement about

digital annotations, this would reveal a view that thought/meaning-making is one part of the process, and the tools to enable this (the annotation system chosen) are separate from this. However, this is not what is revealed in the narratives given. The process is explained as a sequence of cognitive processing which involves both thinking, writing, using digital annotations, or other methods. Again, this can be seen as embodied thinking where the pen or the digital annotations can become an extension of the person.

6 Findings: collaboration and language

In this section I will consider aspects of digital annotations that are related to wider social and cultural issues. One of these is the use of collaboration, which I had expected to be well-represented in the conversations. This turned out to be not the case. The other aspect was the use of more than one language in the creation and use of digital annotations. This second aspect is a feature that became prominent because of the particular participants in this study.

6.1 Collaboration in the use of notes and annotations

The potential for the use of collaboration as a means of learning has been [noted in the literature review](), and it is also familiar to anyone working in teacher education where it is considered to be a fundamental learning approach. It is part of an approach to learning that has "sociocultural-historical understanding of knowledge production as emerging from interactions with others and mediated by a range of semiotic resources" (Abasi & Graves, 2008: 224). There are a number of studies which consider ways to encourage collaboration, and many studies also looking at the features of a particular digital annotation collaborative app or software (Atrash et al., 2015; Burges et al., 2021; Kergel & Heidkamp, 2018; Oeberst et al., 2018, to name a few). Alongside the theoretical arguments given in the teacher education literature for why collaboration is useful for learning, there are also practical suggestions about how to achieve successful collaborative learning (Laal & Ghodsi, 2012; Nunan, 1988; Rojas-Drummond et al., 2008; Speck, 2003). Given these strong expectations of a central role of collaboration in learning, and the affordances of digital technologies to support this, it is surprising that collaborative and social uses of notes and annotations were not more at the forefront of the data from the participants in this study. In this section, I will examine what forms of collaboration were discussed by the participants, and examine some possible reasons why participants were reluctant to use digital annotations as part of collaborative learning practices.

One of the participants in the conversations, participant C, was both a tutor/member of staff in the institution and was also engaged in degree study. When commenting on the use of collaboration she used annotations primarily in her role as a tutor to mark up work done by students, and at the start of our conversation she expected that it was feedback that was the principal use of digital annotations. In their discussion of open social annotation, Brown and Croft (2020) suggest that there are levels of power inherent in the act of annotation; they suggest that "whether one is in disagreement or agreement with the text, the assertion of one's perspective upon a text in a public forum either shares power or creates a tension wherein social power is being negotiated between the original author, annotator, and the readers of both of these texts" (Brown & Croft, 2020: 4). For participant C this tension was demonstrated as she noted that for her it was important to be able to review the annotations before these were sent to the student:

> *C: [in conversation about the possibility of using OneNote to create*
> *synchronous annotations] so when you're actually writing, em, is there*
> *any way you can hide it you've written it as you want it to be? So rather*
> *than just writing it straight away, so with all the faults, .. and so you can*
> *rub it out?*

This aspect of digital annotations was mentioned several times by participant C, demonstrating the level of importance that this aspect had for her, as it was checked by commenting:

> *C: so can you hide something*

> *C: so that's good, you can keep it from the students. I can get things ready*

When demonstrating the possibility of synchronous annotation of the class text in OneNote, this was the first question that was raised by C. For C, it was important to be able to present a more "finished" version of the notes, rather than anything that was from tutor to students as a work in progress. In C's use of annotations here, there is an original author (the student) and annotation created by the tutor and shared with the student, creating a more private dialogue than that discussed by Brown and Croft, but the nervousness demonstrated by C's concern about "the faults" illustrate the perceived social power held by the tutor (although not necessarily aware of this).
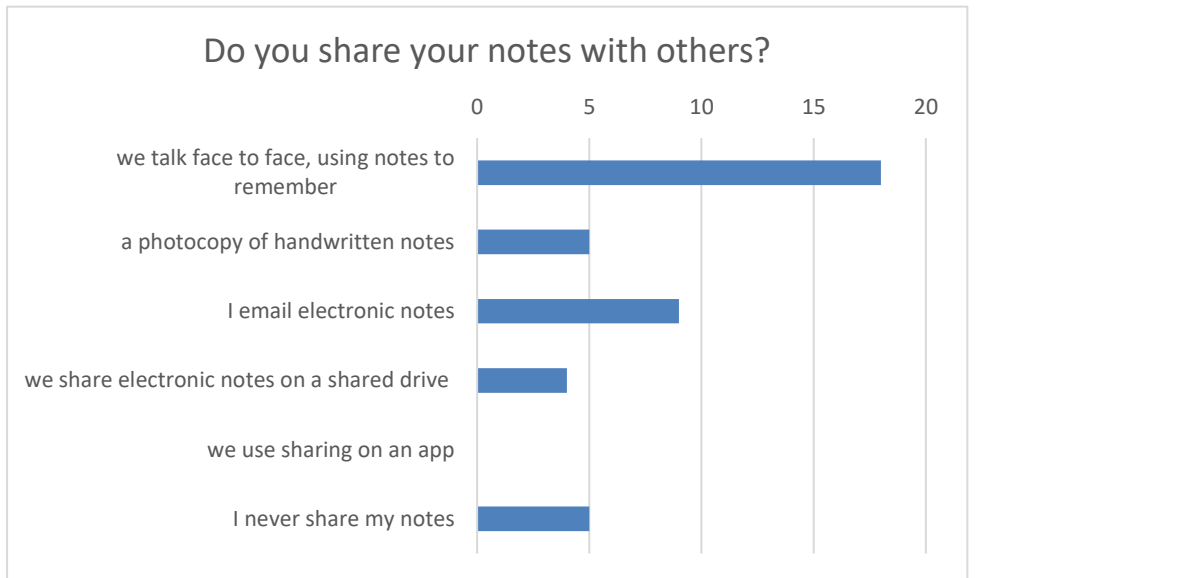
This sense of power in the relationships was not unique to participant C. It was also noted by participant Li, who placed herself in a position of disempowerment. In the conversation while commenting on the way the study group worked, the question was asked "What would you think if the lecturer became part of that group?" And also the question was asked "Would it be good for the lecturer to share questions or notes?" Li commented:

> *Li: I think it will be helpful if we have, uh, if we can see the notes, the lecturer*
> *made. So it will be easier. Um, but it feels like an assignment to us*
> *because the lecture can see. Yeah, we might be more careful with the*
> *notes we made because the teacher can see them*

Participant Li here reveals different ideas about the value of digital annotations from the lecturer. On the one hand, she notes that notes from the lecturer could be "helpful", but then goes on to note a different aspect of the relationship with the lecturer – that of the "marker". Li places herself in a position of choosing not to engage in collaboration with the tutor because this would entail being "more careful", which is the same reason given by participant C who holds the position of power.

The affordances for collaborative sharing of digital annotations is one of the features that was noted in the literature review, and in that discussion I noted that it is an aspect of digital annotations that is referred to in many studies. For this reason, it was included in the

survey. In the survey one of the questions asked if participants share their digital notes with others and results from this were highest for the choice "yes, we talk face to face, using notes to remember":
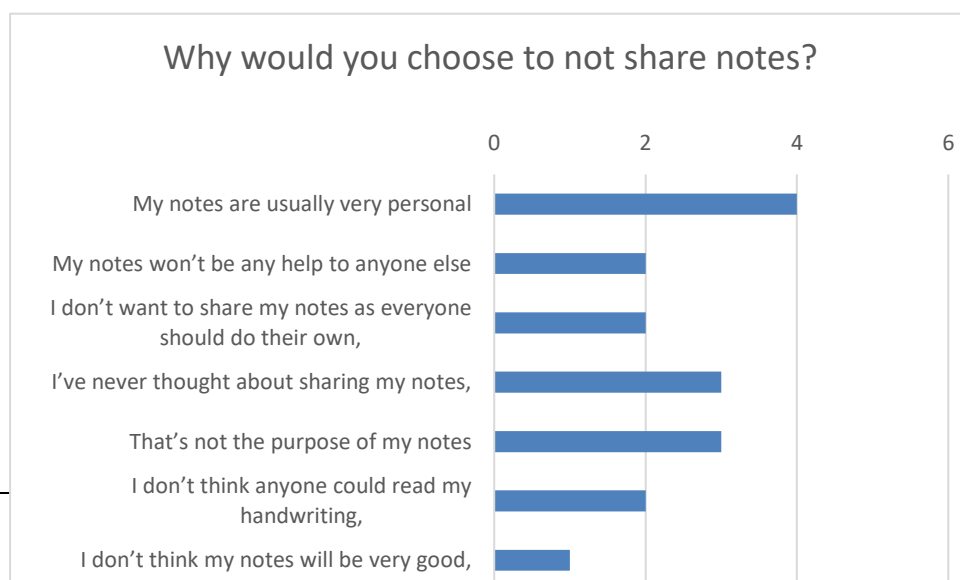
Do you share your notes with others?

Response	
we talk face to face, using notes to remember	18
a photocopy of handwritten notes	5
I email electronic notes	9
we share electronic notes on a shared drive	4
we use sharing on an app	0
I never share my notes	5

10.a If you selected Other, please specify:

Showing 1 response
we share pictures of our notes and comment them

Figure 21: response from survey question "do you share your notes?"

In the survey, there were several responses "I never share my notes". A survey follow-up question asked why, with suggested reasons and the option to add other comments. One respondent selected all the options, and the most common reason in the responses was "my notes are very personal". Only one respondent gave further comments (not a respondent who took part in the conversations).

Why would you choose to not share notes?

Reason	
My notes are usually very personal	4
My notes won't be any help to anyone else	2
I don't want to share my notes as everyone should do their own,	2
I've never thought about sharing my notes,	3
That's not the purpose of my notes	3
I don't think anyone could read my handwriting,	2
I don't think my notes will be very good,	1

Figure 22: reasons given in the survey for not sharing notes

It was surprising that digital notes and annotations were not shared more by participants in the survey, and so these aspects of collaborative practice were followed up in the conversations. Participants in the conversations were asked why they would or wouldn't share their digital notes and annotations with others, and some participants agreed that they would do this, but others hesitated. A number of reasons were given:

> Li: . Yeah, we might be more careful with the notes we made because the
> teacher can see them

> L: But I tend not to ask, um, people for notes because I know that's
> something, some people don't like sharing, I think some people find
> notes, something like personal notes, their own thoughts that they might
> want to use.

> L: I might not, perhaps not to give my own personal notes, um, in case, you
> know, I, not that I don't trust them to write their own work, but just in
> case they didn't do any of their work and copied everything I had.

There are several different reasons given here, although they are also similar to the reasons chosen in the survey:

- There is a power hierarchy in the relationship between who can see the notes and the expectation that the creators of the notes have to be "careful".
- Notes are more like personal artefacts than any kind of finished or prepared work might be
- The potential for another user to use someone's notes instead of preparing their own study outcomes

This last point hints at the potential for plagiarism in collaborative work and drawing on the investigation of social and collaborative use of digital annotations I had expected this could have been more prominent in the conversations. Concerns about intellectual property and ownership of ideas are not only related to the final outcome of a study routine (handing in

an assignment, for example) but are also part of the process of making meaning even when this is accomplished through legitimate study practices.

Comments on the use of annotations in collaboration were also focussed on the social context in which the annotations were employed. One of the participants, A, noted advantages of working collaboratively with notes while at the same time noting that this was to some extent hypothetical. Participant A commented that in university there was little sharing of notes, but in the teaching practice school work he was currently engaged in, it was much more common:

> A: I would never mind sharing these ideas with someone because if I can explain it well and that I understand it well I think by being able to create a group where I can send the paper in others, people can take a look because if we're reading the same papers, someone else can take a look at my notes and go, I think he might have this wrong, or I'm thinking might have this either the wrong … I know there's some people who just like to have the notes and never do anything. And so in that case, they wouldn't, it wouldn't be good for sharing. Um, but I've always been a big fan of, of study groups and teaching groups and things …

> A: Have everyone who is in that [teaching practice] group, see the four or five papers we need to read and people could put notes and comments on it. Everyone can then look at it and … and because we only have a meeting once a month.

Participant A is here constructing a narrative that includes several scenarios, including a hypothetical narrative, suggesting that advantages of collaborating with notes is that it consolidates his ideas and also that another person could point out his errors or misunderstandings. However, he does not give an example of this actually happening. He also comments on a specific example of the way the group in teaching practice share notes. Participant A is using positive and negative statements, moving around the possibilities of how and why notes could be shared, and using modal auxiliaries (would, can, might, wouldn't) that emphasise the contradictory possibilities of the different uses (Norgaard, 2010). In semiotic terms, this juxtaposition of different possibilities helps to create a "positive reality effect" (Hodge, 2017: 254).

Although participant A outlined several ways to successfully potentially share notes, one of the other participants gave information about how notes were exchanged with her study group. She noted that a better system of exchanging notes would be helpful, but at the moment the group made notes that were in a separate text from the original text if they were collaborating.

Li: for our study group, I think it might be useful because currently, because there are a lot of reading, we usually divide the, you know, the workload inside the group. we have our parts signalled and we have our part to read. And I think with that group it might be really useful, because you can, oh - currently, we have to make a PDF and upload it to the, yeah, it's really, it's not, that convenient it's not that easy. So with this I think it would be helpful … Well usually we have a meeting before and after a lecture or before a workshop, we will get around and discuss the readings we read about and discuss the problems we're going to discuss, um, in the workshop. Or the topics or the slides during the lecture that we are not so clear about yet, things like that. So we exchange ideas. Yeah. And, uh, for the reading we separate uh, you know, if there are like three articles, we, uh, like one person takes one, each one takes one, each one of the articles. And now we basically make a document about the brief information in the paper and the ideas in the paper and the questions that are raised. And then we exchange these documents so that we can, uh, start to get a brief idea of the other article. It will make it easier Yes.

In Li's account here there are also modal auxiliaries used, although there are more statements of records pf past events than in A's account. Li presents claims of how the group works alongside personal caveats ("not that convenient", "I think") and hypothetical future use of a different system. The message that Li is conveying is that she is thinking through the possibilities, and the use of modals along with the complex instances of scenarios give a high reality value – we believe that Li is considering all the different ways this may or may not be useful in the way she sees her study practices.

What emerges from this, and the other narratives given by participant A, is that the idea of social and collaborative sharing of digital notes is seen as positive and worthwhile in academic contexts, but the actual use of these is rather more problematic. The participants here are working through the tensions and complexities. They show awareness of the academic force of thought suggesting that social and collaborative work is valued and supportive in their studies, but at the same time they are working through negative features that are perhaps not quite so well-articulated but nevertheless cause them to pause and re-think how and when collaboration would be worthwhile.

For the purposes of this study, my interest in these responses is not in being able to verify if these were "real" reasons or not – an interesting line of research for another study – but in the ways in which my participants identified the actors, tensions and relationships in their accounts.

6.2 Multilingualism and translanguaging

Several of the participants in the conversations identified themselves as using more than one language, and they commented on the ways in which they move from one language to another. This was mentioned in connection with different contexts: as they were discussing listening and making annotations in a lecture, taking part in group seminar preparations and other study processes, or studying on their own. The choice of which language to use did not always correlate to the context, even for individuals. For example, it was not the case that in a lecture presented in English it was always English that was used to make notes. This fluidity with linguistic practice presents a complex entanglement of language boundaries and textual modes, which I will explore in this section.

When commenting on the use of language in making notes, L referred to both handwritten and digital notes, and described using both modes but making a distinction between the languages used for the purpose. The movement from one language to another was described as "automatic" and the preference was "habit":

> L: it's automatic, really. I grew up going to a [language[11]] school and all my education up until university was through the medium of [language]. And I think it's a matter of habit writing my notes in [language]. But when it comes to taking notes from, writing notes from readings, for example, I tend to stick to English because I'm taking information and not really, em, sometimes I'm taking the information and not really doing anything with it at that point in time. I'll come back to it and that's when I might write my own notes about it. So when I take notes on readings, I tend to select information rather than analyse it or question it.

For L the distinction between languages was made easily, but the narrative here shows an ability to use reflexivity to analyse how she made the choice of language. There were definite contexts which merited the use of one language or another – she did not describe code-shifting between languages (as could happen in a conversation where both speakers have both languages). This ability can to some extent be explained by Bourdieu's (1977) view that linguistic competence is not created in isolation from the social situation in which it is enabled. L uses the phrases "it's automatic" and "it's a matter of habit" to explain that at the time of making the language choice she did not pause to consider which would be appropriate but used a process that had been used by her many times before. She offers an analysis of why this might be – that her educational background supported the use of one language and so within the context of "learning" she switched to that language.

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[11] in the examples from participants here I have redacted the language mentioned and the country mentioned, to preserve anonymity of the participants

She then makes a distinction between acts of learning ("that's when I might write my own notes about it") and recording information, with the implication that the recording of information is done without any cognitive processing. She uses "taking information" and "selecting information" to distinguish this from "doing something with it" and "analyse it or question it".

For L the context and mode in which different languages were being used became less important than the cognitive focus of the task. This was explained by L:

> L: I sometimes think it's easier for me to do some things in [language] like, em, when I have to think about things critically it sometimes help me to do it in [language]. … for example, if I'm, right, like, listening to a lecture but then I have my own idea, or something I wanted to question about what I'd heard, I'd write that down in [language]

L made these comments about her use of different languages in relation to writing notes with little hesitation or prompting to give details about shifts in language use. The reflexivity demonstrated in this aspect was also present in the ability to comment on the extension of thought processing in the writing of notes, although this was done with more blending of the actions. "Thinking about it critically" could indicate cognitive processing without any action in writing, but she clarified that the thinking in terms of "question about what I'd heard" was realised in the action of writing it down. Although L is proficient in more than one language, she moves from one to the other for particular purposes and this takes precedence over the mode (hard copy or digital) being used. She is also using the languages in which she is competent to aid the cognitive purposes, making her linguistic choice an agent in the processing. She is demonstrating not only an ability to translanguage, but also to employ language to further aid the purpose, in this case the cognitive functions.

In these examples from L, it is clear that the social and cultural experiences – the habitus – have shaped L's use of language (Maton, 2005; Rawolle & Lingard, 2013). However, this does not fully explain the way in which L is appropriating her language competences to provide what she considers to be enhanced cognitive abilities.

This is an echo from the view that language is dialogic, and that there are social and interactional features force of *habitus* in moving from one language to another. In her experience of education in a particular language, she employed the use of that language for cognitive processes that had been shaped by the sociocultural authority of the educational system even though in the wider society English was also used.

This "shaping" by the social context is illustrated also in a comment by Li, where she notes her changing use of language because of relocation from one country to another:

> Li: In Scotland I write English more but now I'm back to [country] so I write in [language] … because the information I touched are all [language]

When prompted to give more information about which language is used, Li confirmed that "if the text is English, then I will use English", but then qualified this to state

> *Li It also depends on my mind which language, which occurs first I will choose*
> *which one … at first after coming back to [country] I think more in*
> *English and a lot of words in my mind they are English … and sometimes*
> *I use some English to replace some [language] and sometimes I think*
> *more in [language]*

For Li the power of the language used in the Higher education programme she had studied in the UK was stronger than the power of the social language in her return to her home country, but this was changing over time ("at first …" implies that this was not the case after time had passed). In discussions about the use of digital technologies many Higher education colleagues have commented that it is more "natural" to use a pen to make notes or annotations. This is also a topic that is discussed in papers considering innovations in digital technologies – where a dichotomy is set up between pre-digital and digital, and where pros and cons are listed (Mills, 2018). The reality for users, though, is that the choice between digital and non-digital is much more complex and is influenced by language use, social context, *habitus*, and the continuing dialogue between an individual's thought and recording functions.

The analysis here emphasises the fluid nature of translanguaging as part of cognitive processing but also that it is related to sociocultural contexts. In terms of digital annotations, where the conversations were focussed on the language used for different tasks, the differentiation between hard copy and digital annotations was blurred. At times in the conversations it was difficult to tell if the reference was to hard copy or digital. It would be simplistic to say that this indicates a hierarchy of importance, giving prominence to social context over language, as different participants comment that they use language in different ways. However, where they comment on the actions they take in different contexts, they relate this to cognitive function before they comment on hard copy or digital annotations. In this conversation context the process of "learning" or "thinking" takes precedence over consideration of the tools used in making notes or annotations. There is continuity between "thinking" and making notes or annotations.

7 Conclusions and implications

This study started with a predominantly practical direction, taking an instance of current practice and starting to examine it from different angles and theoretical stances. The initial goal was to enhance teaching and learning in Higher education and I have used the instance of digital annotations to investigate some of the factors to bear in mind as decisions are made about introducing or maintaining the use of programmes, technologies and apps. In constructing the research questions, importance was also placed on the values given to digital annotations. These perceived values reflect more than simply the use of this particular tool for academic practice, but also illuminate underlying values in attitudes towards cultural and language practices in Higher education.

There is an inherent danger in forming a study of a particular phenomenon, working through aspects or this phenomenon, and then concluding that the focus of the study is far more important than previously realised. In recognising this, I have tried to be tentative in my conclusions. At the same time, this exploration of digital annotations will raise awareness of current and emergent practices in the development of literacy and the affordances of digital technologies.

I also recognise that the lines that distinguish between one area of academic practice and another are blurred and shifting, but I would suggest that this exploration of digital annotations has provided insights into aspects of teaching and learning in Higher education in the 21st century that go beyond one instance of the use of digital technology. In this section, I will discuss the main research areas and how this exploration has added insights.

7.1 Summary and answers to the research questions

The study used two forms of data: an initial survey, and recorded conversations. The findings from the initial survey indicated that those taking part did not use digital modes to make annotations that were multimodal and collaborative, as might have been expected from consideration of other studies that were reviewed in the literature review.

The survey revealed that there was a preference for using hard copies for annotations related to several different contexts of university study. Further exploration of the extra comments given in the survey showed that there were preferences indicated when participants were asked to distinguish between public and private uses of annotations. Analysis also showed that the choices made between using digital or hard copy was a complex combination of the context, previous experiences, the digital tools/apps being used, and possible expectations of public/private uses of the annotations. The conversations allowed for greater exploration of these issues, both in presenting them to participants who had not commented in the survey, and in teasing out the issues to explore how individuals made these choices.

Using digital annotations

The investigation of the ways the participants use digital annotations revealed that while there was an influence from the institution, the choices made depended more on previous use of apps or software that assisted in making the annotations, and familiarity with these apps and software.

To identify the issues, Activity Theory was used to assist in the analysis of the data from the conversations. As a theoretical framework, it has been useful in identifying the actions and interactions involved in the social context. While there are some personal decisions, the individual using the digital annotations also has to take into account features such as the institutional support given for particular software, the choices the tutors make in presenting their classes and the sharing of notes and annotations with peers. For this particular group of participants, the features that dominated their choices were their familiarity with using particular apps and the ways any new apps could integrate with apps they were already using. While not averse to considering new apps, the participants were not willing to invest in new apps unless the new app had enough sense of familiarity and could integrate easily into their current workflow.

This answers part of research question 1: How do users evaluate and use digital annotations? When making the choices about how to use digital annotations, the participants in this study took into account a range of social practices, some with tensions such as their own need to be familiar with the software contrasted with the institutional provision. Their evaluation of digital annotations was strongly based on familiarity and previous experience.

Multimodal practice and literacy

In the literature review, it was noted that many of the studies in the use of software for digital annotations emphasised the multimodal potential. The participants were aware of some of this potential and discussed their use of multimodal aspects of technology related to making digital annotations. They employed digital handwriting using a stylus, audio recording and taking photographs. However, the choices made were also related to the social context and their familiarity with particular apps. One of the more striking aspects that emerged out of this part of the exploration was the way in which participants actively made choices of a multimodal format not to make it easier, but to force them to think in a particular way. They used the multimodal affordances as an agent in their processing. This made the [difference between handwriting or typing,](#) for example.

The digital technologies provided the possibility of creating multimodal texts, in different contexts, and this choice was utilised by the participants as part of their literacy competency. The creation of annotations requires writing the annotations and then also using them at a later date, as a reader. While this was noted as important for some participants at some times, the data showed that participants did not always do this – the reading of the annotations was often not followed through. One explanation of this is that it

is the process of writing the annotations that provided the thinking/learning processing. These instances were always connected to the making of private annotations rather than using them collaboratively.

This answers part of research question 1: How do users contribute to digital annotations? They create digital annotations using a variety of multimodal forms, but these choices have to take into account whether or not they are familiar with the multimodal features. The data also revealed that the creation of multimodal annotations was used as an agent to stimulate thinking, and was actively employed in this way.

It is also possible that the ease of using multimodal artefacts meant these were created quickly because it was possible, but not subsequently used to take forward meaning-making, answering research question 2: What perceived value is placed on modified texts following the creation of digital annotations?

Collaboration and languaging practices
The use of digital technologies to support collaborative annotations is a feature that is marketed by the creators of the apps, and it fits with current expectations of learning practice. It was surprising that it was not used more by the participants in this study. Various reasons were given for this, and the need to have something more "polished" or adequate for others to see was given by both students and the participant who was also a member of staff. In my experience as a tutor, I have found that students have little exposure to research work that is not "finished" or at a standard to be published; it is expected that student work shows progress, but students don't have access to research that is in progress and that is authored by tutors or others in a position of academic power. While in many ways we could consider it reasonable that a tutor wouldn't like to reveal mistakes in their writing or notes for a student, this continues and confirms the expectation that academic writing should be seen in an accepted standard and that even in an age when continued digital deletions and changes are possible, there is still a desire to have a more "perfect" text. This is one answer to research question 2: What perceived value is placed on modified texts following the creation of digital annotations? They are in many cases considered to be private notes and before they can be used for collaborative study purposes they would have to be modified again in some way.

During the course of the study, languaging practices became more prominent as a feature that was used by the participants both in response to particular contexts and as a form of agency to provide cognitive processing. The relationship between languages being used was more fluid than a simple equation of language input requires the same language for making notes and annotations. At times this was the case, but then the participant actively used another language to examine the information. Participants also deliberately chose a language for a particular purpose in their study processes. There was also tension caused between these practices and the requirements of the institutional practices. This answers aspects of research question 1 as well as research question 2. In the creation of digital

annotations, users employed the ability to use one language, and then in later reviewing and using the annotations, they employed their ability to translanguage to provide greater examination of the information.

7.2 Implications

The emergence of new technologies and the ways users decide to appropriate the technologies has implications for institutions as well as for the students. The examination of what users are actually doing, and how they make their learning experience choices, can be valuable for students as well as staff making decisions about which digital technologies to use, how and when to implement them, and the potential unexpected consequences of appropriating those technologies. The data has been interpreted with a qualitative and interpretative stance and recognises that each individual has a complex series of ideas and values that create their learning reality, and their own approach to learning.

As a teacher, and following the practical impetus for creating this exploratory study, my first impulse is to consider the implications for classrooms, study groups, lectures and online learning materials. Although the point has been made before, it is worth re-emphasising that translanguaging or the use of multiliteracies is not a limiting feature in learning. Instead, it offers a range of affordances that an individual can choose to appropriate for different purposes in different contexts. Where there is an internationalisation agenda in a UK university there is often the assumption that the institution has an obligation to provide ways to access the English-language courses and study materials, and this often takes the shape of English language support classes. I have personal experience of working in several different language schools of this type. I would not advocate that these are redundant, but equally there is very little emphasis given to how the materials, courses and study groups could incorporate translanguaging practices. This would go further than simply tolerance of participants who may need "extra support" but instead there is a need to emphasise that the contribution from using translanguaging is worth exploring as it could lead to enhanced learning for the individual. It should not be necessary to negate the use of other languages while studying in an English-medium institution.

This study does not provide a definitive answer to "what is the best app for university study" because there is no possibility of providing digital technology that will encompass the complex contextual, cultural, social-historical and individual differences that users bring to their studies. However, introduction to the range of possibilities is often ad hoc, and to some extent dependant on the preferences of the course tutor (which could, of course, also include standing back and accepting the institutional choices without examining the ways they work or the best ways to incorporate them into the course work). Equally, pre-programme introductions often do not recognise that selection and experience with suitable digital technologies is as important as academic introductions to writing styles, research methods, and avoiding plagiarism. Teaching staff often have to work with technologies and ideas that are unfamiliar to them and – like students – naturally revert to

what is known and try to adapt the new ways to fit in with that. There is a need, therefore, for professional pedagogical development that can support the integration of digital technologies. In today's Higher education practices every course should have time spent allowing students and staff to consider how digital technologies can be harnessed successfully.

This study considered social and collaborative annotation practices, and it revealed a range of tensions around issues related to the sharing of notes and annotations, and the implications of this for personal integrity, intellectual authorship, and plagiarism. Although not tackled directly in this study, there are also related issues surrounding the current climate of open access to academic material.

There are also implications for future app creators for online learning. The participants in this study showed individuality in their choices, and the expectation that there should be a "one size fits all" approach to support for learning is certainly not shown. What was important were features such as the potential to integrate with other apps, the application of multimodal texts, and the incorporation of different languages.

7.3 Limitations of the study

As noted in the methodology, this is a small-scale, interpretative study and so generalisations cannot be made. It is also a moment in time. Digital technologies are constantly changing, and since the data was gathered for this study, there have been several changes in the apps used. OneNote has developed in recognition of language texts and now supports translation in a larger number of languages and textual symbols, as well as transliteration [12]. Mendeley has removed the app for mobile and tablet use and depends on website and desktop versions only. These types of changes are to be expected; a study of digital technologies will have to acknowledge that change is inevitable. This is one of the reasons for creating this study with a focus on the ways users evaluate their use of apps rather than on a study of the affordances of a particular app.

A further limitation of this study is that both the survey and the conversations used self-reported measures and experiences. The study is focussed on the lived experiences of the participants, and as such was not intended to report on the "truth" of the narratives given in an objective sense. However, this does limit the conclusions to only reporting on what was mentioned at a particular place and time, and these could change with the same participants on a different day and in a different context, limiting reliability concerns. A future study with a more ethnographic slant would help to demonstrate whether the issues and evaluations given by the participants remain relevant over time and in different contexts. However, this does not change the theoretical stance of the study, which is that in human experience it is inevitable that there will always be a different lived reality, whether for different people in the same context or for the same person in different contexts.

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[12] Information on https://docs.microsoft.com/en-gb/azure/cognitive-services/Translator/language-support

The study did not include triangulation of participants' accounts with their levels of digital competence. Other studies (Blake, 2008; Blayone, 2019; Heidari, Mehrvarz, Marzooghi, & Stoyanov, 2021) have shown that there is a direct correlation with competence in using digital technologies and learning success while using those technologies. The issue of how to measure "learning success" is, however, contentious. What this study did show is that users of digital technologies appropriated new technologies in part according to connections with previous experience of the affordances of technologies.

The data in the study does not take into account the changes in use of digital technologies during the Covid-19 19 pandemic. This could have had an effect in two different and opposing ways. The massive uptake in the use of digital technologies to support learning has meant that many more people (students and staff) are now much more aware of how to use digital technologies and the choices that they offer. In terms of the ways digital annotations are used, I would expect that many more people have used a range of technologies as part of their practice, where they would not have had to do this prior to the pandemic. There was a requirement to embrace digital platforms and be flexible in approach to allow learning to continue. However, at the same time, the speed with which this had to be done, and the challenge of transforming face-to-face practice into online modes has meant that there is a strong possibility of crisis management forcing the quickest options; of course, data is still being processed to see if this is what happened (Vargo, Zhu, Benwell, & Yan, 2021).

7.4 Future directions for research

The limitations noted above point to some areas for future research. A longer study with an ethnographic approach would help to clarify questions about how users of digital technologies value their choices of apps in different contexts as they progress through their studies. This would problematize the issues surrounding the relationship between knowledge of apps, study practices, and personal learning goals alongside the development of academic skills that are considered essential by the institutional practices.

In this explorative study I have noted how participants engage with more than one language in a variety of ways. Some participants were able to harness more than one language as part of the process of meaning-making. In this study I have only touched the surface of the intricacies involved, but would suggest that in further studies the use of digital annotations is an area worth considering for further investigations. Any study of aspects of digital humanities could be replicated over time, as the affordances of apps and software are constantly changing. One feature of apps that is currently being developed is the use of translation. Apps now available can take not just words but also phrases and sentences, and translate these into a number of languages. Google Translate (2022) now works in 59 languages, for example. It is reasonable to assume this trend will continue, and apps will be available in more languages and also with more varieties of language fields, including academic styles. A future study, similar to this one, would explore the ways digital

annotations are being used when the received texts (written or spoken) can be easily translated for the user, thus removing the need to consider actively doing some kind of translation. A future investigation could consider if the change in availability of translation modifies the translanguaging practices that have been noted in this study.

The conclusions to this study have revealed one of the points of intersection between digital technologies, multimodality and translanguaging, as shown in the simple diagram below.
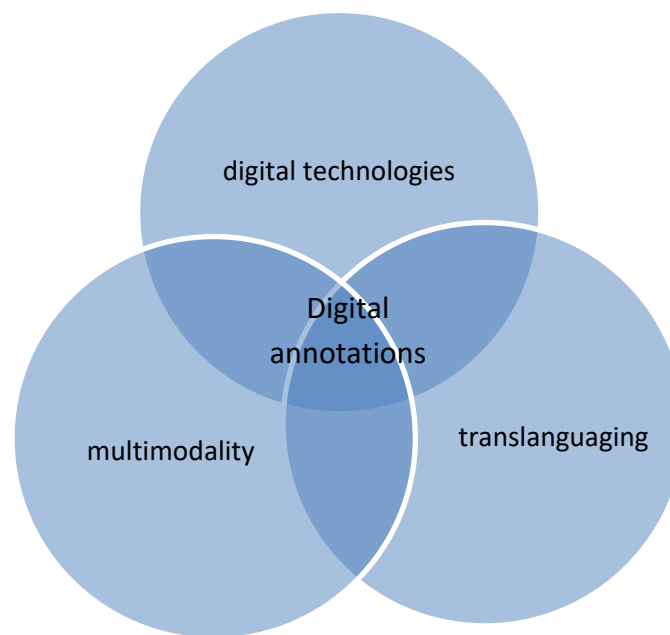
Figure 23: digital annotations at the intersection of digital technologies, multimodality and translanguaging

The dynamics of this relationship depends on the ways in which individuals harness the affordances from each of these areas. For example, as noted in the paragraph above, a change in digital technologies could include advances in the availability of translation apps. This could create freedom for the translingual user to employ a wider range of languages for the context and purpose for making the annotations, thus enabling greater personal choice in approach and using the affordances that translanguaging offers. Equally, different potential in making and using multimodal texts could also change this relationship.

7.5 Final comments

The final shape of this study was arrived at via many routes. This is not least because the landscape of available technologies is constantly changing, and so setting up a study using a particular app or programme is potentially hazardous. Although I have mentioned events during the Covid-19 pandemic, and the changes this has brought to attitudes to digital technologies and their relevance to learning, there has not yet been enough time to examine the effects this has had on study practices. What has become increasingly clear in

exploration like this one is that practices using notes and annotations have far-reaching implications in academic study.

This exploration has also revealed that the creation and use of annotations is largely a hidden part of the curriculum. This is a result of both institutional practice and also personal preference. As institutional practice, support and suggestions about learning through annotating texts is often separate from the curriculum of a particular course. It is possible for students to access help, support and guidance within the larger institution, but as part of the course learning this can often be much less visible than, for example, lecture PowerPoint slides or course assessments.

This is not to say that there is a problem with this, as personal preference is also relevant. In this study, many of the participants commented in different ways about different reasons why their own annotations were fundamentally part of their learning and meaning-making, and would not be suitable as materials for others. In this way, they indicated that their evaluation of their reality in their learning context was created, modified and adapted by themselves in a framework that embodied cognition as well as the tools they used in this process.

And yet …

As a teacher, it disturbs me to think that an area of learning that is so crucial to progress and outcomes can be so private and hidden, therefore not open to supportive scrutiny or expansion.

When considering the perceived value that is placed on modified texts following the creation of digital annotations (research question two), the study shows that without being prompted to consider this, the users don't place a separate value on these modified texts. Their digital annotations are considered as one part of a larger process of learning and making meaning. They didn't separate the use of annotations from the larger sequence or process. As part of the learning process, the participants in this group demonstrated that their digital annotations were one part of a sequence of processing and although the study asked them to consider aspects of their digital annotations, they moved away from this limited focus. It became unnecessary to try to distinguish the creating and using of digital annotations from other parts of their learning and meaning-making as the properties that were afforded from the use of digital annotations were not a purpose in themselves. They were part of the process, and so embedded into the process.

A further conclusion concerns how these participants use and contribute to digital annotations with a focus on translingual/multilingual aspects. To enter a UK Higher education institution like the University of Edinburgh a student must demonstrate a reasonable degree of proficiency in English (the exact levels can vary between programmes

but an IELTS or TOEFL score is often required[13]). Tuition (lectures, seminars etc) is expected to be conducted in English apart from specific language courses or cultural courses that are given special consideration. Assessments are expected to be in English (although I am aware that Scots is also permissible in Scottish universities). International students expect that they will be required to use English language for all of these contexts. In the choice of digital learning platforms to support programmes, the choice of available languages other than English is not a high consideration. I know this from teaching on the course "Online Language Learning" where the majority of students do not have English as their first language and who are taking the course to explore online teaching of English to users of other languages; they have found difficulties in harnessing Blackboard Learn to be able to depict Chinese characters, for example.

Language preferences were revealed as potentially having more importance than collaborative learning processes. I draw this conclusion tentatively as the study did not focus on comparing personal language choices with collaborative learning and so there is limited data to support more conclusions. In our courses, we have sessions to encourage the sharing of ideas. We follow well-researched guidance on how scaffolding and collaborative learning can enhance critical thinking. But we don't give the same emphasis to how to engage with translanguaging practices to enhance personal learning as well as enhanced knowledge production.

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[13] IELTS scores are graded for entry to Higher education and an average score of 6.5 is often required to get the visa, but can vary depending on the institution; see https://takeielts.britishcouncil.org/ielts-recognising-organisations/recognise-ielts for details

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Appendix 1: consent form 1

THE UNIVERSITY of EDINBURGH
Moray House School
of Education

Digital Multi-Media Annotations for Reading, Understanding and Study of texts

Participant information and consent form

This project investigates the use of digital annotations on digital texts and the ways in which readers and writers of these texts make choices about what they write and share. The project takes a critical view of selected current methods for annotating texts. It will consider how and why we make annotations, the purposes we choose for our annotations, and the ways in which texts can be transformed through the use of digital annotations.

The intention of the project is to explore this aspect of digital technology and open up conversations about the new ways we use digital texts. Participants will have the opportunity to learn about some recent developments, and consider the issues related to adopting digital means to explore texts, to study, to build research notes, and to collaborate. The project will involve 2 phases: (1) a questionnaire; (2) interviews alongside guided use of digital annotations. Participants can choose to take part in phase 1 only, or continue and take part also in phase 2 (guided use of digital annotations and interviews).

The following questions aim to ensure that you are aware of my role as researcher, and how the information you share with me in the questionnaire will be used in the research project. Please note that you do not need to agree with statements about phase 2 to take part in phase 1, and further consent will be requested at a future date if this is the case.

Please tick the boxes beside the statements you agree with, and sign and date the bottom of the page. You will be able to retain your own copy of this information and consent form.

☐ I understand that I am taking part in a questionnaire as part of the "digital annotations" project at the University of Edinburgh

☐ I understand the purpose of this research, and that I am able to ask questions about it at any time.

☐ I understand that I am free to withdraw my consent for involvement with this research project at any time.

☐ I am willing for the data I supply in this questionnaire to be used as part of the research.

☐ I understand that anonymised extracts from this questionnaire may appear in publications relevant to this area of research.

☐ I understand that I can, if I want, take part in the questionnaire (phase 1) but choose to not take part in the guided use of digital annotations and interviews (phase 2)

☐ I understand that personal contact information will be required to invite me to phase 2 of the project

☐ If I take part in phase 2 of the project, I am willing for the guidance sessions and interview to be recorded and transcribed for use as part of the research project

☐ I understand that anonymised extracts from the recordings may appear in publications relevant to this area of research

Participant name: _____   date: _____

Researcher name: Ruby Rennie

Moray House School of Education, The University of Edinburgh, Holyrood Road, Edinburgh EH8 8AQ

If you have any queries or concerns, please get in touch with Ruby Rennie at: ruby.rennie@ed.ac.uk

Appendix 2: Consent form for conversations

THE UNIVERSITY *of* EDINBURGH
Moray House School of Education

Digital Multi-Media Annotations for Reading, Understanding and Study of texts

Participant information and consent form – phase 2 of project

This project investigates the use of digital annotations on digital texts and the ways in which readers and writers of these texts make choices about what they write and share. The project takes a critical view of selected current methods for annotating texts. It will consider how and why we make annotations, the purposes we choose for our annotations, and the ways in which texts can be transformed through the use of digital annotations.

The intention of the project is to explore this aspect of digital technology and open up conversations about the new ways we use digital texts. Participants will have the opportunity to learn about some recent developments, and consider the issues related to adopting digital means to explore texts, to study, to build research notes, and to collaborate. The project will involve 2 phases: (1) a questionnaire; (2) interviews alongside guided use of digital annotations. Participants can choose to take part in phase 1 only, or continue and take part also in phase 2 (guided use of digital annotations and interviews).

The following questions aim to ensure that you are aware of my role as researcher, and how the information you share with me in the questionnaire will be used in the research project. Please tick the boxes beside the statements you agree with, and sign and date the bottom of the page. You will be able to retain your own copy of this information and consent form.

- ☐ I understand that I am taking part in research as part of the "digital annotations" project at the University of Edinburgh
- ☐ I understand the purpose of this research, and that I am able to ask questions about it at any time.
- ☐ I understand that I am free to withdraw my consent for involvement with this research project at any time.
- ☐ I am willing for the data I supply to be used as part of the research.
- ☐ I understand that anonymised extracts from the data may appear in publications relevant to this area of research.

☐ I understand that I can, if I want, take part in the questionnaire (phase 1) but choose to not take part in the guided use of digital annotations and interviews (phase 2)

☐ I understand that personal contact information will be required by the researcher to manage phase 2 of the project

☐ I am willing for the guidance sessions and interview to be recorded, video-recorded, and transcribed for use as part of the research project

☐ I understand that anonymised extracts from the recordings may appear in publications relevant to this area of research

Participant name: _____ date: _____

Researcher name: Ruby Rennie

Moray House School of Education,
The University of Edinburgh, Holyrood Road, Edinburgh EH8 8AQ

If you have any queries or concerns, please get in touch with Ruby Rennie at:
ruby.rennie@ed.ac.uk

Appendix 3: Survey

Thank you for agreeing to take part in this survey. Following the results from this survey, you may be contacted to participate in further research, which will involve taking part in a collaborative task and an interview. To do this, we need a way to contact you, and so you will have to provide contact details at the end of the survey (name and email). By providing your contact details you agree that you are willing to be contacted. You may choose to **NOT** provide contact details, in which case your participation will be for this survey only. Please note that your contact details will be used only for this purpose. In addition, there are some demographic questions to help with the analysis of the research data. Your name and contact details will not be linked to this data in the analysis, and all results will be kept anonymous.

This survey should take about 15 minutes to complete.

The full consent details are listed here; if you have any questions about these please contact the researcher by emailing ruby.rennie@ed.ac.uk

Participant information and consent form - phase 1

This project investigates the use of digital annotations on digital texts and the ways in which readers and writers of these texts make choices about what they write and share. The project uses a selection of current methods for annotating texts. It will consider how and why we make annotations, the purposes we choose for our annotations, and the ways in which texts can be transformed through the use of digital annotations.

The intention of the project is to explore this aspect of digital technology and open up conversations about the new ways we use digital texts. Participants will have the opportunity to learn about some recent developments, and consider the issues related to adopting digital means to explore texts, to study, to build research notes, and to collaborate. The project will involve 2 phases: (1) a survey (2) interviews alongside guided use of digital annotations. Participants can choose to take part in phase 1 (this survey) only, or continue and take part also in phase 2 (guided use of digital annotationsand interviews).

The following questions aim to ensure that you are aware of my role as researcher, and how the information you share with me in the questionnaire will be used in the research project. Please note that you do not need to agree to take part in phase 2 to be able to answer the questions in phase 1 (this survey). Further consent will be requested at a future date if you decide to take part in phase 2.

By continuing with this survey, you confirm the following:

- I understand that I am taking part in a questionnaire as part of the "digital annotations" project at the University of Edinburgh

- I understand the purpose of this research, and that I am able to ask questions about itat any time.

- I understand that I am free to withdraw my consent for involvement with this research project at any time.

- I am willing for the data I supply in this survey to be used as part of the research.

- I understand that anonymised extracts from this survey may appear in publicationsrelevant to this area of research.

- I understand that I can, if I want, take part in the survey (phase 1) but choose to nottake part in the guided use of digital annotations and interviews (phase 2)

- I understand that personal contact information will be required to invite me to phase 2of the project, if I choose to do this

digital annotations, notes and ebook survey 2018

Page 1

Thank you for agreeing to take part in this survey. Following the results from this survey, you may be contacted to participate in further research, which will involve taking part in a collaborative task and an interview. To do this, we need a way to contact you, and so you will have to provide contact details at the end of the survey (name and email). By providing your contact details you agree that you are willing to be contacted. You may choose to **NOT** provide contact details, in which case your participation will be for this survey only. Please note that your contact details will be used only for this purpose. In addition, there are some demographic questions to help with the analysis of the research data. Your name and contact details will not be linked to this data in the analysis, and all results will be kept anonymous.

This survey should take about 15 minutes to complete.

The full consent details are listed here; if you have any questions about these please contact the researcher by emailing ruby.rennie@ed.ac.uk

Participant information and consent form - phase 1

This project investigates the use of digital annotations on digital texts and the ways in which readers and writers of these texts make choices about what they write and share. The project uses a selection of current methods for annotating texts. It will consider how and why we make annotations, the purposes we choose for our annotations, and the ways in which texts can be transformed through the use of digital annotations.

The intention of the project is to explore this aspect of digital technology and open up conversations about the new ways we use digital texts. Participants will have the opportunity to learn about some recent developments, and consider the issues related to adopting digital means to explore texts, to study, to build research notes, and to collaborate. The project will involve 2 phases: (1) a survey (2) interviews alongside guided use of digital annotations. Participants can choose to take part in phase 1 (this

survey) only, or continue and take part also in phase 2 (guided use of digital annotations and interviews).

The following questions aim to ensure that you are aware of my role as researcher, and how the information you share with me in the questionnaire will be used in the research project. Please note that you do not need to agree to take part in phase 2 to be able to answer the questions in phase 1 (this survey). Further consent will be requested at a future date if you decide to take part in phase 2.

By continuing with this survey, you confirm the following:

- I understand that I am taking part in a questionnaire as part of the "digital annotations" project at the University of Edinburgh
- I understand the purpose of this research, and that I am able to ask questions about it at any time.
- I understand that I am free to withdraw my consent for involvement with this research project at any time.
- I am willing for the data I supply in this survey to be used as part of the research.
- I understand that anonymised extracts from this survey may appear in publications relevant to this area of research.
- I understand that I can, if I want, take part in the survey (phase 1) but choose to not take part in the guided use of digital annotations and interviews (phase 2)
- I understand that personal contact information will be required to invite me to phase 2 of the project, if I choose to do this

Survey - digital notes and annotations

1. Do you use ebooks/digital books to read for pleasure? Please select those you have used, even if only once (assume "Kindle", "Nook", etc includes specifically the device and also the app on another device): ✳ *Required*

☐ Kindle

☐ Nook

☐ epub (on computer/laptop/iPad/iPhone/Android/smartphone),

☐ iBook

☐ Mobi

☐ Plucker

☐ library ebooks

☐ I have, but I can't remember the format

☐ none - I have never read an ebook

☐ Other

1.a. If you selected Other, please specify:

1.b. Do you consider "reading" to be a hobby or experience that gives you pleasure? This could be fiction or non-fiction, and could be print copy or e-book format *Optional*

☐ yes - I read every day or several times a week for pleasure

☐ yes - I often read for pleasure

☐ yes, although at the moment I have other commitments that make my reading more sporadic (e.g. study, work, family)

☐ not really - I read sometimes but it's not my preferred way to pass time

☐ only on holiday

☐ I don't like reading

☐ Other

1.b.i. If you selected Other, please specify:

2. Do you use ebooks/digital books, digital texts or pdf files (e.g. journal articles downloaded from the library) as part of your study or research process? Please choose "yes" even if you've only done this once

○ yes
○ no (please go to the next question)

2.a. Do you print them out and add handwritten notes?

○ yes - always   ○ yes - sometimes   ○ no - never
○ Other

2.a.i. If you selected Other, please specify:

2.b. Do you make online notes using the ebook site, if it is available? This could include, for example, editing a draft journal article or book for a publisher.

○ yes - always   ○ yes - sometimes   ○ no - never
○ Other

2.b.i. If you selected Other, please specify:

2.c. Do you store the texts/files digitally? This could be (for example) a copy on your computer, or using a library file storage system such as Mendeley

⊞ More info

○ yes - always   ○ yes - sometimes   ○ no - never
○ Other

2.c.i. If you selected Other, please specify:

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2.d. Do you store the texts/files digitally and add digital annotations/notes/highlights?
✱ *Required*

⊞ More info

○ yes - always

○ yes - sometimes

○ no - never

○ Other

2.d.i. If you selected Other, please specify:

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3. Do you have a touch-screen laptop or tablet device (e.g. iPad or android tablet)?
Tick all that apply

☐ yes - I have an iPad

☐ yes - I have an Android tablet

☐ yes - I have a touch-screen laptop

☐ yes - I use my Smart phone for reading digital texts/files

☐ no

☐ Other

3.a. If you selected Other, please specify:

3.b. Do you use this for reading ...

☐ ebooks/digital books

☐ pdf documents

☐ Other

3.b.i. If you selected Other, please specify:

4. Which best describes the way you like to make notes during a **lecture or conference presentation** (where you have little interaction with the presenter)? *

Required

Please don't select more than 1 answer(s) per row.

Please select between 1 and 13 answers.

	my preferred choice / I always try to do this	I sometimes do this if another method is not possible	I would never choose to do this
On blank paper (hard copy, using pen or pencil) or paper notebook	☐	☐	☐
Typing on my laptop / tablet (using a blank document or notes app)	☐	☐	☐
On a print-out (paper copy) of lecture notes (e.g. powerpoint)	☐	☐	☐
On a digital/computer copy of lecture notes – typing notes (using laptop or tablet)	☐	☐	☐
On a digital/computer copy of lecture notes (e.g. powerpoint) using a stylus to handwrite notes	☐	☐	☐
Audio record the lecture and handwrite hard copy notes later	☐	☐	☐
Audio record the lecture and type digital notes later	☐	☐	☐
Audio record and write (using a stylus) digital notes later	☐	☐	☐
Take a photo of the screen / powerpoint slide	☐	☐	☐
Use an outline lecture format on paper (e.g. Cornell notes) to make notes during the presentation	☐	☐	☐

Type notes to an outline lecture format on computer / laptop / tablet	☐	☐	☐
Handwrite digital notes (using a stylus) to an outline lecture format on computer / laptop / tablet	☐	☐	☐
I like using different ways, depending on the lecture/presentation	☐	☐	☐
I don't make notes	☐	☐	☐
I have never attended a conference, lecture or presentation	☐	☐	☐

5. Are there other ways you like to make digital notes? *Optional*

6. Which best describes the way you like to make notes during a **meeting, seminar or workshop** (where it's expected that people attending will participate and share ideas)?

Please don't select more than 1 answer(s) per row.

Please select between 1 and 13 answers.

	my preferred choice / I would always try to do this	I sometimes do this if another method is not possible	I would never choose to do this
On blank paper (hard copy, using pen or pencil) or paper notebook	☐	☐	☐
Typing on my laptop / tablet (using a blank document or notes app)	☐	☐	☐
On a print-out (paper copy) of notes (e.g. powerpoint, or other notes prepared in advance)	☐	☐	☐
On a digital copy of notes – typing notes (using laptop or tablet)	☐	☐	☐
On a digital copy of notes (e.g. powerpoint) using a stylus to handwrite notes	☐	☐	☐
Audio record and handwrite hard copy notes later	☐	☐	☐
Audio record and type digital notes later	☐	☐	☐
Audio record and write (using a stylus) digital notes later	☐	☐	☐
Add notes to an outline/ agenda on paper (e.g. Cornell notes)	☐	☐	☐
Type notes to an outline on computer / laptop / tablet	☐	☐	☐
Handwrite digital notes (using a stylus) to an outline on computer / laptop / tablet	☐	☐	☐

I like using different ways, depending on the meeting/seminar	☐	☐	☐
I don't make notes	☐	☐	☐

7. Are there other ways you like to make digital notes? *Optional*

8. What best describes your attitude to reading digital texts (e.g. ebooks, epub and/or pdf files) – tick all that apply:

□ I don't see much difference between ebooks and paper/hard-copy books
□ I prefer reading paper books for pleasure but don't mind digital texts for study
□ I like both hard copy and digital texts
□ I prefer to read everything in print / hard copy
□ I like using digital texts of any kind
□ I like reading ebooks
□ Ebooks are useful as I can read them anywhere
□ Pdf files are useful for study
□ Other

8.a. If you selected Other, please specify:

9. When you find a text difficult to read, do you note questions/comments to find out about the difficulty later, or to remind you in some way? (tick all that apply)

□ I write questions/notes/reminders on a separate piece of paper
□ I don't like writing on my paper copy
□ I write questions on the paper if I'm reading a paper copy
□ I write questions on paper if I'm reading a digital copy
□ I like to write digital notes on a digital copy
□ I highlight the difficult part to find out more later
□ If it's a digital copy, I use a digital highlighter to note the difficult part
□ If it's a digital copy, I write a digital note
□ I don't ever write down questions or comments

□ Other

9.a. If you selected Other, please specify:

10. Do you share your notes with others (e.g. classmates or colleagues)? Please tick all the options you have done, even if only once.

☐ yes - we talk face to face, using notes to remember

☐ yes - a photocopy of handwritten notes

☐ yes - I email electronic notes

☐ yes - we share electronic notes on a shared drive (e.g. google drive; OneDrive; Sharepoint)

☐ yes - we use sharing on an app (e.g. Mendeley)

☐ I never share my notes

☐ [other]

10.a. If you selected Other, please specify:

10.b. Why would you choose to **not** share notes?

☐ I don't think anyone could read my handwriting

☐ My notes won't be any help to anyone else

☐ I don't think my notes will be very good

☐ My notes are usually very personal

☐ I don't want to share my notes as everyone should do their own

☐ I've never thought about sharing my notes

☐ That's not the purpose of my notes

☐ Other

10.b.i. If you selected Other, please specify:

11. Would you like to see notes that others have made (e.g. after a lecture, conference presentation, seminar, meeting)?

- ○ yes - and this often happens
- ○ yes - I would really like this
- ○ yes - it would be interesting to see
- ○ yes, but I'm not bothered if I can't
- ○ I don't want to see someone else's notes
- ○ Other

11.a. If you selected Other, please specify:

[   ]

12. Do you have any questions/comments about how to make digital notes, and the ways digital notes and annotations could be used? (optional):

[   ]

13. Do you use special fonts, colours, or other means to support your reading of digital

texts (e.g. you may have dyslexia)? Please give any comments about these and how they work for you.

[   ]

11. Would you like to see notes that others have made (e.g. after a lecture, conference presentation, seminar, meeting)?

- ○ yes - and this often happens
- ○ yes - I would really like this
- ○ yes - it would be interesting to see
- ○ yes, but I'm not bothered if I can't
- ○ I don't want to see someone else's notes
- ○ Other

11.a. If you selected Other, please specify:

12. Do you have any questions/comments about how to make digital notes, and the ways digital notes and annotations could be used? (optional):

13. Do you use special fonts, colours, or other means to support your reading of digital

texts (e.g. you may have dyslexia)? Please give any comments about these and how they work for you.

Demographic details

The questions here are intended to make sense of the data you have given, and to confirm that the data has included a range of participants. All questions in this section are optional. The answers in this section will not be used to identify any participants and will not be linked to contact details, should you choose to provide them.

14. What is your current employment and study status? You can choose more than one answer *Optional*

☐ I am currently / just finished studying at undergraduate level

☐ I am currently / just finished studying at postgraduate (e.g. PGDE / Master's / PhD) level

☐ I work part time as an employee

☐ I work full-time as an employee

☐ I am self-employed / run my own business

☐ I am a member of academic staff in a university/college

☐ I am unemployed

☐ Other

14.a. If you selected Other, please specify:

15. What is your highest level of education (including current status)?

○ Master's or PhD/Doctoral level

○ Undergraduate degree plus post-graduate diploma

○ Undergraduate degree

○ A-level / Higher / Baccalaureate

○ Other

15.a. If you selected Other, please specify:

Further research - phase 2

The next phase of this research will involve reading some digital texts, and making notes, annotations, and highlights on the texts (in different ways). You will also be asked to comment on your notes, as part of an interview. It is expected that this will involve:

- about half an hour of training/support in using some methods of digital annotations
- about half an hour of a follow-up interview after you have made some digital annotations

If you are interested in more information about participating further, please leave your contact details. Please note that your details will be used only for the purpose of contacting you, and you are under no obligation to continue even if contacted.

16. Would you be interested in taking part in phase 2 of the research? Note that this is not a commitment and you can leave the study at any time. *Required

- ○ yes
- ○ no
- ○ Other

16.a. If you selected Other, please specify:

17. name: Optional

17.a. email:

Please enter a valid email address.

Appendix 4: Questions in the survey

This table shows the list of questions in the survey

1. Do you use ebooks/digital books to read for pleasure? Please select those you have used, even if only once (assume "Kindle", "Nook", etc includes specifically the device and also the app on another device):

    1.a. If you selected Other, please specify:

    1.b. Do you consider "reading" to be a hobby or experience that gives you pleasure? This could be fiction or non-fiction, and could be print copy or e-book format

    1.b.i. If you selected Other, please specify:

2. Do you use ebooks/digital books, digital texts or pdf files (e.g. journal articles downloaded from the library) as part of your study or research process? Please choose "yes" even if you've only done this once

    2.a. Do you print them out and add handwritten notes?

    2.a.i. If you selected Other, please specify:

    2.b. Do you make online notes using the ebook site, if it is available? This could include, for example, editing a draft journal article or book for a publisher.

    2.b.i. If you selected Other, please specify:

    2.c. Do you store the texts/files digitally? This could be (for example) a copy on your computer, or using a library file storage system such as Mendeley

    2.c.i. If you selected Other, please specify:

    2.d. Do you store the texts/files digitally and add digital annotations/notes/highlights?

    2.d.i. If you selected Other, please specify:

3. Do you have a touch-screen laptop or tablet device (e.g. iPad or android tablet)? Tick all that apply

    3.a. If you selected Other, please specify:

    3.b. Do you use this for reading ...

    3.b.i. If you selected Other, please specify:

4. Which best describes the way you like to make notes during a lecture or conference presentation (where you have little interaction with the presenter)?

    4.1. On blank paper (hard copy, using pen or pencil) or paper notebook

    4.2. Typing on my laptop / tablet (using a blank document or notes app)

    4.3. On a print-out (paper copy) of lecture notes (e.g. PowerPoint)

    4.4. On a digital/computer copy of lecture notes – typing notes (using laptop or tablet)

    4.5. On a digital/computer copy of lecture notes (e.g. PowerPoint) using a stylus to handwrite notes

    4.6. Audio record the lecture and handwrite hard copy notes later

4.7. Audio record the lecture and type digital notes later

4.8. Audio record and write (using a stylus) digital notes later

4.9. Take a photo of the screen / PowerPoint slide

4.10. Use an outline lecture format on paper (e.g. Cornell notes) to make notes during the presentation

4.11. Type notes to an outline lecture format on computer / laptop / tablet

4.12. Handwrite digital notes (using a stylus) to an outline lecture format on computer / laptop / tablet

4.13. I like using different ways, depending on the lecture/presentation

4.14. I don't make notes

4.15. I have never attended a conference, lecture or presentation

5. Are there other ways you like to make digital notes?

6. Which best describes the way you like to make notes during a meeting, seminar or workshop (where it's expected that people attending will participate and share ideas)?

6.1. On blank paper (hard copy, using pen or pencil) or paper notebook

6.2. Typing on my laptop / tablet (using a blank document or notes app)

6.3. On a print-out (paper copy) of notes (e.g. PowerPoint, or other notes prepared in advance)

6.4. On a digital copy of notes – typing notes (using laptop or tablet)

6.5. On a digital copy of notes (e.g. PowerPoint) using a stylus to handwrite notes

6.6. Audio record and handwrite hard copy notes later

6.7. Audio record and type digital notes later

6.8. Audio record and write (using a stylus) digital notes later

6.9. Add notes to an outline/ agenda on paper (e.g. Cornell notes)

6.10. Type notes to an outline on computer / laptop / tablet

6.11. Handwrite digital notes (using a stylus) to an outline on computer / laptop / tablet

6.12. I like using different ways, depending on the meeting/seminar

6.13. I don't make notes

7. Are there other ways you like to make digital notes?

8. What best describes your attitude to reading digital texts (e.g. ebooks, epub and/or pdf files) – tick all that apply:

8.a. If you selected Other, please specify:

9. When you find a text difficult to read, do you note questions/comments to find out about the difficulty later, or to remind you in some way? (tick all that apply)

9.a. If you selected Other, please specify:

10. Do you share your notes with others (e.g. classmates or colleagues)? Please tick all the options you have done, even if only once.

10.a. If you selected Other, please specify:

10.b. Why would you choose to not share notes?

10.b.i. If you selected Other, please specify:

11. Would you like to see notes that others have made (e.g. after a lecture, conference presentation, seminar, meeting)?

11.a. If you selected Other, please specify:

12. Do you have any questions/comments about how to make digital notes, and the ways digital notes and annotations could be used? (optional):

13. Do you use special fonts, colours, or other means to support your reading of digital texts (e.g. you may have dyslexia)? Please give any comments about these and how they work for you.

14. What is your current employment and study status? You can choose more than one answer

14.a. If you selected Other, please specify:

15. What is your highest level of education (including current status)?

15.a. If you selected Other, please specify:

16. Would you be interested in taking part in phase 2 of the research? Note that this is not a commitment and you can leave the study at any time.

16.a. If you selected Other, please specify:

17. name:

17.a. email:

Appendix 5: Extra comments in the survey

1.a. Do you use ebooks/digital books to read for pleasure?

- WPS, which is an app similar to Microsoft word, but it has the function of reading on mobile devices.
- using iPad to read journals in the Markup App
- free pdf novels on internet

3. Do you have a touch-screen laptop or tablet device

- Lenovo yoga 710, a touch-screen laptop
- Surface pro

3.b. Do you use this for reading ...

- Comics
- I don't use it for reading *(note: this was in reference to "do you use a smart phone for reading?")*

5. Are there other ways you like to make digital notes (notes during a lecture or conference presentation)

- I use the echo 3 smart pen to regarded the lectures and make a digital copy of my notes later
- I used to noting with handwringing, but it could be inefficient when there are many content on the slide and you can't write down everything in time, so it's a good idea to make notes just on the slide. But there is disadvantage for digital note taking that is I could've lost thoughts or missed lecturer's speech while typing.
- I sometimes do a bit of cut and pasting from ebooks or journal articles - i.e. I select a sentence or two to copy and paste onto a blank document, which I later use as a direct citation or paraphrase, or simply keep on my document to remind me of the exact wording, while I formulate my discussion around it. Then I delete it.
- I use a Bamboo Slate to digitise my handwritten notes: https://www.wacom.com/en-es/products/smartpads/bamboo-slate
- The truth is that for me digital notes are difficult... I only use them when correcting my essays adding comments, but when taking notes I prefer to use pencil and paper.
- sometimes I take a picture of a PowerPoint presentation on my phone during a lecture/conference/presentation when i don't have a digital copy of the lecture
- I only take digital notes when i do research / read for class, not in the lectures.
- no

7. Are there other ways you like to make digital notes (during a meeting, seminar or workshop)?

- Actually I don't take a lot of notes during seminars.
- https://www.wacom.com/en-es/products/smartpads/bamboo-slate

8. What best describes your attitude to reading digital texts

- I prefer taking handwritten notes, but I don't mind reading digital texts
- I like both for different reasons - i prefer print (I read faster and you can be more creative with your notes, like draw etc) but digital is just easier to search, revisit and more environmentally friendly. i like ebooks for pleasure, uni ebooks are annoying - limited notes options and you can't always access them (internet connection etc)

10. Do you share your notes with others (e.g. classmates or colleagues)?

- Sometimes classmates will take pictures of my notes on their smartphones.
- we share pictures of our notes and comment them

10.b. Why would you choose to not share notes?

- i don't belong to a study group or have friends who wanted my notes. once we were required to prep notes for classmates and i did it digitally, but they weren't really mine...my style of notes, they were more logical and organised so people could follow me. it took forever to prepare so i guess my regular notes are just for me

12. Do you have any questions/comments about how to make digital notes, and the ways digital notes and annotations could be used? (optional):
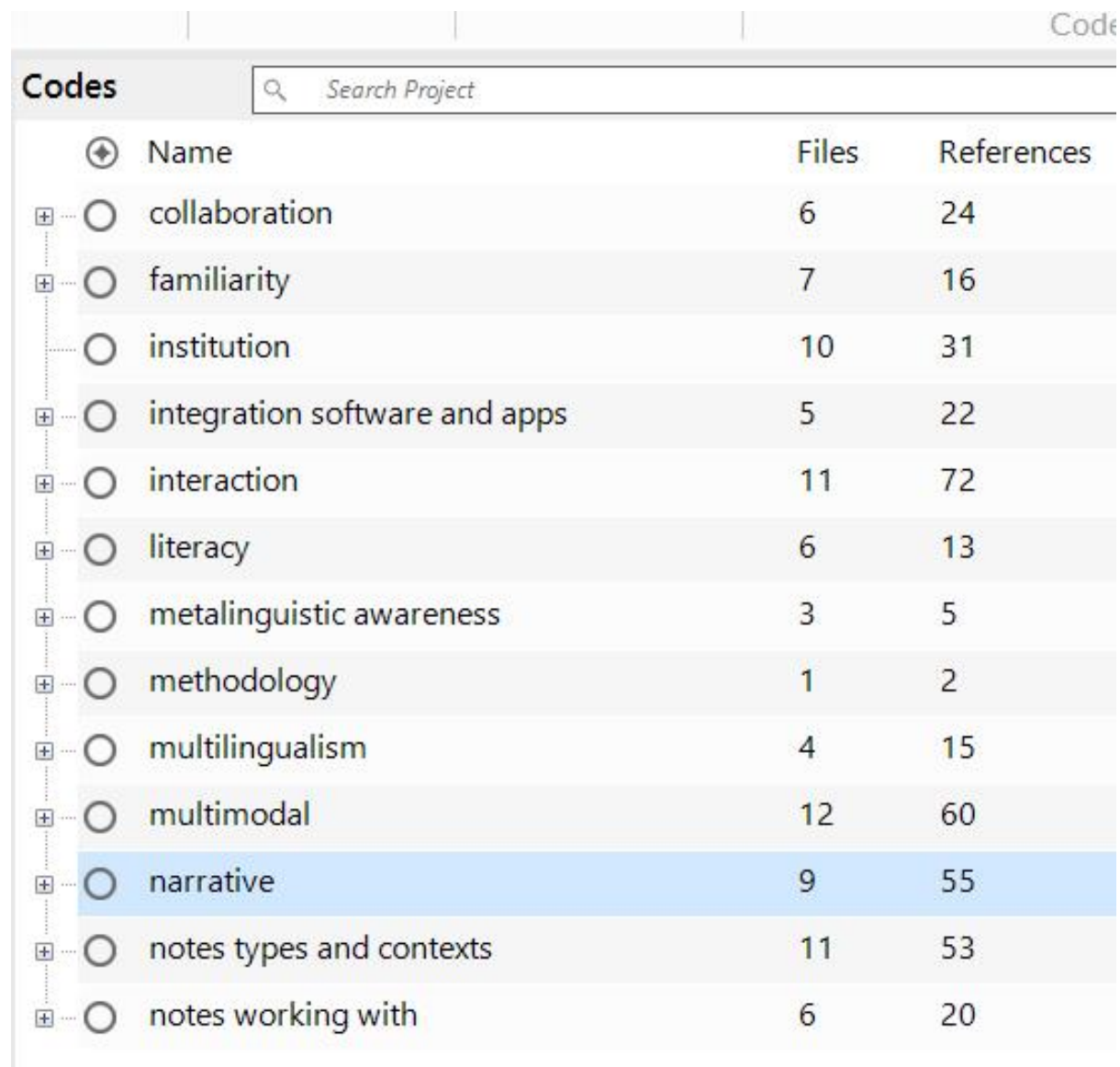
- Voice recording could always be useful because I always miss some important parts in lecture due to slow typing or handwriting.
- If more tablets had stylus capabilities I would handwrite my notes on digital formats (e.g word documents, pdfs, lecture notes)
- I'm still looking for the right tools for this. I prefer to use my laptop but this is much easier if you are sitting at a table. Small devices or pen & paper are better if you have nothing to lean on.
- To be honest I don't know how to make digital notes in a pdf. For me digital notes are writing in a work document

13. Do you use special fonts, colours, or other means to support your reading of digital texts

- I usually color the keywords that can remind me of the general idea of the paragraph, so that I don't have to scan the text again to get the meaning.
- I also have an Audible account and read books this why wherever possible. If reading for study I also add notes to these

Appendix 6: NVivo codes

Screenshot of coding in nVivo used to analyse the data

Name	Files	References
collaboration	6	24
familiarity	7	16
institution	10	31
integration software and apps	5	22
interaction	11	72
literacy	6	13
metalinguistic awareness	3	5
methodology	1	2
multilingualism	4	15
multimodal	12	60
narrative	9	55
notes types and contexts	11	53
notes working with	6	20

Appendix 7: Interviews / conversation schedule

Participants in the conversations met with the researcher on two occasions during October 2018. One participant met in person, and for the second conversation used Skype (as she had moved to a different country but wanted to continue as a participant in the study). Conversations were record in situ (permission given by participants) and uploaded onto a OneNote folder that participants could access, so that they could (if wanted) access their own recordings (but not those of other participants). This OneNote class document was also used to provide notes about the apps to the participants with sections for them to be able to try out uses for OneNote.

Conversation 1:

Participants were introduced to the apps/software being used in the study (Mendeley and OneNote) and asked to comment on these and also other apps they were using for digital annotations. The conversations were constructed as semi-structured interviews, with questions that were used as prompts but modified as the conversations took place.

Questions:

1. Do you remember taking part in the online questionnaire? Do you have any comments about that?
2. Tell me about the ways you make notes or add annotations.
3. Tell me about a time digital notes or annotations worked well for you / not so well for you
4. (Using OneNote / Mendeley) What sorts of things might you find this useful for?
5. Tell me about other ways you make digital notes or annotations
6. Do you ever share your notes or annotations with others? Why (not)?
7. Have you found any ways you wish digital notes or annotations could work better?
8. Which language do you use when you make notes or annotations?

At the conclusion of this conversation, participants were asked if they could try using digital annotation apps (either the ones introduced, or others) and return for a second conversation.

Conversation 2:

Similar questions were used as prompts for conversation 2:

1. Did you use OneNote / Mendeley?
2. Tell me about the ways you made notes or add annotations.
3. What worked well for you?
4. Tell me about other ways you make digital notes or annotations
5. Have you found any ways you wish digital notes or annotations could work better?

Appendix 8: Screenshots of the OneNote class notebook for use by participants and Mendeley highlight and annotation

Highlighted text and annotation in Mendeley:

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s understand students' written texts as intertextual responses to pedagogical and institutional practices
ously are articulated from, and (re)articulate, social discourses.
unding the central role of appropriation in human learning, the sociocultural framework adopted here
dominant authorial ideology (and by implication, the notion of textual plagiarism) that rests upon the
nership of language and ideas, and challenges the belief that authorship is individual and original. It also
ention to the dilemma for student writers. On the one hand, they need to appropriate from others in order
e; on the other, they must put the words and ideas they borrow into their own words to avoid accusations
raud. The challenge becomes more pronounced for international students writing in another language,
t yet have access to "words of their own" in that language.

GENERAL NOTES   B I U

PRIVATE ANNOTATIONS

Ruby Rennie Panter   Just now

dilemma for students - authorship and
plagiarism