THE SOCIAL CONSTRUCTION OF KNOWLEDGE IN HEALTHCARE STUDENTS' ELECTRONIC PORTFOLIOS

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Copyright statement

Abstract

This thesis set out to describe how electronic portfolios support the social construction of knowledge by healthcare students. It will do this by drawing on the various forms and functions of the students' electronic portfolios', their associated socially constructive processes and artefacts, and healthcare students' views on how electronic portfolios are used on their courses. These factors are also considered alongside the impact of the socio-historical and socio-technical developments of electronic portfolios and healthcare course requirements.

A broad grounded theory approach was used to generate substantive theory grounded in data gathered from a sample of UK and North American students (n=82). Data was gathered through an analysis of electronic portfolios (n=25), an online questionnaire (n=52), and in-depth interviews with students (n=16).

The research found a limited number of socially constructive processes and artefacts that are used within healthcare courses. These processes and artefacts supported the social construction of knowledge within the students' electronic portfolios.
Even though healthcare students were not at ease with the limitations of their electronic portfolios they found that the pedagogical use of the electronic portfolio defined the range and extent of the learning they were required to demonstrate.
A range of factors, internal and external to the electronic portfolio, determined the use of the electronic portfolios. This included the student's confidence with using technology, the requirements of the professional bodies and the healthcare courses that incorporated them, and the skills of academics in using the electronic portfolios.
The students found the electronic portfolios format allowed them to use a wider range of digital artefacts (i.e. images, video and audio) that were not available in paper portfolios. They also thought the integration of the Internet into their electronic portfolios meant that their portfolio was safe in a digital cloud based repository.
The research found that despite the widespread use of Web 2.0 by most of the students in their personal lives, this was not incorporated into students' electronic portfolios. This appears to be because of the lack of Web 2.0 functionality in the electronic portfolio software, and the lack of Web 2.0 knowledge in those implementing the electronic portfolios in the healthcare courses.
This impact of limited processes and artefacts, and failure to use the potential of the Internet and Web 2.0 has a negative impact on the students' abilities to socially construct their knowledge within electronic portfolios.

Recommendations are made that future research identifies additional developments in software and hardware that can increase the socially constructive processes and artefacts that are incorporated into electronic portfolios. These developments must be done by consulting student users, software developers, educational technicians and academics. Finally, recommendations are made that the theory generated in the research is applied to larger samples across a wider range of healthcare student professions. The ongoing research will ensure that the theory continues to respond to ongoing hardware and software developments within the socio-historical and socio-technical student environment.

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Chapter 1: Introduction

1.1 Background to the study

Since the use of electronic portfolios began to increase from the mid-1990's, they have developed to incorporate a variety of functions that can be applied across a range of personal and professional settings (Ahmed & Ward, 2016a; Amaya, Agudo, Sánchez, Rico, & Hernández-Linares, 2013). It is suggested that reasons for electronic portfolios success are because of their ability to incorporate electronic artefacts that can be created to reflect the increasingly 'digital world' (Gao, Coldwell-Neilson, & Goscinski, 2014). Add to this the potential of the Internet and Web 2.0 to collaborate with others and share artefacts, the possibilities of electronic portfolios offer additional opportunities when compared to their paper counterparts.

One area where the uptake of electronic portfolios seems to be greater is within education, where they have supplemented traditional methods of assessment, reflection, feedback, and personal development (Gao et al., 2014; Guder, 2013; Mohammed, Mohssine, M'hammed, Mohammed, & Abdelouahed, 2015; Tzeng, Kuo, Talley, Chen, & Wang, 2015). Educational electronic portfolios allow students to include electronic artefacts, scaffolding their learning, share their learning more easily with others, provide an environment that students engage with, and support reflection, assessment and personal development planning (Birks, Hartin, Woods, Emmanuel, &

Hitchins, 2016; Chen, Yang, & Huang, 2015; Dominguez, Morales, & Tarkovska, 2014; Gallagher, Thompson, & Hughes, 2015; Green, Wyllie, & Jackson, 2014; Oakley, Pegrum, & Johnston, 2013; Vernazza et al., 2011).

In my experience as a healthcare academic, I have seen some trends in students and fellow academics. Despite the advantages discussed above, it appears that students have maintained a broadly negative view of electronic portfolios. Added to this academics also suggest that electronic portfolios had a limited capacity as an educational tool. This appears to be supported by the Centre for Learning and Performance Technologies who do not list any of the most popular electronic portfolio platforms in its 'top100' educational tools (Hart, 2017). Literature also suggests more broadly, concerning e-learning of which electronic portfolios are one tool, there is an observable resistance by staff and students (Lichy, Khvatova, & Pon, 2014; Petit dit Dariel, Wharrad, & Windle, 2013).

While I had also noticed resistance from students when paper portfolios were introduced, the 'electronic' nature of these portfolios seems to bring some additional issues. While the format of paper portfolios may have been easier because it was a medium that students were more comfortable with, my initial thoughts were that perhaps it was the 'electronic' aspect that was troubling students? There was also a suggestion that electronic portfolios are not based on sound pedagogical principles (Watty & McKay, 2016) so if

students did not know why they were being used this could also explain the resistance?

I also noted that the nature of healthcare education itself might bring inherent difficulties to the implementation of electronic portfolios. Professional bodies, the academics and practice staff will all have an input into developing the students as ‘knowledgeable doers'. This means that the electronic portfolios have a specific and narrow focus that could potentially result in less diverse uses within healthcare education?

Perhaps the general resistance to electronic portfolios, the lack of a sound pedagogical approach and the narrow scope of the electronic portfolios in healthcare education means they may not be implemented effectively.

Despite these observations regarding the potential of electronic portfolios and student views, these areas have recieved limited attention and have therefore left me with several questions as I consider the future of electronic portfolios as an educational tool. All these observations prompted me to investigate the impact of electronic portfolios in healthcare education on student learning.

1.2 Purpose of the study

The purpose of the thesis is to generate a theory, grounded in data, that will describe the use of electronic portfolios within one pedagogic approach namely the social construction of knowledge. It will do this by showing the socially constructive processes and artefacts found in healthcare students' electronic portfolios. The study will also examine students' attitudes to the use of electronic portfolios in their healthcare courses again with the social construction of knowledge.

The theory that is generated will offer academics, software developers, professional bodies, and the students themselves an insight into how electronic portfolios could be more efficient as a tool in healthcare education. The thesis aims to explain how the form and function of electronic portfolios can improve learning, and what additional socially constructive processes and artefacts electronic portfolios could utilise.

However, if students find few benefits and the electronic portfolios are limited in supporting the social construction of knowledge, the recommendations for the use of electronic portfolios in healthcare education must be re-evaluated.

1.3 Research aim and questions

The thesis investigates how electronic portfolios support the social construction of knowledge by healthcare students to generate a theory, grounded in the data they produce. It purposely focuses on one pedagogy, the social construction of knowledge, which has grown in popularity in many educational settings (Zhao & Chan, 2014). It will generate the theory through answering the following questions:

1. What is the form and function of the electronic portfolios used in healthcare education in relation to the social construction of knowledge?

2. What are the associated processes and artefacts of the social construction of knowledge in healthcare courses?

3. What do healthcare students think about the use of electronic portfolios in their courses, as they socially construct knowledge?

1.4 Approach of the thesis

The following section begins by summarising the broad grounded methodology and socially constructive ontological and epistemological basis used within the thesis. It then moves on to define the socio-historical and socio-technical context that has impacted on the student and the electronic portfolio. The section finishes by outlining the general forms and functions of the electronic portfolio. All these areas are built on within the remainder of the thesis.

1.4.1 Methodology

This thesis will use a 'broad' grounded theory methodology that will generate codes, categories and themes until no more are found, and the theory becomes 'saturated'. This will answer the aim and questions set out above. The broad grounded theory methodology will identify the processes and artefacts that support the social construction of knowledge alongside the people that contribute to the student's socially constructed knowledge. Although grounded theory discourages methods that might stifle the generation of theory (Berger & Luckmann, 1966), this thesis adopted, pragmatically, a socially constructive epistemology and ontology (discussed below) from the outset. It also deviated from 'pure' grounded theory by including an initial literature review, and using an online questionnaire to help find a sample and add qualitative data to the data.

The challenges these deviations from 'pure' grounded theory brought to the research, and how they were addressed, are discussed fully in Chapter 3. At this point however it is important to state that the broad grounded theory that evolved was able to produce a theory that was grounded in the data. This theory that was produced explains how the healthcare students used electronic portfolios to socially construct learning on their courses and was able to explore students' views on portfolio use. Both the socially constructive epistemology and ontology and the literature review, therefore, helped shape the methods and data analysis in this thesis.

1.4.2 Socially constructive ontology and epistemology

As the thesis is based on the belief that knowledge is socially constructed investigating alternative epistemologies and ontologies has limited use. In accepting this, it is acknowledged that while other interpretations of how students gain and apply knowledge are possible (e.g. behaviourism, or cognitivism), this thesis simply focusses on social construction. Indeed, it is also acknowledged that no ontological and epistemological theory can be said to offer a true picture but instead offers different ways of examining the way we understand the world and knowledge of that world.

Two important but linked criticisms of socially constructive approaches need to be considered. The first comes from the realist ontology that argues that if social construction is just based on an interpretation by individuals acting

in a social group (Cromby & Nightingale, 1999), how do we know that it is the actual reality? In this instance, how can we be sure that the students will be describing the reality of how electronic portfolios are used? Is just their interpretation or a full social interpretation?

The second concern is that by not focussing on the individual, but on the views of the group, social constructionism can ignore the place of personal choice and 'free will' (North, 2016). How can we differentiate between a student making a choice that is the result of social interaction or as a personal choice?

Because of these challenges, it is necessary to be clear that this thesis aims to generate a theory of how students construct knowledge in the 'social' context of healthcare education with electronic portfolios. The theory that emerges will be based on a collective understanding of how the students describe the use of electronic portfolios in their learning. So, while there may be individual variations in understanding the use of electronic portfolios, it will be necessary to take a step back and find the overarching themes. Chapter 2, the literature review will build on this assumption by describing the ways that we can show how knowledge is socially constructed through it being objectified, institutionalised and legitimised. These ways are achieved through social interactions, negotiations, and collaborations (Berger & Luckmann, 1966; Crane, 2012; Palincsar, 1998). At this point it is helpful to understand the key points of this definition so: objectification is the creation

of objects or artefacts through social processes; institutionalisation as the repeated actions and habits of individuals that lead to the embedding of knowledge; and legitimisation, as the ways in which the world is "explained and justified" (Berger & Luckmann, 1966).

One final point to address at this stage is to differentiate social constructivism from social constructionism. Although some authors use the term interchangeably, it should be emphasised that social constructivism refers to how the individual student learns in a social context, whereas social constructionism, as used in this thesis, is described as how a group of students develop knowledge (Andrews, 2012). This thesis, therefore, acknowledges the development of knowledge by the individual in a social context (constructivism) but explores the social construction of knowledge from the perspective of students as a group.

Having acknowledged these points, the following summarises the epistemological and ontological approach of this thesis and the research it describes.

1.4.2.1 Epistemology

Epistemologically, social construction proposes that the nature of knowledge is constructed, based on beliefs and processes that are derived, and supported, by processes of social interactions, negotiation, and collaboration (Berger & Luckmann, 1966; Crane, 2012; Palincsar, 1998). The resulting

social construct or construction, therefore, has a shared meaning within a society and will govern how that society understands or interacts with the social construct. Epistemologically social constructionist research aims to understand the ways in which individuals and groups, build that meaning and how that meaning is used or institutionalised in a social world.

Applying this epistemology to this thesis allows us to understand electronic portfolios through the processes of social interactions. Indeed, Cambridge (2010) suggests that to understand electronic portfolios requires us to understand the 'social networks' in which people use electronic portfolios, and how the users of electronic portfolios act within their community. In healthcare education, these social networks include Professional Bodies academics and practice staff, but literature is unclear if this the case in electronic portfolios.

1.4.2.2 Ontology

Ontology, or what and how objects are known to exist, is relativist and anti-realist in social constructionism. This means that knowledge is not seen as a direct perception of reality but is instead, a result of the subjective interpretation of individuals within society (Andrews, 2012). Rossi and Singh (2007) expand on this by referring to knowledge as 'contextualised knowledge' so, for students, knowledge is developed through discussions,

arguments, and questioning in social interactions. Within this thesis, the socially constructive ontology will be used to understand how the students, as a social group, interpret the use of electronic portfolios in their learning.

1.4.3 Socio-historical and socio-technical context

Up to this point, the conceptual framework has discussed the theoretical underpinnings of the research approach. What follows is a discussion of how socio-historical and socio-technical developments have influenced the development, adoption, and the various forms and functions of electronic portfolios in healthcare education. The literature will summarise the 'digitisation' of society and the place of the Internet and Web 2.0 within the context of this digitisation. Reference will be made to the location of students in this digital society and how this might affect the use of electronic portfolios. Chapter 2, the literature review, will discuss these aspects in more detail.

1.4.3.1 The digitisation of society

The influence that technology has on our social relationships, the economy, communication, media, and the way we access knowledge and information are extensive. Since the introduction of personal computers, in the mid-1980's, we have seen the widespread adoption of computers, tablets, smartphones and the Internet throughout society in the developed world. For example, Ofcom (2016) suggests that within the United Kingdom (UK), over 80% of adults are now using the Internet. Within 30 years information and communication technologies can be seen to have been assimilated into

mainstream society, leading to the use of phrases such as the 'digital society', the 'networked society' or the belief that we are living in the 'computer age' (Loveless & Williamson, 2013). Lupton (2014) goes on to suggest that to understand identities in the context of the digital society, and our interactions with the digital society, we must also consider the technology we use to do this. So, for the students in this study, we need to consider their interactions with others and the electronic portfolios they use.

1.4.3.2 The internet

It is argued here that the biggest impact on the digitisation of society and the development of information and communication technologies has been through the incorporation of the Internet. So much so that we now expect to access the Internet wherever and whenever we want. Both the demand for and capabilities of the Internet has resulted in the development of various technologies such as smartphones which, by 2016, accounted for 16% of the total Internet activities in the UK (Ofcom, 2016). It is even suggested that smartphones and tablet devices will eventually replace computers and laptops as the main way people access the Internet.

This will undoubtedly have an impact on the way society access information. For the students in this thesis the use and views of the Internet, which host many forms of electronic portfolios, could be closely linked to their views on

electronic portfolios. It may, for example, be possible to link negative experiences of using the Internet to negative uses of electronic portfolios?

1.4.3.3 Web 2.0

Web 2.0, as the name suggests is an evolution of the Internet, and has become synonymous with technologies that allow individuals to interact with each other instead of simply accessing information (Andersen, 2007; Belk, 2013; Conole & Alevizou, 2010).

The effect that Web 2.0 is having in society cannot be underestimated and, as Rudd et al. (2006) says the networks it creates are a "perfect example of the social, economic, and technological changes of the last 30 years" (p.4). Many believe that this is now a fundamental way in which society is organised and how we understand the world (Rudd, Sutch, & Facer, 2006)

The impact of Web 2.0 in education is also significant and alongside changes in learning styles, increasing access to digital media and digital devices means that students are now accessing a range of Web 2.0 tools for professional as well as personal reasons (Rogers-Estable 2014). Haji et. al. (2013) adds that "social media [Web 2.0] is likely to provide interactive tools to enhance the quality of e-learning environment, where individuals socially interact in the Internet". Web 2.0 technologies also have the potential to extend learning interactions beyond geographical limitations (Hamburg, Engert, & ten Thij, 2007) and allow students to use alternative

forms of communications. This means that students have the potential to create and share artefacts in ways that traditional paper-based electronic portfolios methods cannot.

Web 2.0 which can exist as blogs, wikis, social networks, video sharing, slide sharing and data ‘mash-ups' can be incorporated into a wide range of educational activities (Song & Lee, 2014). Rogers-Estable (2014) suggests that the Web 2.0 tools most commonly used in higher education are: ‘YouTube’ an online video repository; instant messaging and chat for communication between staff and students; RSS feeds, to gather information on specific subjects; podcasts, to record and distribute learning; blogs to discuss and disseminate information in a journal approach; and the use of online grading, quiz and examination tools; and external social media tools such as ‘Facebook’ and ‘Twitter’.

1.4.3.4 Digital divide

Although these technological innovations would appear to be an empowering force in society, it also has the potential to create a ‘digital divide' that may be affected by a range of demographic determinants, including age, gender, and economic background (Webster, 2014). These demographic factors result in individuals having limited access to technology but may also affect an individual’s competence in using the technologies.

Taking age and Internet use as an example, Ofcom suggests that 95% of adults aged 55 and under use the Internet, but this falls to 33% in those aged 75 and over. Other differences include higher social classes using the Internet for more hours per week than the lowest social class, and that females use mobile phones slightly more than males to access the Internet (Ofcom, 2016).

While Ofcom suggests that differences in the use of information and communication technologies appear to be influenced by social class and age, the report only looks at ‘use' and ‘non-use' and not the relative skills within the demographics. It does not explain, for example, why there is intra-demographic differences, e.g., why some individuals within a gender group have a better skill set than others. This is important because, although anecdotal, it is believed that differences in technology use are related to ‘experience in using' rather than age, gender, or social class. This difference partly explains why some studies have identified that, while individuals may be able to use ICT, this is limited to either accessing and consuming data, e.g. web-pages, emails, music, and video and to make purchases or bank online (Ofcom, 2016). It is suggested that those users who do have problems appear to struggle with higher order skills such as filtering, manipulating and creating artefacts to produce new ‘knowledge’.

1.4.4 The socio-historical and socio-technical evolution of the electronic portfolio

To understand the place of electronic portfolios in healthcare education, it is useful to consider their development, from physical formats (e.g. paper or physical artefacts such as paintings or sculptures) to the current Internet hosted formats. This will be done within a socio-historical and socio-technical framework.

Several authors suggest that electronic portfolios are simply an 'electronic' copy of the form and function of their physical counterparts taking advantage of emerging information and communication technologies (Begoña & Carmen, 2011; Carless, Salter, Yang, & Lam, 2010; Walz, 2006). The introduction of software packages that could produce and store electronic artefacts with packages, such as Microsoft Office and Lotus SmartSuite, meant that word processed documents, spreadsheets, graphics, databases and latterly videos could then be compiled. These could then be distributed on floppy discs and CD-ROM's. Over time, portfolios developed into electronic portfolios as a collection of digital artefacts that detail an individual's experiences and achievements, supported by a "rich and complex processes of planning, synthesising, sharing, discussing, reflecting, giving, receiving and responding to feedback" (JISC, 2008).

Subsequently, from the mid 90's, when computers and the Internet came together it allowed individuals to develop an 'online' portfolio (Ralston, 2015). Some electronic portfolios are now beginning to embrace Web 2.0

technologies to integrate socially constructed knowledge (Avila, Sostmann, Breckwoldt, & Peters, 2016b; Haines & van Engen, 2013; Linton, 2015; Tur & Urbina, 2016; Walz, 2006). As such Web 2.0 technologies such as Facebook, Twitter and Instagram are being regarded as portfolios in themselves as they collect and present artefacts of 'learning' to a wider audience (Haines & van Engen, 2013; Stephensen & Dillon, 2013).

So, to summarise, electronic portfolios have incorporated, and support, the key set of functions of paper portfolios, but include:

- Hyperlinking: where students can add links to different portfolio elements or artefacts created outside the portfolio. These are accessed by clicking a web-address, image or file.
- Increased portability/remote access: Students can replace bulky paper portfolios with a USB key, or via the Internet.
- Structure learning: Electronic portfolios provide structure that guides students to write in a way that meets requirements
- Incorporate Multimedia: Students can add more media types, including videos, pictures and podcasts
- Sharing: It becomes easier to share the portfolio with others such as academics, and future employers.
- Multiple uses: A student can achieve several different outcomes within the same set of artefacts. For example, the portfolios can showcase

learning, host assessments, support learning, provide CV-like portfolios, and personal development planning.

Adapted from Van Wesel and Prop (2008a)

1.4.5 Forms and functions of electronic portfolios

Literature suggests that the form and functions of electronic portfolios fulfil a range of purposes, based on a combination of three core functions that may include showcasing, assessment, and learning (Green et al., 2014; Mohammed et al., 2015; Oakley et al., 2013; Porter, Kleve, & Palermo, 2016).

In the context of this thesis, it is acknowledged that this definition of electronic portfolios might also be referred to uses as personal learning environments, virtual learning spaces or digital portfolios but that these all share the same features: collecting digital artefacts to show learning, assessment, or to showcase artefacts. These types of electronic portfolio are summarised below.

1.4.5.1 Showcase portfolios

Showcase portfolios are characterised by the presentation or demonstration of personal, professional or career development, assessment, or achievements. These portfolios contain electronic artefacts, but do not

usually detail the learning process that led to the creation of the artefacts (Young, 2008). In healthcare courses, these may include certificates of achievements, qualifications, or evidence of competence.

1.4.5.2 Assessment portfolios

An assessment portfolio consists of goals that may or may not be placed within learning structures or processes (Ralston, 2015). For example, some health care professionals need to prove competence in doing certain practical tasks or skills, and these are recorded through processes that use electronic formats.

1.4.5.3 Learning portfolios

Learning portfolios are usually dynamic, and develop as the learner finds what needs to be learned and how it should be learned in response to changing interests, personal requirements, and personal understandings. An example would be personal development planning (PDP) (Head & Johnston, 2012), and in the case of healthcare students, this may relate to their developing professional identity.

1.4.5.4 Hybrid of the above three types of electronic portfolios

While electronic portfolios may be based on the single functions described above, many portfolios are a hybrid of the three. Figure 1 illustrates the possibilities of hybridisation which, for example, might be learning and

assessment, or learning and showcasing. Electronic portfolios may encompass all three and have elements of showcasing, learning and assessment seen as the centre of the diagram in Figure 1.

Figure 1: Types of electronic portfolios showing overlap of uses

These types of electronic portfolios also allow lifelong and 'life wide' learning (Bauer 2009; Cambridge 2008; Gordon 2014; Huang, Wu, Yang, & Hwang, 2012; InfoNet 2008; Lopez-Fernandez & Rodriguez-Illera, 2009a; Peet et al., 2011; Ravet 2011) where portfolios are used to record learning beyond the courses the students are on.

While acknowledging that this understanding of electronic portfolios has been necessarily reductionist for the conceptual framework areas such as audience, and the portfolio's use in educational and healthcare educational settings will be discussed in the following literature review.

It is therefore important to point out that the term electronic portfolio can refer to a wide variety of form and functions and this is sometimes confusing as they may refer, for example, to just assessment portfolios or have elements of all three functions.

1.4.6 Processes and artefacts of knowledge construction in electronic portfolios

It is important note at this point the differentiation between the socially constructive ‘processes' and ‘artefacts' in electronic portfolios that will be used throughout the thesis.

A socially constructive process is defined as a set of actions that is carried out in a social context. This, for example, might be the interactions between a student and their academic tutor as they develop a shared understanding of a clinical procedure. The interaction is the process through which knowledge is built.

Socially constructive artefacts, as Cooper and Love (2007) suggest, can also be used as evidence of the outcome of a collaborative process in the social construction of knowledge. A socially constructive artefact that might be

found in an electronic portfolio is a student's written reflection following a critical incident that involves others.

There are times when separating the artefact from the process is problematic and is concurred with by (Marcoul-Burlinson, 2006) when she states:

> "Learning becomes an artefact itself, an object and a process in which the participants engage throughout their life."

To avoid confusion, I have made it clear that the discussion in the thesis refers to either the process or the artefact. So where this confusion might arise in this thesis, for example in the discussion of assessment and feedback; I have made it clear that this could be a socially constructive process involving others, or the submission of an assessment (e.g. an essay or Wiki text) or written feedback as an artefact.

1.4.7 Gaining student views

One of the most important investigations in this research is to understand the views of students towards electronic portfolios as they socially construct knowledge. In this it is acknowledged at the outset that it is unlikely that the students will identify their learning as a socially constructive process but just as 'learning'. These students will be concerned about how and why they learn but not about its philosophical or pedagogical basis. Gaining student views will also be influenced, as Boud and Falchikov (2007), by the

suggestion that some students are focussed on passing assessments than any other learning beyond these requirements.

While these two points are taken into account in the research, these are seen as an additional reason why we should understand how students use electronic portfolios on their healthcare courses and support the aim and questions in this thesis.

1.5 Organisation of the thesis

The remainder of this thesis consists of five further chapters:

Chapter 2, the literature review, builds on this introduction to present a current understanding of the structure and function of electronic portfolios, ways to show learning, and socially constructive learning. This is then applied to healthcare and the exploration of student views.

Chapter 3 outlines the development of the broad grounded theory and socially constructive methodology and methods that were used to identify the individuals, processes and artefacts involved in the social construction of knowledge in electronic portfolios. This chapter also details how the themes from the student views were identified.

Chapter 4 presents the results of the data analysis, naming the individuals, socially constructive processes and artefacts, and views of the students who use electronic portfolios in healthcare education.

Chapter 5 discusses the the results, in understanding the use of and views of students, towards the use of electronic portfolios in healthcare education. It does this by outlining the emergent theory and the points that are pertinent in maximising the potential of electronic portfolios. It also discusses the limitations of the research and generalisability of the theory that has been grounded in the data.

Chapter 6 concludes the thesis by offering suggestions to academics and software developers to maximise the impact of electronic portfolios in

healthcare education. It ends with recommendations for further research and a reflection on how this thesis has affected my academic practice.

1.6 Conclusion

This introductory chapter has given a rationale to why this thesis is important in adding to the knowledge of how electronic portfolios are used by healthcare students. By focussing on one pedagogy, the social construction of knowledge, it describes how understanding socially constructive processes and artefacts, alongside student views, are central to this understanding. A justification for the use of a broad grounded theory methodology within a social constructive ontology and epistemology to explore these areas has also been outlined.

This chapter has also outlined the conceptual framework by discussing the socio-historical and socio-technical developments that explain how electronic portfolios developed and the impact that information and communication technologies have had on them and the students who use them.

The rationale, research approach and understanding of electronic portfolios are important in understanding the healthcare students' views on the place of electronic portfolios in their education. These understandings are developed, and a discussion on how they are applied to the research and data analysis begins in the following literature review and the chapters on methodology and methods (Chapter 3), and the results (Chapter 4).

Chapter 2: Literature Review

2.1 Introduction

Whether to include knowledge, from the literature or the researcher's experiences, is a common dilemma when using a grounded theory approach. It challenges the notions of the researcher's impartiality when sampling, collecting and analysing data (Dunne, 2011; Ramalho, Adams, Huggard, & Hoare, 2015). Whereas most other research methodologies accept that the researcher will have a full understanding of the subject area before embarking on any investigation (Dunne, 2011), grounded theory approaches can contradict this. For example, traditional grounded theory, as described by Glaser (Glaser, 2008), suggests that literature should not be contemplated before the research, but should be applied towards the end when theory begins to emerge. Glaser's approach, therefore, allows the grounded theorist to still be open without any pre-conceived ideas about what would be expected to emerge. In contrast to this, both contemporary Straussian grounded theory (Corbin & Strauss, 2008) and Charmaz's constructivist grounded theory (Charmaz, 2014), suggests a literature review could be helpful in choosing a sample; developing the questions the researcher asks; and helping to identify emerging themes. Despite this, and giving rise to further confusion, both Strauss and Corbin and Charmaz acknowledge that literature should be used to enhance, and not constrain,

any emerging theory. It is suggested here that this approach is not that different from Glaser.

Considering the differing views of Strauss, Corbin and Charmaz, and also acknowledging that the methodology will follow a broad grounded theory approach (see Chapter 3), the following literature review will use a flexible, less Glaserian approach to support the research and data analysis.

Applied to this research, the literature review, therefore, allowed me to be reflexive, helped identify a suitable sample, and supported the data analysis (Glaser & Strauss, 1967). It is therefore important to note again that this literature review is an amalgamation of literature that helped define the research methods and the data analysis.

Finally, and aside from the practicalities of conducting this research, it is important to acknowledge that as part of the practical requirements of developing this Doctoral proposal I was required to provide a rationale for conducting the study. This rationale included developing the aims, research questions, and state the methodology and methods that were going to be used. It is unrealistic therefore to say that this study could have begun without acknowledgement of this prior knowledge and its associated literature.

So, acknowledging the place of the literature review, the following will discuss three areas: the current use of electronic portfolios in education and

healthcare education, how we can identify the social construction of healthcare knowledge in electronic portfolios, and lastly how we can investigate student's beliefs about using electronic portfolios. These areas align to the original research aim and questions. Literature was identified through a range of databases including Summon® and Google Scholar ®, as well as specialist databases such as CINAHL ®, PubMed ® and ERIC ®. Google Scholar® was also used to find grey literature, e.g., conference proceedings and online theses detailing the application of electronic portfolios to healthcare education.

2.2 The use of electronic portfolios in educational settings.

The adoption of electronic portfolios in education has been significant, with one study suggesting that up to 50% of students were using portfolios in 2012 (Dahlstrom, Walker, & Dziuban, 2013). The reasons for adoption, which saw exponential growth in the four year period from 2008 to 2012 (Dahlstrom et al., 2013), has been largely a result of the impact of digitisation and the internet (Chang et al., 2013; Peacock et al., 2011; Welsh 2012)(Ahmed & Ward, 2016b). This has led to educational electronic portfolios being used across a range of devices and technologies (Chelliah, Conway, & Clarke, 2011; Forte, de Souza, da Silva, do Prado, & Rodrigues, 2013) and the ease of creating electronic artefacts to evidence the associated educational outcomes (JISC, 2008; Peacock, Gordon, Murray, Morss, & Dunlop, 2010). These forms and functions of educational electronic portfolios have given students the ability to utilise information and communication technologies to maximise their learning.

Despite this clear potential, both published and 'grey' literature, suggests that not all educational disciplines have embraced electronic portfolios to the same extent. The literature suggests a greater use in subjects such as education (teaching), healthcare, computer science, engineering and business but less in disciplines such as forestry, geology, and zoology. Although caution is needed, the literature suggests that courses that are driven by professional body requirements or with 'technical' backgrounds, or

where paper portfolios had been used previously, use electronic portfolios more extensively. Three areas, the preparation of teachers, and business and finance courses are used to show how electronic portfolios are used and their intended outcomes.

In the preparation of school teachers' electronic portfolios have been used to record and reflect on their thoughts and feelings in a 'journal' as they progress through their course and complete practical experiences (Hall & Townsend, 2017; Oakley et al., 2013; Watson, 2012). This journal helps student teachers show how they have achieved professional body requirements (Chesney & Marcangelo, 2010; Hall & Townsend, 2017; Jun, Anthony, Achrazoglou, & Coghill-Behrends, 2007; Oakley et al., 2013; Trent & Shroff, 2012; Tur & Marín, 2013; Tur & MarÍN, 2015; Tur & Urbina, 2016; Watson, 2012) .

Within business and finance, authors detail the benefits of electronic portfolios in supporting student's self-directed learning (Dominguez et al., 2014; Morales, Soler-Domínguez, & Tarkovska, 2015); supporting "technical and complex modules in a controlled environment" (Morales et al., 2015, p. 1733); and developing the professional 'identity' of the student (Bennett, Rowley, Dunbar-Hall, Hitchcock, & Blom, 2014).

Because of the educational requirements of the courses, and the material that is presented, the electronic portfolios in these examples have a greater emphasis on learning and assessment (Guder, 2013; Hall & Townsend,

2017; Nor Azlan Mohamad, Amin Embi, & Mohd Nordin, 2015; Oakley et al., 2013; Ralston, 2015; Tur & MarÍN, 2015; Walton, Gardner, & Aleksejuniene, 2016; Watty & McKay, 2016). Because of the educational uses of these portfolios, this is not surprising but does confirm that these are an effective use.

There is, however, literature that supports the use of electronic portfolios to showcase students' work and these focussed on the lifelong and life-wide learning. This was through the incorporation of personal development plans (PDP's), the presentation of a student's curriculum vitae (CV) or as a presentation of the 'self' online, e.g. through online journaling, or blogs (Buzzetto-More & Alade, 2008; Dominguez et al., 2014; Rezaei-Zadeh et al., 2013; Stansberry & Kymes, 2007; Stefani, Mason, & Pegler, 2007). Showcasing was highly evident within music education where they are used as a 'curated exhibition' (Stephensen & Dillon, 2013) and in the previously discussed mentioned business courses through the student developing a curriculum vitae (Flanigan, 2012).

These three educational uses (assessment, learning and showcasing), alongside the incorporation of lifelong and life-wide learning, support the earlier general descriptions of the functions of electronic portfolios offered in Chapter 1.

Literature in the following section examines healthcare electronic portfolios to see if similar trends are present.

One point to note in regards to the use of electronic portfolios shows that there has been a shift in focus since their initial introduction when the focus was looking at 'best practices in adoption' and 'the potential uses of electronic portfolios', e.g., (Joyes, Gray, & Hartnell-Young, 2010; Reese & Levy, 2009; Rennie, Morrison, & Mason, 2008; Stefani et al., 2007) to contemporary investigations that aim to maximise the information and communication technologies available within electronic portfolios (Chantanarungpak, 2015; Deneen, Brown, & Carless, 2017; Haines & van Engen, 2013; Hall & Townsend, 2017; Hinojosa & Howe, 2016; Karlin, Ozogul, Miles, & Heide, 2016; Porter et al., 2016; Ralston, 2015; Sharifi, Soleimani, & Jafarigohar, 2016; Stephensen & Dillon, 2013; Tu, 2014; Tur & Urbina, 2016; Turbow & Chaconas, 2016; Tzeng et al., 2015; Watty & McKay, 2016). In recent years, there has been an increasing interest in how to maximise the potential and acceptance in the student population (Ahmed & Ward, 2016a) and this thesis will contribute to that dialogue.

2.3 The use of electronic portfolios in healthcare settings

While the adoption of electronic portfolios across non-healthcare courses is varied, literature suggests that healthcare courses have utilised electronic portfolios more extensively with evidence that most professions adopt them. While no professional body has required their use, some academics have incorporated them into their courses, and it appears to be related to individual interest, technical, pedagogical or financial reasons.

The following health professions have comparatively high levels of publications: *medicine* e.g., Avila, Sostmann, Breckwoldt, and Peters (2016a); Belcher et al. (2014); Bleasel, Burgess, Weeks, and Haq (2016); Fungerlings, Schmidmaier, Fischer, and Hartl (2015) ; *nursing* e.g. Green et al. (2014); Josephsen (2012); Tzeng et al. (2015); *midwifery* e.g. Baird, Gamble, and Sidebotham (2016); Birks et al. (2016), (Pincombe, McKellar, Weise, Grinter, & Beresford, 2010); and *dentistry* e.g. Gardner and Aleksejuniene (2008); Kardos, Cook, Butson, and Kardos (2009); Vernazza et al. (2011); Walton et al. (2016).

One noticeable difference between healthcare and non-healthcare electronic portfolios was that there was noticeably less literature on the use of electronic portfolios to showcase healthcare student learning. At the time of completing the literature review, there was no examples or literature relating to publicly available showcase electronic portfolios from the UK. There were, however, examples of literature and publicly available electronic

portfolios in North America (Cambridge, 2010), but only literature from Australia (Pincombe et al., 2010). These showcase electronic portfolios were typically part of capstone courses which are intended to show how students have integrated their learning beyond the course outcomes (Watty & McKay, 2016). The majority of these capstone courses and their showcasing electronic portfolios were in nursing and midwifery (Baird et al., 2016; Birks et al., 2016; Karsten, 2012) but could also be found in occupational therapy (Hinojosa & Howe, 2016). A search of online portfolios also found examples from medicine and dentistry in North America.

Another theme that emerged was how healthcare electronic portfolios processes and artefacts were influenced by who 'owned' the portfolio Baumgartner (2009). Ownership could be by the course or by the student. If the course owned the portfolio then processes and outcomes were related to the course and its assessment. Examples from the literature include assessment of learning in: Dentistry (Walton et al., 2016); dietetics (Porter et al., 2016); occupational therapy (Hinojosa & Howe, 2016); medicine (Bleasel et al., 2016); midwifery and nursing (Garrett, MacPhee, & Jackson, 2013). If the student owned it then the outcomes were driven by them. Watty and McKay (2016) also expressed the effect of 'audience' on the processes and outcomes of the portfolio. If the electronic portfolio were for students to demonstrate the achievement of course outcomes then the portfolio content would be tailored to meet the requirements of the academic

or assessor. If the audience were the public then the material would be adapted for this audience.

Having described the predominant form and functions of electronic portfolios in healthcare education, the literature now turns its focus to how we can identify the processes and artefacts of the social construction of knowledge. This identification is done by discussing the challenges to identifying the social construction of knowledge, and then how the researcher might identify interactions, negotiation, and collaboration in socially constructed knowledge (Berger & Luckmann, 1966; Crane, 2012; Palincsar, 1998)

2.4 The social construction of healthcare knowledge

Section 1.4.2 described how healthcare knowledge is constructed through understandings that have been objectified, institutionalised and legitimised within the healthcare social context. It also explains how students, through the interactions, negotiations, and collaborations develop socially constructed knowledge (Berger & Luckmann, 1966; Crane, 2012; Palincsar, 1998). This section discusses the ways of showing how healthcare knowledge becomes institutionalised and legitimised through individual and social processes and the resultant socially constructed artefacts.

2.4.1 Institutionalised and legitimised healthcare knowledge

It is suggested here that, for healthcare electronic portfolios, the greatest impact on the way that knowledge is institutionalised is through the professional bodies who set out the core knowledge, skills and attitudes, that are required through the students theoretical and practical experiences (GMC, 2015; HCPC, 2014; NMC, 2010). By doing this, the professional bodies offer frameworks for the ways that knowledge institutionalisation, legitimisation, creation, normalisation and application takes place.

The concept of institutionalised and legitimised organisational knowledge is also discussed by Novotna, Dobbins, and Henderson (2012), Oborn, Barrett, and Racko (2010) who suggest that these processes are reliant on personal values, social norms and objective facts.

Also, Blackler (1995) suggests that this institutionalisation and legitimised knowledge has to be embodied, embrained, encultured and encoded. Firstly, embodied knowledge needs a physical presence and relies on sensory information and the act of 'doing', for it to be embodied. This is usually defined in healthcare as the practical skills needed to undertake a task, taking a blood pressure for example.

Embrained knowledge is the knowledge that is the result of cognitive abilities and conceptual skills, the theory that is needed to undertake a practical competence. While the 'embraining' process may be learned from others it is regarded as being observable through an individual's actions.

It is suggested here that the remaining three dimensions are useful when understanding how socially constructed knowledge becomes institutionalised and legitimised through being 'embedded', 'encultured' and 'encoded'.

Embedded knowledge according to Blackler (1995) relies on systematic routines, the continual repetition of tasks and activities, for it to be embedded into students' knowledge. In the example of taking a blood pressure, the accepted 'correct' technique relies on the healthcare practitioners repeating the correct routine in their practice.

Encultured knowledge is understood in similar terms except in this case it is the knowledge that is gained through shared understandings.

Finally, encoded knowledge is the knowledge that is then conveyed through signs and symbols. This would include publications around certain subjects including books, journal articles and codes of practice.
The production of these artefacts, as part of the social construction of knowledge within electronic portfolios, will also be discussed in section 2.5.1.

To understand and analyse the institutionalisation and legitimisation of knowledge literature is, therefore, suggesting that we should consider the impact of the professional body requirements; personal values, social norms and objective facts; and embodied embrained, encultured and encoded knowledge.

2.4.2 Healthcare students' interactions, negotiations and collaborations

Implicit in the understanding of the social construction of knowledge, is the need to understand how students take part in social interactions, negotiations, and collaborations (Berger & Luckmann, 1966; Crane, 2012; Palincsar, 1998). The literature now examines how this occurs outside electronic portfolios, through communities of practice, and internally through educational processes and artefacts.

2.4.3 Communities of practice and discourse communities in healthcare education

Bandura's theory of social learning (Bandura & Walters, 1977) is one of the most widely cited works when considering the effect on an individual's social learning within the context of cognitive, behavioural and environmental domains. However, Bandura's theory focuses on the individual rather than social understandings that are at the centre of this thesis. To consider the social understandings literature suggests that we need to consider 'communities of practice' and the student's interactions, negotiations and collaborations with others as they learn and build [theoretical and practical] knowledge (Lave & Wenger, 1991).

Wenger (1998) characterises communities of practice through four dimensions which, in this thesis, can be used to understand how students socially construct knowledge.

The first of these four dimensions is through the development of 'meaning' whereby each student, either by themselves or as a profession, make their theoretical and practical experiences have some meaning in their day to day student lives.

'Practice', the second dimension, allows the students to develop, through their theory and practice, a shared historical and social understanding that consists of a range of frameworks and perspectives, or ways of applying and continuing the development of knowledge.

Being part of a healthcare professional 'community' defines the student's learning, and 'competence', the third dimension is where Professional Bodies set standards that students should be competent in achieving.

Finally, as students work towards becoming part of a professional community, they develop their 'identity' through building personal histories because of their interactions. Understanding the place of meaning, practice, community and identity in this way will allow the research to identify students' participation in their community of practice and the social construction of knowledge within that community.

Acknowledging communities of practice, Kerka suggests that socially constructed learning should, therefore:

> "reproduce the key aspects of communities of practice: authentic activities sequenced in complexity, multiple experiences and examples of knowledge application, access to experts, and a social context in which learners collaborate on knowledge construction."

(Kerka, 1997, p5)

However, Wenger's description of a community of practice is not without criticism and as Roberts (2006) points out an individual's power within a community of practice can skew not only the relationships but the

knowledge that is created. In this respect, the following research acknowledges the place of the educational institutions and professional bodies in the type and range of knowledge that is constructed. So, while a student might be part of a community of practice, there may be inherent academic, institutional or professional body bias that means that knowledge becomes skewed to a particular viewpoint. This may lead to a misuse of power, trust, and resistance to change by individuals in that community (Roberts, 2006).

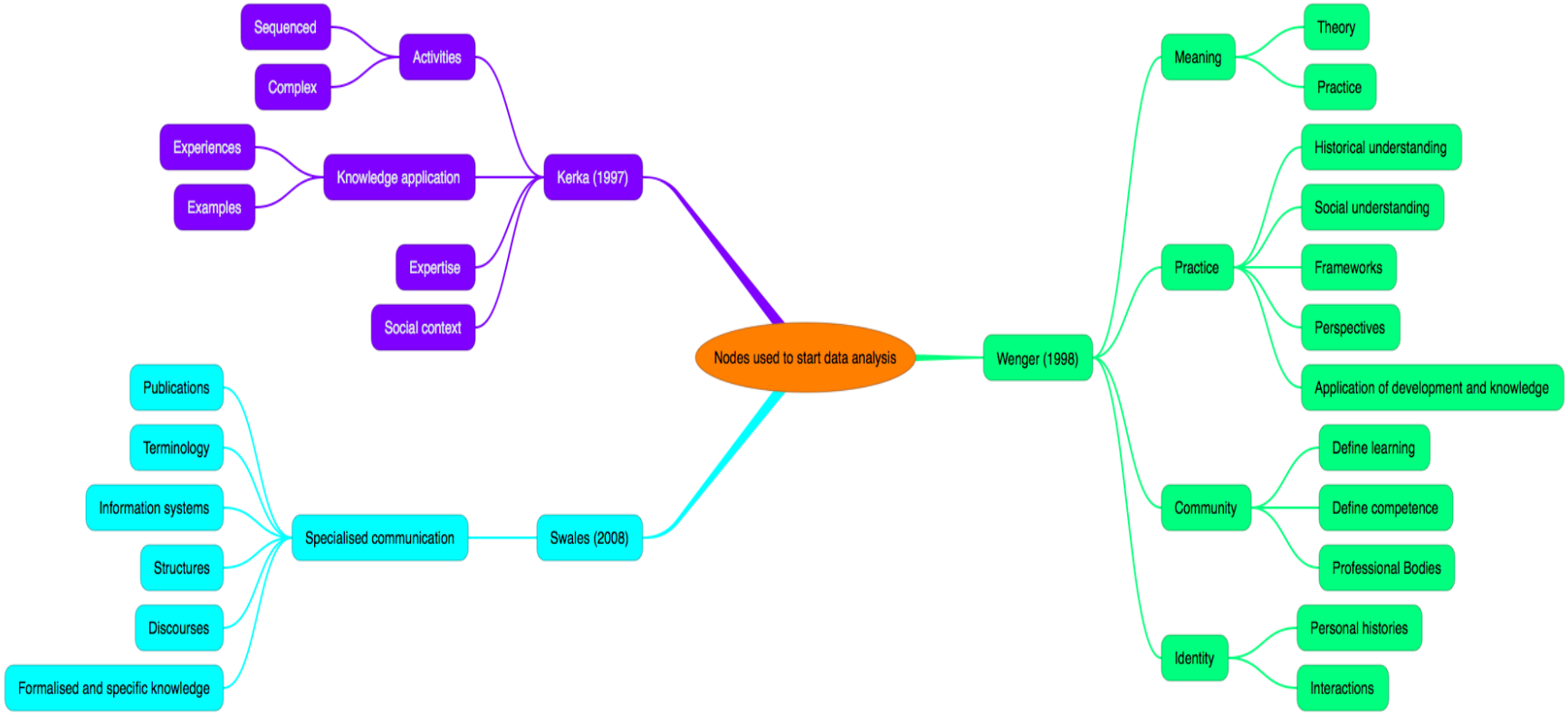
Caution should, therefore, be applied as there may be strong views expressed by a minority of students, or the unbalanced effect of professional bodies in the research, that could overwhelm other themes that might emerge.

To address the concerns of relative power within communities of practice a refinement of Wenger's communities of practice was considered. Swales (2008) proposes the existence of a 'specialised' community of practice that is an enhanced 'discourse' community which, in this context, refers to healthcare professionals or students. This discourse community has a specialised set of communicative practices, publications, terminology, information systems and structures (Swales, 2008). This is further developed through ways in which its members recognise the produced information structures through their professional discourses (Abrahamsen, 2003). This in turn influences, restricts and stylises its content for other

professionals. Healthcare knowledge could, therefore, be considered as being highly formalised and specified, having its paradigms accepted by most of the ‘discourse community' (Cartelli & Ramirez, 2007).
Although this alternative definition of a community was initially thought to address power imbalances when it came to examining students' social participation in knowledge construction, there was little that added to Wenger's definition (Wenger, 1998).

Collecting these definitions together the social construction of knowledge can be identified through Wenger’s (1998) four dimensions (meaning, practice, community and identity), alongside complex activities, experiences, the application of knowledge, access to experts, and a social context. When considered together the literature is beginning to generate a set of keywords that were initially used as codes in the data analysis (See Chapter 3). These are summarised in Figure 2.

Figure 2: Sample of codes from the literature used to inform methods and the data analysis



2.5 Social construction within healthcare students' electronic portfolios

The literature review now describes the ways the research will understand the role of the students' electronic portfolios in the social construction of knowledge. This, however, is not without problems with some authors even suggesting that electronic portfolios lack these processes and artefacts (Zhang, Olfman, & Firpo, 2011). However, as noted in Chapter 1, this thesis is not concerned with discussions around the existence of the social construction of knowledge, but to accept that this is one interpretation of how knowledge construction occurs. In this respect, it is the connection between the social construction of knowledge and the role of electronic portfolios that needs to be discussed, and in relation to this thesis, healthcare electronic portfolios. With this lack of literature, the evidence on how elements of the social construction of knowledge might occur was considered.

2.5.1 Socially constructive processes and artefacts found in electronic portfolios

What became evident from the literature review is that most authors claim that knowledge is socially constructed through several processes and artefacts that occur both within and external to the electronic portfolios These socially constructive knowledge building processes can occur through socialising with others, group working, shared online learning activities,

knowledge sharing, assessment, feedback, computer supported collaborative learning and by using Web 2.0 (Begoña & Carmen, 2011; Blom, Rowley, Bennett, Hitchcock, & Dunbar-Hall, 2014; Carless et al., 2010; Cartelli & Ramirez, 2007; Chang, Tseng, Liang, & Chen, 2013; Coric, Balaban, & Bubas, 2011; Gerbic, Lewis, & Northover, 2009; Gouseti, 2010; Jonassen, Davidson, Collins, Campbell, & Haag, 1995; Jonassen, Peck, & Wilson, 1999; Welsh, 2012; Zhang, Olfman, & Ractham, 2007)

Socially constructive artefacts are seen as evidence, artefacts or outputs of how individuals acquire skills and knowledge within social settings (Gao et al., 2014; Luchoomun, McLuckie, & van Wesel, 2010). For healthcare students these could include: records of achieving clinical competence (Garrett et al., 2013), reflections on clinical incidents (Avila et al., 2016a); assessment of theoretical outcomes (Woodley, Fernstrom, & Sims, 2011); and personal development plans (Luchoomun et al., 2010).

These social constructive processes and artefacts are summarised in Table 1.

Table 1 Socially constructive processes and artefacts found in the literature

Socially Constructive Processes	Socially Constructive Artefacts
• Socialising • Group working • Shared online learning activities • Feedback • Knowledge sharing • Assessment • Lifelong learning	• Written feedback • Personal Development Plans • Written artefacts because of assessments

The following sections discuss the role of computer supported collaborative learning and Web 2.0 in the social constructive knowledge building seen in many electronic portfolios.

2.5.2 Computer supported collaborative learning

Computer supported collaborative learning is currently considered to be a central process in the ways that students learn within higher education (Strijbos, 2011) and, because of its collaborative nature, has resonance with socially constructing knowledge. Computer supported collaborative learning facilitates a range of activities including online group learning activities, problem-solving and information sharing (Kimmerle, Moskaliuk, Oeberst, & Cress, 2015). As an example, Erkunt, Erçetin, and Yildiz (2008) described

the use of electronic portfolios in a pre-service teacher preparation course to allow a group of students to collaborate on the development of shared teaching materials.

A way to analyse the processes involved in computer supported collaborative learning has been offered by Gunawardena, Lowe, and Anderson (1997) and this consists of identifying five stages of learning. These stages map the development of knowledge, from how students get information to how they then construct knowledge. In doing this, it is suggested that students share, explore inconsistencies in, and modify the development of new knowledge (Lucas, Gunawardena, & Moreira, 2014).

Similarly, an alternative way to understand computer supported collaborative learning had also been developed by van Aalst (2009) who suggests that collaborative learning can be shown using seven primary codes (summarised below) and 33 sub-codes that can be applied to understanding computer-supported collaborative learning.

Van Aalst's seven primary codes used to show collaborative learning in computer environments:

- 'Ideas' can use conjecture, elaboration, explanation, facts and opinion.
- "Community' is expressing and seeking views from within a community
- 'Questions' where the student may ask questions for clarification, getting an explanation, and finding out facts.

- ‘Information’ is where information is introduced to solve a problem.
- ‘Linking’ is where students link to other forms of knowledge to build on their own or community knowledge.
- ‘Agency’ is evidence of working with and helping others to build knowledge.
- ‘Meta-discourse’ is like agency but is less supportive and is evidence that the student proposes knowledge.

(van Aalst, 2009)

Combining the themes identified by Gunawardena et al. (1997) and van Aalst (2009) also contributed to the methodology and data analysis.

2.5.3 Web 2.0

Web 2.0 has previously been defined in section 1.4.3.3, so this section focusses on the potential of Web 2.0 technologies to support knowledge construction in electronic portfolios. The literature review was conducted using the terms ‘electronic portfolio’ and ‘portfolio’, incorporating the most common electronic portfolio software vendors with ‘collaboration’, and with the various combinations of Web 2.0 tools.

Examples of literature included Tur and Urbina (2016) who discussed how in initial teacher training students have used Web 2.0. What was noticeable

was that most of the collaboration occurred outside of the electronic portfolio with Web 2.0, but was evidenced as artefacts within portfolios. While not explicitly discussed by other authors it does appear that this is common with other uses of Web 2.0 and electronic portfolios. A further example, to define the use of Web 2.0, was discussed in a paper by Karlin et al. (2016). Here students used a blog site (Wix), a virtual learning environment (Schoology), and Google Docs to create an electronic portfolio. It is argued that in this is a further example that the 'electronic portfolio' does not *incorporate* Web 2.0 but is instead a portfolio made up of Web 2.0 tools.

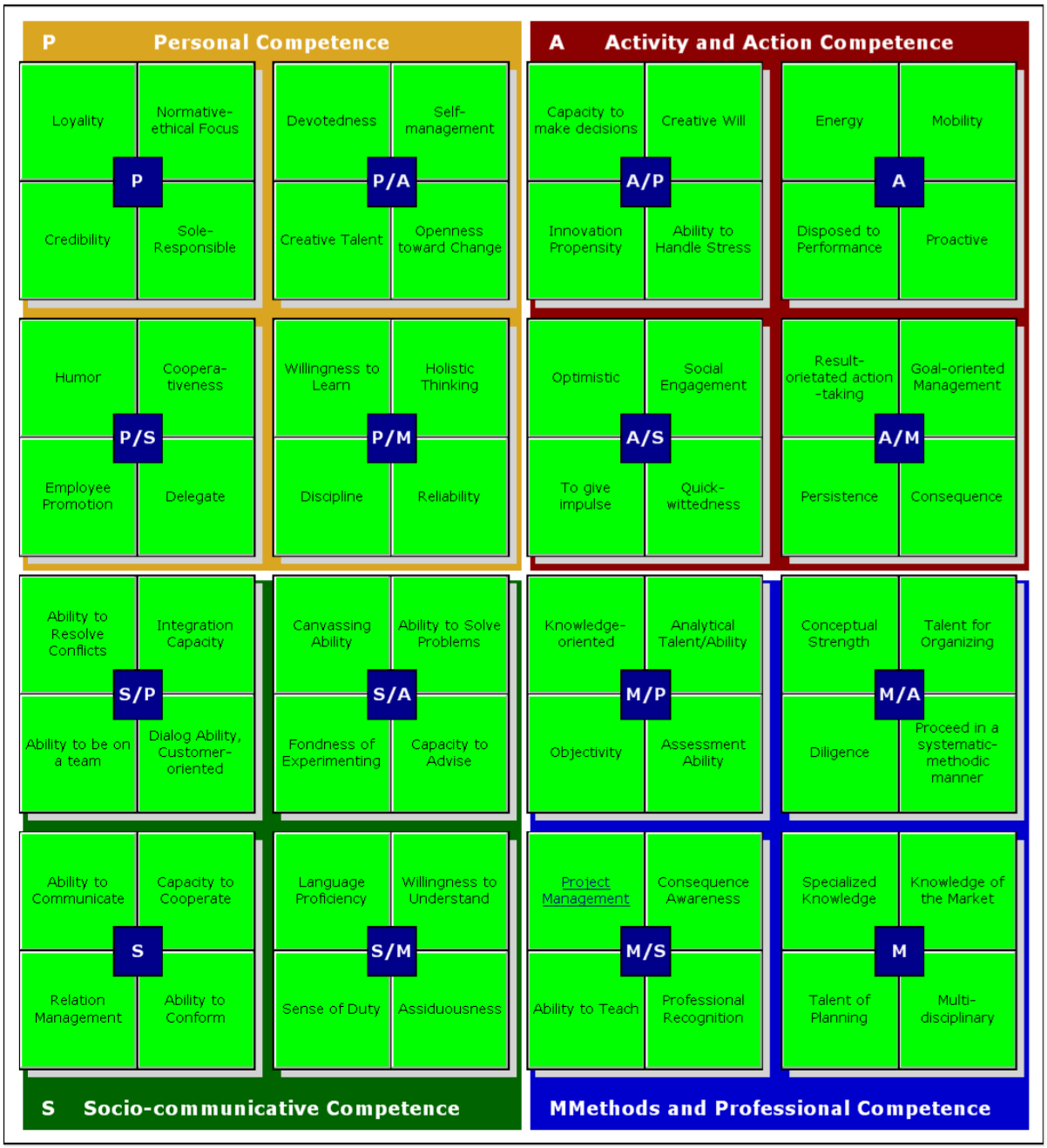
It could, therefore, be assumed that these Web 2.0 tools would be part of a student's collaborative learning but that it is not always part of the electronic portfolios' software. This is despite much of the publicity material provided by the electronic portfolios providers (e.g. Blackboard, Pebblepad, and Mahara) promoting their products as allowing collaboration. This raises questions as to the nature of the tools electronic portfolios use, and this will be explored in the following research.

2.5.4 Communication and the social construction of knowledge

As well as computer-supported collaboration and Web 2.0 the importance of 'social communication' in the social construction of knowledge (Berger & Luckmann, 1966; Crane, 2012; Nightingale & Cromby, 2002) benefitted from further investigation.

A way to explore socio-communicative competence was developed in Erpenbeck and Heyse (2004) competence explorer, translated from the native German by Zawacki-Richter, Baecker, and Hanft (2010). While the explorer examines various competencies in learning, namely personal competencies, activities, and professional competence (see Figure 3) it is the socio-communicative competencies that are of interest in this thesis. Figure 3 shows 'communication', 'co-operation', 'relationships' and 'conforming' as contributing to the social construction of healthcare knowledge by the students as part of the socio-communicative processes. However, other dimensions also overlap with socio-communicative competence and could also be helpful in showing the social construction of knowledge. For example, we might also consider 'social engagement' and 'ability to teach'.

Figure 3: Erpenbeck and Heyse (2004) competence explorer



Legend: Erpenbeck and Heyse (2004) competence explorer suggests overlaps between the following competencies: Personal (P), Activity and Action (A) Socio-communicative (S) and Methods and Professional (M).

Translated and cited by Zawacki-Richter et al. (2010).

Up to this point, the literature has given insights into the way healthcare knowledge is institutionalised, legitimised, and objectified, and how the social processes might be shown. This addresses the first two questions of the research.

The literature review now explores the literature on students' views towards electronic portfolios to help answer question 3 "What do healthcare students state are the positives and negatives of using electronic portfolios, in their courses, as they socially construct knowledge?".

2.6 Exploring students' views on the use of electronic portfolios in healthcare education

Much of the literature on the implementation of electronic portfolios, in particular between 2008 and 2012 has focussed on students' views on the form and function of electronic portfolios as well as their perceptions of learning within electronic portfolios. Within this there are noticeable similarities to previous evaluations of paper portfolios where authors discussed the need for adequate preparation of students to use the portfolios, setting clear objectives and outcomes for the portfolios, student anxieties, and lifelong learning and reflection (Davis, Ponnamperuma, & Ker, 2009).

Obviously, as electronic portfolios have processes and artefacts embedded in information and communication technologies, the concerns, while partly the same as paper portfolios, have added 'electronic' dimensions. The electronic dimensions result in positive and negative views by students.

The following literature review examines literature from a wide variety of educational settings that were then used in the later research and data analysis. It is important to note that this was structured around 'positives' and 'negatives' because of themes in the research but also in the development of the grounded theory that follows. As described in the following chapter some of the themes that emerged about the students' views included positive and negative views. Themes found in the literature are summarised in Table 2 and explained in the following subsections.

Table 2: Students' positive and negative views themed from literature review

Type of view	Theme
Positive views	Structure and track their learning and development.
	Supported communication to enable the social construction of knowledge.
	Allowed creativity in the ways portfolios are presented and increased the range of possible artefacts.
	Accessibility, safety and linking of learning artefacts.
	Develops additional ICT skills.
Negative views	Unsure of use of electronic portfolios or why they were producing evidence
	Lack of functionality that supports learning
	Student's lack of basic skills in computing and information technologies
	Software is not intuitive
	Concerns with public sharing of the electronic portfolio
	Lack of potential in lifelong and life-wide learning

2.6.1 Students' positive views of electronic portfolios

The literature found five major themes that explained how the students said their electronic portfolios supported learning and these were as follows. Firstly, students said their electronic portfolios helped them structure and track their learning and development both formally (Bennett et al., 2014; Birks et al., 2016; Davis et al., 2009; Parker, Ndoye, & Ritzhaupt, 2012), informally (Birks et al., 2016; Wuetherick & Dickinson, 2015), and as they progress towards professional body competence (Parker et al., 2012).

Expanding on the latter benefit students also identified that the portfolios could develop their [professional] identities (Belcher et al., 2014; Gardner & Aleksejuniene, 2008) and that this was, in turn, helpful when seeking employment once their course was finished (Bolliger & Shepherd, 2010) (Wuetherick & Dickinson, 2015).

This structure, and the outcomes that electronic portfolios have, led to students to believe that their portfolios had: a positive impact on their learning (Belcher et al., 2014; Bolliger & Shepherd, 2010); helped them integrate theory and practice (Bennett et al., 2014; Bogossian & Kellett, 2010): and also helped them identify weaknesses in their learning (Birks et al., 2016; Cheng, 2008).

Secondly, students said that electronic portfolios helped them to communicate and connect with others (Bolliger & Shepherd, 2010; Chang, 2008; Hsieh, Chen, & Hung, 2014; Luchoomun et al., 2010; Wakimoto & Lewis, 2014; Wang, 2009) (Wuetherick & Dickinson, 2015) primarily among themselves as students, with academics and with others in their community of practice. This was concerning feedback (Bleasel et al., 2016) (Wakimoto & Lewis, 2014), reflection (Bolliger & Shepherd, 2010; Chang, 2008)

Thirdly, students stated that electronic portfolios allowed them to be creative in how the electronic portfolios were presented, and they could be creative with a range of digital artefacts to show their learning (Bolliger & Shepherd, 2010) (Cheng, 2008; Donnely, 2013; Gardner & Aleksejuniene, 2008;

Morales et al., 2015) (Wakimoto & Lewis, 2014; Woodley et al., 2011). One paper suggested students thought that the range of artefacts that could be used was greater than could be utilised in paper portfolios (Andrus, Benander, Burns, Rafaei, & Thompson, 2015)

The next major theme related to how students described how electronic portfolios collected and presented artefacts either electronically or via the Internet. Students stated that this meant the portfolios were readily available (Belcher et al., 2014; Bogossian & Kellett, 2010), less bulky than their paper counterparts (Bogossian & Kellett, 2010) and meant that their work was safely stored through the Internet in 'the cloud' (Belcher et al., 2014; Bogossian & Kellett, 2010). Because the portfolios were electronic students also liked that they could easily link artefacts of learning to other learning outcomes (Morales et al., 2015), for example, one reflection could be related to two separate outcomes without having to write the text again.

The fifth and final theme was that by using electronic portfolios a secondary benefit, that of increasing students information and communication technology skills could be seen Donnely (2013) Tur and Marín (2013) Wang (2009).

2.6.2 Student's negative views of electronic portfolios

The largest area of concern for students was that they did not always feel that they knew why electronic portfolios were being used (Belcher et al.,

2014; Bennett et al., 2014; Bleasel et al., 2016; Bolliger & Shepherd, 2010; Cheng, 2008; Devlin-Scherer, Martinelli, & Sardone, 2006; Garrett et al., 2013; Hsieh, Lee, & Chen, 2015; Lopez-Fernandez & Rodriguez-Illera, 2009; Ritzhaupt, Singh, Seyferth, & Dedrick, 2008; Ryan, 2011; Tosh, Light , Fleming, & Haywood; Woodley et al., 2011). This is surprising because educational tools are not usually introduced without outlining clear pedagogical processes and artefacts (Belcher et al., 2014; Birks et al., 2016; Vernazza et al., 2011). One example of the lack of clarity is when the students are asked to reflect in electronic formats, compounded by limited experience of reflection before using their portfolios (Bolliger & Shepherd, 2010; Faulkner, Mahfuzul Aziz, Waye, & Smith, 2013). Indeed many students believed that a lot of their learning still relied on paper exercises (Davis et al., 2009).

Students also reported that the electronic portfolios lacked some essential functions that restricted the range and numbers of artefacts that could be included (Andrus et al., 2015; Birks et al., 2016; Donnely, 2013; Gardner & Aleksejuniene, 2008; Garrett et al., 2013; Ralston, 2015; Ritzhaupt et al., 2008; Tosh et al.; Van Wesel & Prop, 2008a). If the students also had limited experiences of using the Internet or computers, this also led to an increase in negative views (Bogossian & Kellett, 2010; Parker et al., 2012; Tosh et al.; Vernazza et al., 2011). This lack of functionality and any associated lack of practical experience often led students to find the

electronic portfolios time consuming especially when creating electronic artefacts (Bogossian & Kellett, 2010; Donnely, 2013; Gardner & Aleksejuniene, 2008; Hsieh et al., 2015; Parker et al., 2012; van Wesel & Prop, 2008b).

One further aspect of students using the electronic portfolios was that they did not find the software to be easy to use and intuitive (Birks et al., 2016; Luchoomun et al., 2010; Ralston, 2015; Tosh et al.; Woodley et al., 2011). Students felt the software made the electronic portfolios a 'closed system' (Garrett et al., 2013), reducing learning to a tick-box exercise (Belcher et al., 2014) and limited their ability to become independent learners (Birks et al., 2016).

Students also expressed some personal unease and concerns when considering the social aspects, considered a positive in the previous section. The primary concern here was in sharing the electronic portfolio with others outside of the immediate community of practice (Belcher et al., 2014; Cheng, 2008; Garrett et al., 2013; Hsieh et al., 2015; Ritzhaupt et al., 2008) (Andrus et al., 2015). This appears to be centred around breaching confidentiality but also in a lack of confidence or unease in writing positive aspects of themselves (Bennett et al., 2014; Kardos et al., 2009).

A final theme that emerged was that students did not think the portfolios had potential in relation to their lifelong and life-wide learning. The thought that their portfolios had limited ability to prepare for them for future

employment (Birks et al., 2016) and that they felt employers would not consider the electronic portfolio at interview (Woodley et al., 2011).

2.7 Conclusion

This literature has outlined the use of electronic portfolios used within education and in healthcare education. It suggests that knowledge is constructed through communities of practice that are limited to a small range of individuals directly related to the student's development of theory and practice. These people are academics, practitioners, service users and carers.

The electronic portfolio itself is a way of hosting a range of socially constructive processes and artefacts that could be enhanced through the possibilities of the Internet and Web 2.0.

Students hold both positive and negative views of electronic portfolios that are influenced by how the portfolios are 'sold' to the students, the ease of using software and its functionality as well as the student's skills and attitudes.

If these points are found, the literature suggests that students might think the portfolios can structure their learning and supporting social processes in a creative way that is not possible in paper portfolios. Despite this, students did express concerns about sharing the products of their learning beyond their immediate community of practice. The students also thought electronic portfolios were a safe way of storing their learning activities through the Internet. Although the students thought it helped develop their ICT skills they thought there was little benefit to their lifelong or life wide learning.

The literature, particularly on the socially constructive processes and artefacts, and student's positive and negative views, will be used to inform the theoretical sampling, data gathering tools, and data analysis described in Chapter 3.

Chapter 3: Methodology and methods

3.1 Introduction

By their nature, the aim and research questions set out in section 1.3, already begin to define the methodology and methods which would be suitable to explore the social construction of knowledge and healthcare students' views. A literature review identified several other approaches from a range of disciplines including knowledge management, philosophy, technology, and pedagogy. These were subsequently refined by examining how the social construction of knowledge is investigated within the use of technology and electronic portfolios, healthcare knowledge and educational courses. The literature review also examined research methodologies and methods which explored student views.

The literature identified five methodologies which could investigate the social construction of knowledge and the views of students about their electronic portfolios. These methodologies, were ethnography, discourse analysis, narrative analysis, mixed methods research and grounded theory (Bamkin, Maynard, & Goulding, 2016; Bryman, 2012; Burck, 2005; Hammersley, 2007; Jung, 2009; Silverman, 2011).

Discourse and narrative analysis were discounted because their focus is on the researcher's interpretation of how an individual sees the social world rather than understanding the social world from a collective viewpoint (Bryman, 2012; Burck, 2005; Silverman, 2011). There was also a clear

limitation as exploring the structure of the electronic portfolios would not be possible within these methodologies alone.

It would, therefore, seem reasonable that a mixed methods approach would have been best able to cover both the elements required. However, the mixed methodology approach described by Creswell (2008) requires the researcher to make decisions about the process and intended outcomes of the research from the outset. While this method can bring clarity to the purpose and direction of the research, I found this approach restrictive. I wanted a methodology where the theory would emerge from the data and felt that imposing a pre-determined structure on that process would not allow that to happen.

What the exploration of the methodologies up to this point confirmed was that I wanted an approach that could flexibly gather data about the portfolios and student views. This flexibility appeared to be possible within grounded theory approaches.

The broad grounded theory methodology that was eventually used was able to accommodate research that investigated the form and function of the electronic portfolios as an ‘object' and the views of students as a social group. The methodology also offered flexibility in data gathering methods and sampling that became an important issue as the research progressed.

A number of papers finally convinced me that a grounded theory methodology and methods would be the best approach to answering the

research questions of this thesis. Andrews (2012) identified a link between grounded theory methodologies and social constructionism. Gunawardena et al. (1997); Lucas et al. (2014) explored the social construction of meaning in computer conferencing using grounded theory. Two papers considered the benefits of grounded theory in developing 'new' theory in areas that had not been explored before (McCann & Clark, 2003; Payne, 2007).

3.2 The development of the broad grounded theory methodology and methods used in this research

Since Glaser and Strauss (1967) introduced the grounded theory methodology and outlined the associated methods, it has evolved into many traditions. Common to all is the emergence of a theory that is ‘grounded' in the data, but they differ in how the methodology and methods are applied to develop the grounded theory.

After completing an extensive literature review on grounded theory, and its application to a variety of relevant settings, a decision had to be made on which of the many grounded theory methodologies and methods would be used in this research. This review resulted in three potential approaches being that of Glaser (2001), Strauss, (2008), and constructivist grounded theory (Charmaz, 2014).

Glaser advocates the ‘discovery' of theory where categories emerge from the data, generated from empirical evidence. Constructivist grounded theory adopts a similar approach but avoids the positivist empiricism assumptions. Instead, constructivist grounded theory is much more flexible in what methods are required to identify the emerging theory. Straussian methods employ a set of clearly defined procedures that guide the researcher towards the emerging theory. These three methods offer the researcher varying levels of support and guidance, as well as some ontological flexibility, in carrying out grounded theory.

However, Straussian approaches are overly prescriptive and, like the mixed, the methods approach, not something that I thought would be flexible enough to respond to the emerging theory. This left constructivist grounded theory which allows the researcher to develop suitable approaches within a set of principles and practices that are more flexible than those of Corbin and Strauss (2008).

While the constructivist approach worked well for the initial research processes, problems with accessing students and their electronic portfolios meant that I also had to modify the sampling and data gathering approach. Grounded theory approaches recommend 'theoretical' sampling which Glaser and Strauss (1967) describe as:

> "the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data, and decides what data to collect next and where to find them, to develop his theory as it emerges."

Theoretical sampling, therefore, guides the researcher to choose where they obtain their data from. This is based on the initial research question, and then developed alongside any subsequent data they have gathered in the research process (Charmaz 2014, pp. 192-199; Glaser & Strauss, 1967). Therefore problems with accessing the students and their portfolios meant that the initial sample could not be a 'theoretical sample' because the emerging theory did not inform the sample.

Because of these difficulties an online questionnaire was devised, primarily to identify a sample of students, but also to gather data that could be used in the analysis. The data gathering in the questionnaire was based on the research aim and questions and then influenced by the literature review and data gathered at that point. The data collected from the online questionnaire, especially the open responses, highlighted further points that were investigated in subsequent interviews as part of the grounded theory methods. Also, the questionnaire allowed larger amounts of data to be gathered on the specific questions that did not necessarily need qualitative information, for example, the types of electronic portfolios used and who contributed to the electronic portfolios.

Developing a data gathering tool in this way, like having a convenience sample, does not conform to grounded theory methods, where data gathering should be based on emerging data. However, the online questionnaire was seen as the best way to support the research at that stage. It was noted that the use of questionnaires and quantitative data in grounded theory had been accepted by Glaser (2008), Walsh (2014b) and Ball (2013) in the belief that ‘all is data' and can contribute to the grounded theory. So, the use of questionnaires, although forced in this instance, could still contribute to the emerging data.

The issues with sampling and data collection raised concerns that made me question if the methodology and methods I used could still be termed

grounded theory. Indeed, could the emerging theory still be considered as 'grounded' in the data that was being collected. I revisited the literature to see if any alternative methods could respond to these issues.

I considered that the research now had more in common with Cresswell's mixed methods (2008) because it was going to use a combination of both quantitative and qualitative data. However, a further review of the literature identified authors who were combining quantitative, qualitative and grounded theory methodologies into a 'grounded theory mixed methodology' or 'mixed method grounded theory' (Ball 2013; Harrison & Murray, 2012; Walsh 2014a). The justification these authors used for using mixed methods grounded theory is that by limiting grounded theory to qualitative data, it might exclude quantitative data that is as important in understanding the emerging theory (Walsh, 2015). Indeed, it is argued here that this was Glaser and Strauss's (1967) original intent for grounded theory approaches and confirms the assumption that 'all is data'. Mixed methods grounded theory suggests that the generation of theory can still be 'grounded in the data' (Matavire & Brown, 2013, p. 121).

While considering my position and this literature, it was becoming obvious that my original intention of following constructivist grounded theory was becoming more difficult. Although I could term my approach as mixed method grounded theory I also found that the literature all included the broad principles of grounded theory. A decision was made at this point to

follow these 'broad' grounded theory methods to ensure that the research I conducted was as faithful to these methods.

Reassurance that the use of broad grounded theory approaches had previously been used came from Kennedy and Lingard (2006), Matavire and Brown (2011) Mills, Bonner, and Francis (2006) and Razavi and Iverson (2006). These studies used the broad principles as a guide rather than a rigid framework to ground the development of theory in the available data. The literature described here was supplemented with a further literature review and was then used to generate a flexible guide to the methods that were used:

1. *Theoretical sampling* to identify the samples used in the research
2. The researcher being aware of *theoretical sensitivity* or the way the approach could impact on the emerging theory
3. *Constant comparative analysis* of the emerging data to ensure that the emerging theory is based on the data
4. *Coding and categorisation* of the data that then contributes to the emerging theory. This continues until *saturation* occurs i.e. no more codes or categories emerge
5. The production of *analytic memos* where the researcher details their thinking processes in relation to the progress of the research and emerging theory

6. *Literature* that supports findings is applied to the results

7. *Integration of theory* where the theory that has arisen is used to explain what was found.

The guide I have developed here is not intended to impose a rigid structure, as Corbin and Strauss (2008) suggest in their work, but to act as a prompt for me to consider what grounded theory methods to use. How these methods were applied in this research are discussed in the following sections.

It is worth pointing out that although the early research deviated from grounded theory approaches (sampling and data collection via the questionnaire) I could ensure that subsequent aspects of the research followed the grounded theory methodologies more closely. For example, I was able to employ theoretical sampling by choosing the online showcase electronic portfolios that addressed limits in the initial convenience sample of electronic portfolios. I was also able to apply grounded theory methods in the remaining data analysis.

3.3 The Sample

The aim of sampling is to make sure that there is enough student data to achieve theoretical saturation, and answer the aim and questions of the thesis. As a reminder, the aim is to investigate how electronic portfolios support the social construction of knowledge by healthcare students by answering the following questions:

1. What is the form and function of the electronic portfolios used in healthcare education in relation to the social construction of knowledge?

2. What are the associated processes and artefacts of the social construction of knowledge in healthcare courses?

3. What do healthcare students think about the use of electronic portfolios in their courses, as they socially construct knowledge?

The sample therefore required data from a range of the types of electronic portfolios, identified in Chapter 1, as well as responses from students about their use of electronic portfolios. The sample would be theoretically sampled until saturation of the theory occurred.

To do this a sample of 82 students was identified in 4 stages.

Firstly, a convenience sample identified 5 students who were willing to have their electronic portfolios analysed and one also agreed to be interviewed. An online questionnaire was then used to identify a further convenience sample of 57 students who contributed quantitative data and qualitative data through open and closed questions (see Appendix 2).

Of the 57 students identified through the online questionnaire, 15 took part in face to face or email interviews alongside one interview from the initial convenience sample, so 16 interviews in total.

A final sample, of 20 students' online electronic portfolios was chosen to explore publicly available showcase electronic portfolios.

This sample resulted in data being generated from an analysis of 25 student electronic portfolios, 16 interviews, and 57 responses to the online questionnaire.

3.3.1 The student sample used in the research

This section discusses the steps taken to ensure that the sample was as close to a theoretical sample as was possible. The discussion then details the limitations but acknowledges how later sampling and analysis contributed to the generation of the grounded theory.

Recruitment began with a web search to find several Universities in the United Kingdom that were using electronic portfolios. The use of Joint Information Systems Committee (JISC) mailing lists, and electronic portfolio

providers resulted in a range of Universities' healthcare courses that used electronic portfolios. An introductory email was sent and followed up with phone calls.

This approach generated an initial response from 10 HEI's that delivered pre-and post-registration courses including, nursing, midwifery, medicine, and physiotherapy. When expressions of interest were received, a detailed outline of the proposed research was sent, including the statement of ethical approval from the School's Research and Ethics panel. Within the outline, details were included outlining my wish to interview the students and access the electronic portfolios of the participants (see Appendix 1).

When I said I wanted access to the students' electronic portfolios, it became apparent that this was problematic and the universities I contacted showed reluctance in allowing me access. When I was given access, to the first five UK electronic portfolios, I was told that while I would be allowed to access the portfolios, no data could be exported or captured for later analysis. This was despite my assurance of maintaining confidentiality. Thus, the first expression of interest from 10 HEI's did not yield any further participation. In retrospect, this may have been because of my naivety in expecting access to the electronic portfolios, but it did begin to give insights into the later exploration of sharing and the social construction of knowledge.

As I investigated reasons for the universities reluctance the reasons given were that the portfolios 'belonged' to the students. These portfolios could,

therefore, hold confidential information that may be generated by, or be related to, the student.

It also appears that a statement in my information sheet contributed to universities reluctance. This was:

> "As a Registered Nurse I am bound by a professional code of conduct that requires I consider a "duty of care", and if I came across evidence of "harm", I would be obliged to follow this up with yourself and an appropriate academic contact."

I had thought that including this statement would show that I was taking a robust approach to my responsibilities as a nursing academic researcher. However, it appears that both academics and students might have misconstrued my true reasons for examining the electronic portfolios because of this. The research was never intended to highlight weaknesses in individuals, institutions, processes or tools but this seems to have made them think that this was what I was trying to identify. I can, in retrospect, see how this could deter participation.

Following this setback, I amended my introductory letters and approach to include the completion of an online questionnaire with an invite for the student to take part in an interview. These were re-approved by my School's Research and Ethics panel.

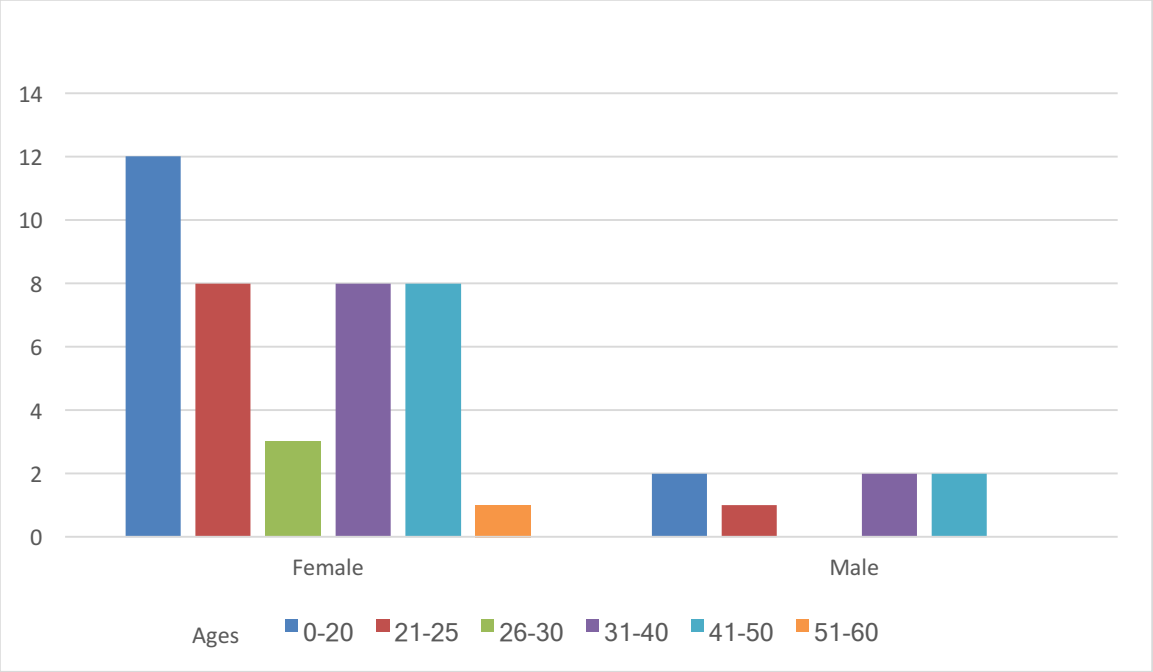
I also took from the reluctance to 'share' that it would still be problematic for me to find a sample that allowed access to electronic portfolios.

This resulted in the development and deployment of an online questionnaire which is discussed in detail in section 3.4.1. It was easy however to convert the issues I would have addressed in my analysis of the electronic portfolios to a set of online questions.

One of the pieces of data that emerged about the sample was based on the results of the online questionnaire and was on the age and gender of respondents. Within the interviews not every respondent was willing to disclose this demographic information, and as explained later this became less relevant as the theory emerged. Demographic data, other than gender was also absent from the North American electronic portfolios

Generating any theory based on this incomplete and at best low numbers spread across the various samples was therefore problematic. With these limitations in mind Figure 4 is included and shows that although some demographics that characterise healthcare students, a prevalence of females for example, these students were between the ages of 30 and 50. This is an older demographic represented in this sample than would be expected in the wider population.

Figure 4: Age and gender of all respondents where given



Other limitations include the range of courses the students were on. While there was the expected predominance of nursing across both pre and post-registration courses the numbers from other professions make generalisation more difficult but as will be seen not impossible.

The sample included pre-registration nursing students (n=31), post-qualifying nursing students (n=14). Other professions included midwifery, medicine, and radiography though numbers in these were smaller. Any grounded theory based on these demographics would also be limited.

3.3.2 The electronic portfolios sampled in the research

Eighty-two students provided information on their electronic portfolios through direct analysis as well as through the online questionnaire and interviews. This data was collected over a four year period between 2012 and 2016.

Twenty-five electronic portfolios were analysed independently in the research using the methods described in section 3.4.2. Five were bespoke, designed specifically for one UK University, and were not able to be viewed publicly over the internet. The remaining 20 portfolios were identified at a later stage in the research as part of theoretical sampling in response to the lack of representation of showcase and openly available electronic portfolios. After an extensive online search the 20 showcase electronic portfolios could only be sourced from North America. No other countries or courses could be found that shared these portfolios online. This finding held true through to the conclusion of the writing of the thesis. This is taken as an indication that this is not usual for healthcare students' electronic portfolios to be shared and this was explored in later stages of the research.

Of the 20 North American showcase electronic portfolios, 11 were hosted and developed for University and College websites, e.g., Central University of New York's OpenLab and Georgetown's blogging platform. Nine were organised by the individual students themselves, and of these nine, six were hosted within WordPress and three within Google sites. None of the North

American electronic portfolios used commercially available portfolio prevalent in the UK and Australia such as Pebblepad.

The online questionnaire sample included courses in BSc Nursing, MSc Nursing (postgraduate study), BSc Midwifery, MSc in Medical Informatics, MSc in Social Work, MSc in Public Health, and a Doctorate in Dentistry.

Figure 5 collects the information described above and from the remainder of the data sources to show that the majority of the 82 electronic portfolios, were from the UK and not openly available over the Internet. Of these 62, 80%, were Pebblepad users and 20% were using software developed by their institutions.

On the other hand, the twenty North American portfolios were openly available on the Internet, 40% were Web 2.0 portfolios, e.g., Wordpress, Google Sites, and the remainder were institutional electronic portfolios (60%).

Figure 5: Percentage use of open and closed access portfolios showing origin of software used by students in the UK (n=62) and North American (n=20) samples

3.4 Data gathering tools

Grounded theory methodologies suggest that the researcher should decide on the best methods to gather data based on the theoretical sampling that occurred in the research (Glaser & Strauss, 1967). So, methods to identify student views and understand the form and function of electronic portfolios were needed to answer the aim and questions set out at the start of the thesis.

A review of the literature, suggested that gaining student views within grounded theory could be done through questionnaires, surveys and interviews (Davis et al., 2009; Gerbic et al., 2009; Hsieh et al., 2015; Pincombe et al., 2010; Timmins & Dunne, 2009; Vernazza et al., 2011). Within this research, as already discussed, problems with recruiting a sample meant that an online questionnaire had been chosen and this was therefore for pragmatic rather than based on the grounded theory methods. However, the later choice of interviews was led by the data and theory that emerged.

The online questionnaire was therefore developed with greater influence from the literature review while the interview questions were developed from the emerging data and subsequent literature review (see section 2.4 through to 2.6).

Analysing the content of the electronic portfolios, to find the socially constructive processes and artefacts, began with the application of the tools and frameworks defined in the literature review (see section 2.4 and 2.5). So, the ways in which the interviews and electronic portfolio analysis occurred followed the grounded theory method of constant comparative analysis where the emerging data informed how and what was explored (Glaser & Strauss, 1967). The ways in which the online questionnaire, electronic portfolio analysis and interviews were developed is explored in the following sub-sections.

However, before this discussion Table 3 summarises the way the tools were applied and developed in response to the constant comparative method

The table demonstrates that the research began by analysing an initial set of electronic portfolios and one interview (column 2 and 3). This preliminary analysis highlighted that a refinement of the methods needed to identify how the social construction of knowledge occurred, in electronic portfolios and the interviews with students, was necessary. This resulted in literature being consulted, which was then applied in the questionnaire, the primary set of interviews, and electronic portfolio analysis (columns 4, 5 and 6).

Table 3: Summary of tools used to gather the research data

	Portfolio Analysis	Interview	Questionnaire	2nd Interviews	Online Portfolio Analysis
Purpose of portfolio					
Socially constructive processes					
Socially constructive artefacts					
Views of students					

A condensed timeline to illustrate when each of the data gathering methods started and finished is shown in Table 4 that follows.

Table 4: Condensed timeline showing data gathering periods

	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6
Interviews						
Questionnaire						
Portfolio analysis						

3.4.1 Online questionnaire

The use of questionnaires in grounded theory is often criticised as potentially putting limits on the theory that emerges because they use closed questions that do not allow the researcher or respondent to fully explore the areas under investigation (Corbin & Strauss, 2008; Glaser & Strauss, 1967).

Despite this there is a body of literature that supports the use of questionnaires to identify data, as was used in this research, which then informs later data gathering (Carini, Hayek, Kuh, Kennedy, & Ouimet, 2003; Corbin & Strauss, 2008; Glaser & Strauss, 1967; Kays, Gathercoal, & Buhrow, 2012).

The questionnaire used in this research was devised within the Bristol Online Survey tool and the full set of questions, developed after considering the aim and questions of the research, literature review, and data gathered up to that point, can be found in Appendix 2. These though are summarised below:

- The types of electronic portfolios used by the students?
- The main reasons that the electronic portfolio was used, as expressed by the student?
- How was the learning recorded within the electronic portfolio by the student?
- Who else, besides the student, contributed to the electronic portfolio?
- In what ways did the students' say that the electronic portfolio's software and hardware impact on their learning?
- Do the students express a preference for paper or electronic portfolios?

3.4.2 Analysis of electronic portfolios

The analysis of the healthcare students' electronic portfolios was based on identifying their form and function. This included: if they were showcasing, assessment or learning portfolios as identified in section 1.4.5; data on the software manufacturer; if the student or institution 'owned' the electronic portfolio (see section 2.3); and whether the portfolio was publicly available or not. This information was also collected at the start of the interviews, within the online questionnaire, and from analysis of the electronic portfolio within NVivo.

During the analysis of electronic portfolios, the definition of learning, assessment and showcase portfolios alongside 'ownership' did not provide a sufficient understanding of the breadth of the forms and functions of the electronic portfolios, so additional methods were sought to identify differences. A literature review resulted in numerous ways to differentiate the forms and functions of electronic portfolios but these were summarised in Tomkinson's framework (1997).

Originally used to differentiate the form and function of paper portfolios in teaching, Tomkinson's framework (1997) describes four portfolio forms and three portfolio functions. While Tomkinson described these in terms of dichotomies, when I completed the analysis, I found that some electronic portfolios contained both elements of these dichotomies (see section 3.4.2) and this needed to be taken into account.

Tomkinson’s four forms are based on the portfolios style, structure, whether the content is confidential and how they are completed by the student. The *style* of the portfolios could be ‘descriptive' where the student would be expected to describe the learning that they participated in during their courses. Alternatively, the style could be ‘reflective' where students develop their learning through referencing and reflecting on that learning. The *structure* of the electronic portfolio could be either ‘informal' where the student creates their content to meet outcomes or ‘formal' where there are set ways in which to demonstrate learning. Tomkinson also identified *confidentiality* as something that can differentiate the form of electronic portfolios, where confidentiality means that the portfolio is either ‘open' (available to all) or ‘closed' (available to a few). Finally, the *timing* of how students presented the electronic portfolio was able to show if the content was submitted at an ‘end point', for summative assessment for example or ‘continually' as ongoing formative or summative assessment.

Tomkinson also identified three functions of electronic portfolios related to their scope, purpose and content. S*cope* identifies if the electronic portfolios record student learning or details the application of learning to situations by the student. The *purpose* of electronic portfolios is related to whether it is summative or formative. The content of the electronic portfolios could be f*ocussed* on a set of objectives, professional body outcomes for example, or

free form where the student can take the results in a direction they think is appropriate to demonstrate learning.

It was through analysing assessment, learning and showcase elements alongside Baumgartner's 'ownership' (Baumgartner, 2009) and Tomkinson's framework (Tomkinson, 1997) that I was able to fully understand the form and functions of electronic portfolios in healthcare education.

The analysis of the electronic portfolios also attempted to identify the processes and artefacts related to the social construction of knowledge. This began with the application of the tools and frameworks defined in the literature review (see sections 2.4 and 2.5). This was an iterative process following the constant comparative method and meant that the electronic portfolios would be continually revisited as a new theory emerged. This, as described previously, occurred until there no more processes and artefacts emerged within the portfolios as part of the saturation of the theory.

Analysis began with identifying the processes used within the electronic portfolio, e.g., assessment, reflection or feedback, as identified in the literature. It then attempted to identify other processes. If a process emerged at a later stage, the remaining electronic portfolios would then be re-analysed to see if they also contained this new process. Processes were not just related to these structural processes, but were identified through

communities of practice and then how they were institutionalised and legitimised through computer supported collaborative learning and Web 2.0. A similar method was used to find the artefacts within the electronic portfolios.

3.4.3 The use of face to face and email interviews alongside the questionnaire's free text responses

Analysis of students' views of electronic portfolios was achieved through 16 interviews in addition to the free text responses to the online questionnaire. The 16 students who were interviewed are detailed below with details of their age which was considered important at the outset of the research, the types of electronic portfolio used, the professions represented, the type of interview and which of the five universities the students came from.

The 16 interviews that were conducted consisted of 10 face to face interviews, which included one Skype interview, and 6 email interviews. This is summarised in Table 5 with names, as in all the presentation of all subsequent data, anonymised to ensure confidentiality.

Table 5: Interview sample

Student	Age	electronic portfolio	Profession	Interview Type	University
Robert	41-50	Pebblepad	Nursing	email	2
Rachael	-	Pebblepad	Nursing	Face	2
Catherine	41-50	Pebblepad	Nursing	Skype	3
Elizabeth	41-50	Institutional	Nursing	Face	1
Hannah	41-50	Pebblepad	Nursing	Face	3
Stephanie	31-40	Pebblepad	Nursing	Face	3
Olivia	31-40	Pebblepad	Nursing	email	2
Ella	-	Pebblepad	Nursing	Face	3
Hilary	41-50	Pebblepad	Nursing	email	3
Joseph	21-25	Institutional	Medicine	email	4
Mandy	41-50	Institutional	Nursing	email	1
Nichola	41-50	Institutional	Nursing	Face	1
Linda	-	Institutional	Nursing	Face	1
Sophie	-	Pebblepad	Nursing	email	5
Megan	-	Institutional	Nursing	Face	1
Andrew	41-50	Institutional	Podiatry	Face	1

In addition, students who gave responses to the free text questions in the online survey, but were not interviewed, are named in Table 6 below.

Table 6: Questionnaire free text responses

Student	Age	Electronic portfolio	Profession	University
Fiona	0-20	Pebblepad	Nursing	2
Jane	0-20	Pebblepad	Nursing	2
Alison	0-20	Pebblepad	Nursing	3
Joan	41-50	Pebblepad	Nursing	-
Adele	21-25	Pebblepad	Nursing	-
Ruth	31-40	Pebblepad	Nursing	-

The qualitative data was gathered from twenty-two unique individuals who were predominantly nurses and used Pebblepad (n=15) or an institutionally developed electronic portfolio (n=7).

It is important to note that most of the interviews were conducted with healthcare students who were aged between 30 and 50. This was considered and balanced against other sources that included the other age ranges in the comparative analysis. This included an acknowledgement that because of the general unease students felt in disclosing their experiences with electronic portfolios, that older respondents were more at ease with discussing and sharing their views than younger respondents. This, it is suggested, is due to a relative confidence that may come with age and experience.

While the free text responses were gathered at a fixed point in the online questionnaire, the interview questions were developed using the grounded theory constant comparative method. This meant that in the first interview the student was asked about their views on using their electronic portfolio in their learning and the student could freely discuss the topics that mattered to them. When the student's discussion ‘dried-up' or wandered off topic, I introduced broad prompts around the areas I wanted to investigate. The interview, therefore, balanced the requirements of the research with grounded theory approaches and allowed the theory to emerge from the data. Care was taken not to direct the discussion or impose any of the thoughts or beliefs I, as the researcher, had about the electronic portfolios. Subsequent interviews refined the questioning in response to the earlier research and each interview was unique in this respect.

It is acknowledged that while investigating student views about their learning, the majority of students would not be able to describe their learning in terms of ‘knowledge that was socially constructed’ that I was interested in as a researcher. Instead the students would probably see this as learning without knowing how it was achieved. Even so, the research assumed that students were able to have insights into their learning and demonstrate "knowledge and thought about thinking and learning itself" (Pritchard, 2013, p32).

The impact of the limited insights by students into their own might mean, for example, that students were not able to fully express their experience of learning with electronic portfolios resulting in me ‘guiding’ the students' responses. Being reflexive though, and bracketing my thoughts and feelings, during data gathering (see section 3.6) addressed this concern.

Importantly I also concluded, through examining the students’ learning processes and artefacts, that all the students’ learning can be considered as being socially constructed. For example, when students learn independently they draw on knowledge, in books, journals and online resources that were developed by ‘others' and are thus socially constructed. This means that I can focus on the processes and artefacts of learning, in the knowledge that any that were identified would be a product of the social construction of knowledge.

With the understanding of the limitations of student insights and the acknowledgement that all knowledge can be regarded as socially constructed three stages were used to guide the research in conjunction with the aim, questions and ongoing findings of the research:

Stage One

"Can you tell me about some of the things you have learnt on your course that you have recorded in your electronic portfolio?"

Using the examples given by the student begins to explore:

- How it has been registered in the portfolio; e.g. text, reflection, assessment?
- Who was involved in that process of learning?
- How did they get from the act of learning to record learning in the electronic portfolio e.g. was it facilitated in the portfolio or an experience that was then written up?

Stage Two

"Can you tell me how you thought the electronic portfolio itself helped or hindered in how you learned things on your course?"

- If required prompt students to consider how the hardware and software might have influenced learning
- How did the software help or hinder your learning?
- How did the hardware; e.g. computers, mobile devices, help or hinder learning?

Stage Three

The interview would end by asking the students if they had any final comments they wanted to make; to ask the student to address any point that they were not asked; or if the student felt they wanted to expand on previous responses.
Interestingly stage three was often the richest part of the interview as it appears that students felt more relaxed after the formal element of the research and they reflected on some of their responses.

The process of refining the questions and conducting new interviews stopped once saturation was achieved (Glaser & Strauss, 1967). This, as described previously is the point when no new codes or categories emerged.

For those students who were interviewed and had already completed the online questionnaire, their responses were extracted from the questionnaire and summarised for the student before the interview took place. As an example, if a student said they had used images as an artefact of learning this would be discussed in the first stage of the interview (above) that dealt with "What artefacts are recorded in the electronic portfolios?".
An example of an interview transcript that shows how the questions were integrated and explored can be found in Appendix 5.

The students who were less confident with face-to-face interviews requested email interviews and as with the limitations of face-to-face interviews it is useful to describe the effects of this on data gathering.

Meho (2006) suggests that while face to face and telephone interviews allow interaction and feedback, email interviews do not offer these to the researcher. This might result in some of the subtleties of the visual and non-verbal responses being lost. While this is acknowledged, the emails were useful in this research because it allowed the students to feel less threatened by the interview process.

The sample from the face to face interviews and email interviews were compared at regular intervals, and there were similarities in the theory that emerged in these two groups. Because the email interviews used the same broad questions, described previously, the questioning and answers were the same as those of the face to face interviews.

Concerns over the lack of usable data were not found in this sample as, for example, Hanna's email interview was a rich source of data in the results.

3.5 Methods of data analysis and the use of NVivo

As data was gathered from the interviews, online portfolio and electronic portfolio they were analysed through coding and categorisation and constant comparative analysis and supported by the use of analytic memos and the application of literature at key points (Charmaz, 2014; Corbin & Strauss, 2008; Glaser & Strauss, 1967).

For this research, an appraisal of computer and non-computer based methods of analysing data in grounded theory approach was carried out and resulted in the decision to use computer based methods. While Bazeley and Jackson (2013a) outline several advantages and disadvantages of using computer aided qualitative data analysis software, Basit (2003, p. 143) concludes, this is more to do with "the size of the project, the funds and time available, and the inclination and expertise of the researcher". These reasons did indeed prompt the decision and, as an experienced user and advocate for computer based approaches in education and research, I decided that the advantages offered by computer based methods was more appealing than the traditional 'paper and scissors' approach. This was especially true as many of the pieces of data I was analysing were digital and easily imported into NVivo the chosen software package.

3.5.1 Choosing the data analysis tool

There are several computer-assisted qualitative data analysis tools available for grounded theory research including ATLAS.Ti, DEDOOSE, MAXQDA and NVivo. Each of the various software options had a range of advantages and disadvantages. With no one option being better than the other, a pragmatic decision, based on availability within my university, resulted in NVivo being the preferred choice.

Using NVivo allowed me to work with a range of data from the electronic portfolio analyses, questionnaire and interviews. It also allowed me to manipulate, query and compare the data across a range of codes and categories to develop the central themes that can then be translated into the theory (Bazeley & Jackson, 2013; Gibbs, 2002; Hutchison, Johnston, & Breckon, 2010; Johnston, 2006).

There are however several acknowledged limitations of using NVivo. The sophistication of QDAS packages requires a level of skill in understanding the necessary processes and steps required to extract the relevant information and if the user does not possess these skills then there is a danger that this can lead to missed or incomplete analysis (Bazeley & Jackson, 2013; Bringer, Johnston, & Brackenridge, 2004). Over the duration of the research felt I achieved a level of expertise in using NVivo, but I still felt there were areas where this could have aided the emergence of data. For example, not fully understanding the power of using the software as a

research journal to connect my analytic memos and provide a full audit trail of the research. It was also noted that keeping research articles related to the data, codes, and emerging themes outside of NVivo meant that making links to the literature more difficult when I was writing the thesis. Because NVivo offered a structured approach to data analysis, I may have relied on this aspect to generate the emergent theory. This, when combined with quantitative information on qualitative data, may force the emergence of findings in these terms (Bringer et al., 2004)

There was also a feeling at times that the software presented so much data after coding that it became difficult to see the themes that were emerging. The number and spread of the codes made this difficult initially, and it was necessary to return to the interviews outside of NVivo to be reacquainted with what the students were saying.

Nvivo may also be criticised for disassociating the student from the words that they spoke because of the format of the imported data (Bringer et al., n.d.). The act of converting their words from their original rich sources that include a range of verbal and non-verbal cues to textual data is thought to remove part of the 'essence' of what the students were saying (Bringer et al., 2004).

While it is acknowledged that these dimensions could have had an impact, or reduced the extent of the research findings, I remain confident that combining the use of NVivo with the methodological framework provided by

the grounded theory approach has allowed a full exploration of the data through coding the data, constant comparison, bracketing and reflexivity.

3.5.2 Coding and the generation of categories with NVivo

Coding within this research began with 'initial' or 'open' coding where the raw data from the interviews, online portfolio and electronic portfolio analysis was imported into NVivo and given an initial set of labels (Charmaz, 2014; Corbin & Strauss, 2008). These labels or codes are referred to as nodes within NVivo.

While some might argue that grounded theory should not allow quantitative data from the online survey to be included, I found that the information the online survey generated helped me identify categories for further investigation in later research. The use of data, not qualitative or gathered as part of traditional grounded theory methods is supported in part by Glaser and Strauss (1967), who suggested that "all is data".

An example of a coded interview can be found in Figure 6 where the coloured bars and associated text on the right refer to the coding of the interview on the left of the page.

Figure 6: Example of the coding in NVivo

DVT_A005_140827_0957

I: It is, yeah, yeah, I know a little bit about it, it sounds scary, great. Can I move onto the ePortfolio itself then. What would you say were the good aspects of the ePortfolio, what did you really enjoy about it when you used it?

R: I liked, you could always see the assessment criteria, so when you were working, you'd know what you were working against. The timeline, there's a timeline and on the top, which tells you how much time you've got left, it really helps you focus. Erm, so and it also tells you how much of the work that's set on there, have you completed. So as you have something completed and signed off, it actually not only ticks off the learning objectives, but it actually says you've got so much of your evidence. So you can actually see as you work, it progresses and you know how much. I'm not saying I didn't have it signed off the day before, but that was work and different things, so, erm, but you can actually [I: but it's a good visual], it's a good visual prompt to say you're at the half-way point now, right, how much have I got done and focusing to get it done because even though you may have it, those two pieces that were there just needed typing in. So in a night, I had it sorted up to there. The contact with the people who, like the consultant, the pharmacist, the non-prescriber, course leader, when you submitted a piece of work, it came back to you via the ePortfolio, so you just had to access it and I quite liked that because then it didn't get mixed up into the rest of my emails. So it was, like the case study, I submitted it, the first one, [redacted], my tutor, my consultant, came back, yeah fine, you could have discussed, which was whether to stop the drug or not. On the second one, there was prompts, well think about this, think about, think about this, so that case study went backwards and forwards. So he was prompting my learning as well was me. Erm, so checking that, like knowing when I'd submitted something to somebody, thinking right, they're busy, I'll give them twenty four hours and then another email, so it helped in that way because I could see where they were at and it didn't get mixed up in my work email, so they got

documented I suppose. So I quite liked it, it didn't go, people worry that they're going to, its technology, its going to be faulty. It might do, but it didn't. Err, we knew when upgrades were coming, so we knew when it was going to be out of circulation and things like that, erm. I think it was a positive experience, something new, which is something we're looking at now within work, to find some sort of ePortfolio that we can evidence for learning as we go towards this advanced practice. Erm, just somewhere that we can have everything together, as I say, instead of scraps of paper everywhere. So that's on the burner at the minute, looking at something.

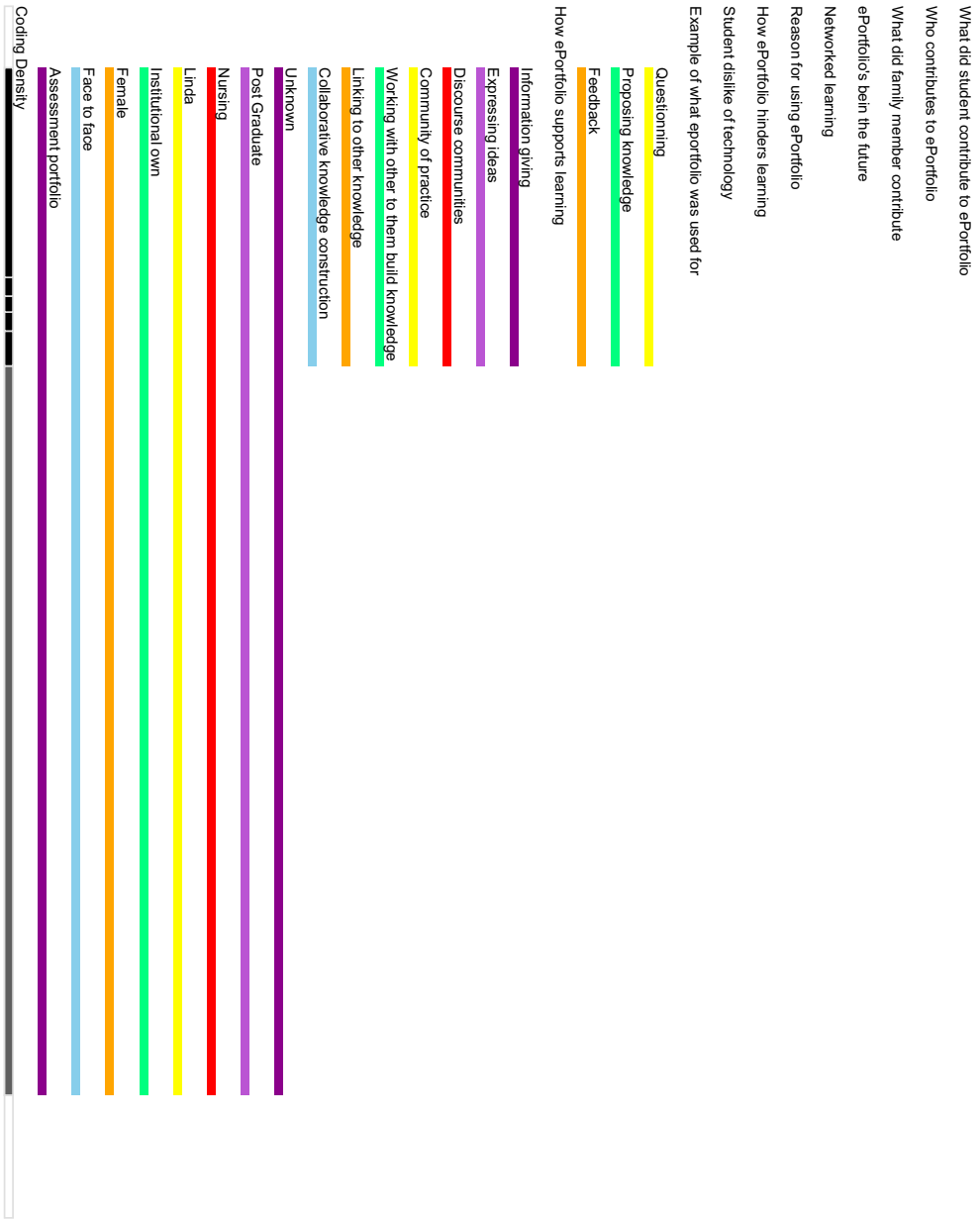
I: Any negatives then, about it? You feel, it feels that you're fairly positive about it, but?

R: Me putting something in the wrong place, but that was me just, yeah, made a mistake, but it was quickly rectified, as I said. I'm not the first one, I won't be the last, erm, no, I thought it was fine, I didn't think there was anything really negative. I'd say getting something into a thousand words can be a challenge actually, but.

I: So it was the restrictions on the work rather than the ePortfolio.

R: Yeah, but it helps you focus, it stops you rambling.

I: Yeah, ok, that's fine. When you were filling out the ePortfolio then, was there anything that you thought that the skills that you had personally or the knowledge that you had personally, that made using that ePortfolio better? I mean one of the things that you said earlier was the way that you learn, you know, and it helps structure that learning for you, but it also prompted you to do other things. But I just wondered if there was any sort of skills or background knowledge that you think that you had that made using that ePortfolio a better experience than maybe some of your other colleagues that might have struggled a bit with it.



During ‘focussed coding', the initial codes were grouped into categories that subsequently contributed to the emergence of themes. This open and focussed coding continued until no new themes emerged and as such the themes were considered ‘saturated'. Once the themes were saturated, I could then begin to develop theories that were grounded in the data (Charmaz 2014; Corbin & Strauss, 2007; Glaser & Strauss, 1967).

Section 3.2 discussed how grounded theorists have different views on emergence. While these differences offer valuable insights into the data analysis for the researcher, it was decided to use the broad principles of emergence to generate the categories, and themes that will lead to the emergent theories based on these methods.

At various stages in the coding nodes were generated as a result of exploring the emerging categories and themes through published literature. These codes included ‘assessment’, ‘feedback’, ‘communities of practice’ and ‘networked learning’ as well as those identified via the various frameworks discussed in section 2.5.

During focussed coding, these nodes were grouped to determine categories of codes. As an example, one set of codes were categorised around the student's ‘community'. This categorisation led to the emergence of the theme that socially constructive processes involved a specialist community of practice or ‘discourse community' (see section 2.4.3) that had

contributions from peers, academics, practice staff in which assessment and feedback occurs.

3.5.3 Constant Comparative Analysis with NVivo

Constant comparative analysis is described as a process where data is compared with previously collected data to look for the similarities and differences in the data which then contributes to the development of themes and categories (Walsh 2014b, p. 6). This continues until no new theory can be generated (Glaser & Strauss, 1967). Constant comparative analysis methods were applied in this research during the coding, categorisation and identification of the themes in NVivo and were supported by the writing of analytic memos that contributed to ensuring rigour and reflexivity that will be discussed shortly.

The constant comparative analysis began after the initial electronic portfolio analysis and interview. The data from this stage was then coded, and categories were identified that then influenced the development of the online questionnaire, informed the interview questions and subsequent electronic portfolio analysis. It is important to note that this occurred incrementally as each new category or theme emerged.

3.5.4 Analytic Memos

Analytic memos were used in this research at various points, as part of the constant comparative analysis and to structure my ideas around the emerging data and the categories. They contributed to the formation of the emerging theory. As suggested by Charmaz (2006), Corbin & Strauss (2008), Gibbs (2007) and Saldaña (2012) analytic memos were used as I moved through the various stages to record the ideas that emerged and the 'internal debates' that I had.

While Corbin and Strauss (2007, pp. 117-141) offer a number of methods with which to manage analytic memos NVivo, allows for the creation of memos and, notably, for these memos to have dynamic links to a range of sources including codes, data, documents, and interview transcripts (NVivo 10 for Mac Help n.d.). This has the potential to offer a broad range of benefits such as keeping the data in one place and the ability to apply emergence and theoretical sampling to the data with greater ease. Analytic memos were initially recorded in NVivo and then, in the later stages of the data analysis, in Scrivener, a piece of software that I was using to help write my thesis. Analytic memos were therefore used as I moved through the various stages to record the ideas that emerged and the 'internal debates' that I had (Charmaz 2006, p. 237; Corbin & Strauss, 2007, p. 310; Gibbs 2007, pp. 30-31; Saldaña 2012a, p. 86). An example of an analytic memo

can be found in Appendix 4 where ideas, generated from the data, were recorded and developed alongside a number of themes.

Examples, in this research, of the use of analytic memos included: an exploration of students thoughts on how electronic portfolios were used to provide evidence in fulfilling course outcomes; determining if electronic portfolios contributed to lifelong learning; investigating how students used the structures built into the portfolios; deciding whether students develop their learning outside using a range of methods and import these into the electronic portfolios?

3.6 Ensuring rigour, reflexivity and ethics in the research

Researchers have a responsibility to make sure that grounded theory research is rigorous, not influenced by the researcher's beliefs, and that it is carried out ethically at all stages of the research.

Glaser and Strauss suggest that research rigour should take account of workability, fit, relevance and modifiability (Glaser & Strauss, 1967), while Charmaz (2014) cites credibility, originality, resonance and usefulness as effective markers.

Chiovitti and Piran (Chiovitti & Piran, 2003) offer eight ways in which a researcher should enhance rigour in grounded theory research. These are listed in Table 7 alongside ways in which they were addressed in the research.

Table 7: Methods of ensuring rigour and their application to this research

Method	Application in this research
(1) letting participants guide the enquiry process	At all stages, participants were asked their views on the use of electronic portfolios. The feedback contributed to theoretical sampling.
(2) check the theoretical construction generated against participants' meanings of the phenomenon and (3) use participant's actual words in the theory;	Any theory generated was supported by student's statements or what students do not say.
(4) articulate the researcher's personal views, and insights about the phenomena explored and (5) specify the criteria built into the researcher's thinking;	This has been covered in the introduction and literature review and revisited in the discussion and conclusion
(6) specify how and why participants in the study were selected	This was articulated in the discussions of theoretical sampling
(7) delineate the scope of the research	This was covered in the introduction and literature review
(8) describe how the literature relates to each category which emerged in the theory	This was covered in the constant comparative analysis, theoretical sampling, discussion, and conclusion.

Adapted from Chiovitti and Piran (2003)

While rigour, as described here, is relatively easy to identify and address reflexivity challenged a number of aspects of my role as a researcher. Being reflexive is not just about reflecting on the research and its process but also requires the researcher to be aware of the effect of 'self' on every aspect of the research (Neill, 2006). Irrespective of Glaser's (2001) suggestion that we do not need to consider reflexivity separately from the correct

implementation of constant comparative analysis it is useful to point out its impact on this research.

One of the most challenging ways to be reflexive was for me to suspend the awareness and knowledge I had gained through my academic and my earlier experiences with electronic portfolios. To be reflexive, I had to consciously put aside or 'bracket' this knowledge until the later stages of data analysis where it helped inform the emerging theory (Bryman, 2012; Corbin & Strauss, 2008; Dunne, 2011; Hall & Callery, 2001).

Being reflexive also required me to acknowledge the differences in the power relationships between myself as the researcher and the students being researched (Bringer et al., 2004; Hall & Callery, 2001). To do this, I had to acknowledge my personal value systems and any associated role conflicts that might have influenced the outcome of the research. For instance, the potential of my academic position at the time of completing the research was something I became aware of and approaching students as a member of academic staff had the potential to make students less open. When approaching the usual demographic of healthcare students, younger females, these students may also have felt less inclined to take part because of my age and gender. I addressed this by referring to myself as a PhD student rather than an academic to try and minimise any perceived power differentials.

At the core of rigour and reflexivity is the need to research in an ethical way. As a nurse and academic, I always consider that I have a professional responsibility to be ethical, but this alone is not enough in the conduct of research. Ethics should also be subject to external scrutiny and checked against a robust system which in this research was done through my School's Research and Ethics Panel (SREP).

It is acknowledged, however, that gaining ethical approval in grounded theory studies raises some issues as the researcher is asked state the specific aims and objectives, produce interview schedules, consent forms, information sheets and defines the sample at the outset. These requests are certainly at odds with a grounded theory approach which calls for these to emerge over the course of the research (Glaser & Strauss, 1967).

In my ethical application, I, therefore, made it clear that this research will be a grounded theory study and stated the broad aim and research questions I hope to address. Ethical approval was successfully obtained from my School's Research and Ethics Panel (SREP) including the outline of the research proposal, letters of recruitment, an information sheet, consent forms and an outline interview schedule.

I did, however, in response to the grounded theory methodology, submit amendments to my ethical approval documents. These were then re-approved at the School Research and Ethics Panel and can be found in Appendix 1.

3.7 Conclusion

This chapter describes the matching of an exploration of social constructive epistemology and ontology with a grounded theory research methodology and methods to answer the research aim, objectives and questions.

In so doing it provides an insight into how the broad grounded theory approach was applied in the research to gain insights into student views and the socially constructive processes and artefacts in electronic portfolios.

By discussing the strengths and weaknesses of this approach and, the data and theory, it generated it contextualises the following findings which are then also picked up in the discussion chapter.

Ensuring the correct methodology and methods are used to explore what students think about the use of electronic portfolios and how the electronic portfolios affect the social construction of knowledge was essential to the success of the research. It was also imperative that the theory generated was a faithful and robust account.

Chapter 4: Results

4.1 Introduction

The thesis set out to understand how healthcare students socially construct their knowledge while using electronic portfolios in their courses by answering the following three questions:

1. Do healthcare student's electronic portfolios support socially constructive learning?

2. If electronic portfolios support the social construction of knowledge what are the associated processes and artefacts?

3. What do healthcare students state are the positives and negatives of using electronic portfolios in their courses as they socially construct knowledge?

Following the application of the broad grounded theory methodology and methods to the sample and the data, the research has identified three socially constructive processes within the electronic portfolios when the categories became saturated. These processes were common across the various forms and functions of electronic portfolios used by healthcare

students in the sample. The three processes were related to community knowledge building, alongside course and student related activities. These processes resulted in four types of socially constructed artefacts: text, PDF's, images and videos.

The form and function, processes and artefacts of electronic portfolios are aligned to course outcomes which are in turn influenced by professional body requirements. This combination of factors in this study resulted in electronic portfolios that were limited in scope.

It is suggested that this limitation, alongside students' competence in using the hardware and software, explain the broadly negative views of students about the efficacy of electronic portfolios. Students did, however, describe some positive aspects of the electronic portfolios and when these were considered alongside the negative views, they gave an insight into how healthcare students perceived their electronic portfolios.

These results will be used in the discussion and concluding chapters to suggest ways in which academics, professional bodies, students and electronic portfolio developers can improve the use of electronic portfolios in healthcare education.

4.2 The form and function of healthcare students' electronic portfolios

The literature review had suggested that healthcare students' electronic portfolios forms and functions conform to the learning, assessment and showcase portfolios identified in section 1.4.5 What was found however was, because of the requirements of the theoretical and practical elements of the healthcare courses, there were aspects of the students' electronic portfolios that made them unique compared to general use and other educational courses. A taxonomy to show this can be found in Figure 8 below.

To arrive at this healthcare electronic portfolio taxonomy the data from the interviews, questionnaire and electronic portfolio analysis was explored through the grounded theory methods described in chapter 3. Analysis of the electronic portfolios using the original assessment, learning and showcase taxonomy is presented in Table 8 (below).

The students' electronic portfolios were analysed following Baumgartner's (2009) suggestion that the use of portfolios was influenced by who 'owned' the electronic portfolio (see the literature review 2.3). This was not found to be the case in these healthcare students electronic portfolios because even when the student developed the electronic portfolio themselves, the professional bodies and courses dictated the form and functions that were found. This was irrespective of them being showcase, learning or reflective portfolios.

This is best exemplified with the Google sites, Weebly or Wordpress showcase portfolios that were built and populated by some of the North American students. Although these electronic portfolios were owned by the students, they were still subject to the course requirements of the outcomes of capstone modules or courses. It could be argued that the courses still ‘owned' the electronic portfolios because of this but if this is the case, more clarity is needed about what ownership means.

The form and functions of the analysis of the electronic portfolios in the sample are shown in Table 8 and Table 9 below.

Table 8 shows a differentiation between the sample from the UK source that demonstrated assessment and learning and the North American portfolios that showcased students' achievements both within and external to the healthcare courses they were on. While the UK assessment and learning portfolios were ‘owned by the institution, the North American electronic portfolios were a mixture of institutionally and student owned.

Table 8: The form, functions and ownership of electronic portfolios in the sample

Origin	Student	Type of electronic portfolio	Ownership
UK	Ann		
	Becky		
	Charlotte		
	Andrew		
	Danielle		
North American (The USA and Canada)	Munoz		
	Kheluram		
	Navitskaya		
	Kea		
	Williams		
	Graham		
	Amalfitano		
	Pryce		
	Binder		
	Cargill		
	Walker		
	Hawkins		
	Steinkopff		
	Allan		
	Bakidis		
	Hu		
	Terill		
	James		
	Messman		

Key to the types of electronic portfolios and ownership in Table 8

Assessment	
Learning	
Assessment and Learning	
Showcasing	
Student owned	
Institutionally owned	

Table 8, therefore, demonstrates that irrespective of the ownership type of electronic portfolio assessment and learning were the main uses of the electronic portfolio. The difference in the North American electronic portfolios is that they may also contain examples of lifelong and life-wide learning. This was lifelong, and life-wide learning was where students detailed how they applied their learning to activities outside their course.
This can be identified in Nicole Hawkins electronic portfolio where she notes

> "Throughout these pages, you will learn about me, how I ended up in Northwestern's MMI program, descriptions of the courses I have completed for my degree, my reflections on those courses and my future plans."

http://nhawkinsmmi13.weebly.com/

A further understanding of the form and function of electronic portfolios came with the application of Tomkinson's framework (1997) to the electronic portfolios that was described in section 3.4.2 of the literature review. These results are summarised in Table 9.
The analysis using Tomkinson's framework shows the unity of form and function within but not across the UK and North American portfolios. The

difference in the form and functions is directly related to the types of electronic portfolios identified in Table 8.

The UK assessment and learning portfolios all describe learning and reflect on it, have a formal structure, focus on learning and its application, have formative and summative elements, are not openly available, have a focussed content, and have assessments throughout and at the completion of the portfolio.

The North American showcase portfolios are reflective, informal, applies learning to a range of experiences, are summative, not confidential, are not structured by academics, and are considered at the end of the module or course.

Table 9: The form and function of electronic portfolios using Tomkinson's framework (1997)

Origin	Student	Style	Structure	Scope	Purpose	Confidentiality	Content	Timing
UK	Ann							
	Becky							
	Charlotte							
	Andrew							
	Danielle							
North American (The USA and Canada)	Munoz							
	Kheluram							
	Navitskaya							
	Kea							
	Williams							
	Graham							
	Amalfitano							
	Pryce							
	Binder							
	Cargill							
	Walker							
	Hawkins							
	Steinkopff							
	Allan							
	Bakidis							
	Hu							
	Terill							
	James							
	Messman							

Key to the elements found in the electronic portfolios

Style (Form)	Descriptive	Reflective	Descriptive and reflective
Structure (Form)	Informal	Formal	Informal and formal
Scope (Function)	Record of learning	Application of learning	Learning and its application
Purpose (function)	Formative	Summative	Formative and summative
Confidentiality (Form)	Closed	Open	Open and closed
Content (Function)	Focussed	Free-form	Focussed and free-form
Timing (Form)	End point	Continuous	End point and continuous

Both Table 8 and Table 9 have identified that the healthcare electronic portfolios in this sample are used to assess or record student learning. This was also confirmed in the analysis of the electronic portfolios in Table 13 where the majority of students were able to demonstrate personal competence and develop knowledge and professional competence.

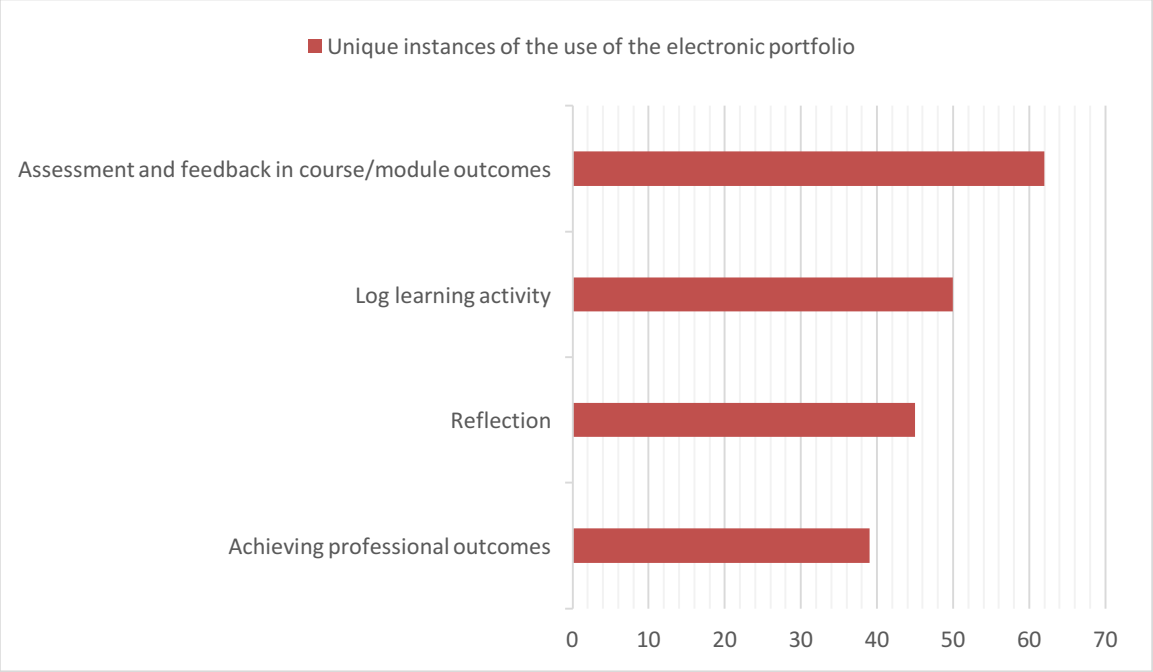
The form and function of this assessment and learning are dependent on the pedagogic use within the healthcare courses that use them. Most of the North American electronic portfolios are used within capstone courses where students are expected to reflect on and apply their learning to contexts outside of the courses they are studying. This removes the need for most of the students to detail their professional learning and focus instead on how this learning has contributed to their personal development.

The use within UK courses is focussed on assessment and learning and contains information about how well the student is doing in achieving these outcomes. This makes the content difficult to share because of disclosure and the potential that it may contain information that is confidential to the student or to the person for whom they are caring. This finding reinforces the reasons for sampling issues I experienced when conducting the research.

Up to this point, the results have been able to describe the forms and functions within healthcare students' electronic portfolios through analysis of the electronic portfolios. The next set of results combines the data from the online questionnaire and interviews to find out what students believe the

electronic portfolios are used for. These results are limited because I was unable to access any North American students, to compare with the UK students who used the assessment and learning portfolios. These uses are detailed in Figure 7 and refer to unique references made by the 62 students. For example, all 62 students in the sample identified assessment and feedback in the questionnaire or during their interview, but only 39 of these students identified achieving professional outcomes as a function.

Figure 7: The four functions of electronic portfolios identified by UK students

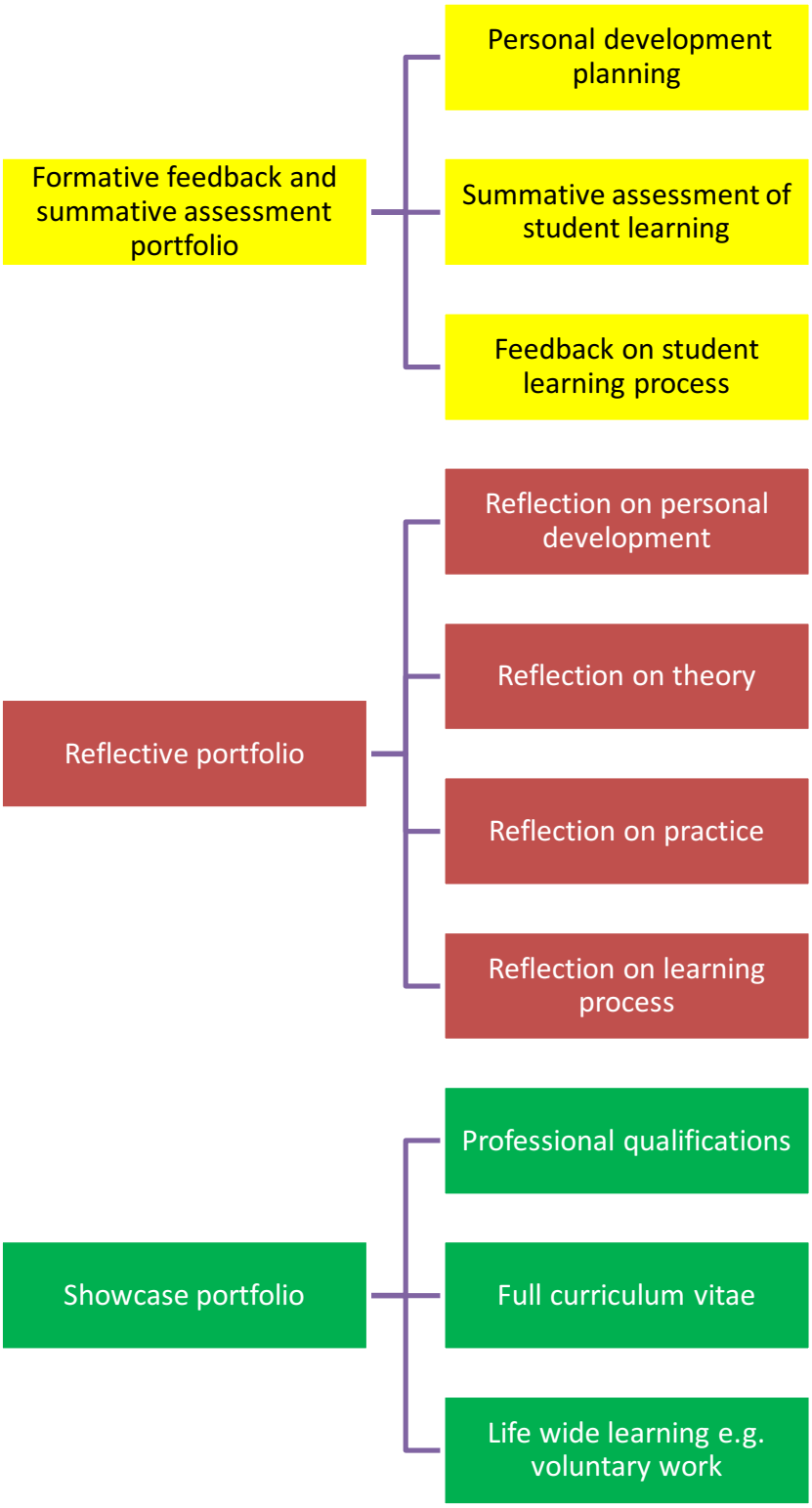


The four functions of electronic portfolios defined by the UK students in Figure 7 are to be expected considering the types of electronic portfolios that were identified in Table 8 and Table 9. What is of interest though is in the student data is that less than 40 of the students associate their portfolios with achieving professional outcomes. During the interviews, this was found

to be because students believed this was part of the other elements. This result has been attributed to a lack of clarity in the question within the online questionnaire (see Appendix 2 question 8).

The analysis of the form and function of the healthcare students' electronic portfolios, combined with the results from section 4.3 below, resulted in the following taxonomy (Figure 8). The figure shows the three most important forms of healthcare students electronic portfolios: a portfolio with summative assessment following formative feedback; a reflective portfolio, and a showcase portfolio. Each of these forms has some associated functions. For example, the reflective portfolio incorporates reflection on personal development, theory, practice and the learning process.

Figure 8: Suggested taxonomy of healthcare students' electronic portfolios



As with the showcase, learning and assessment portfolios described in the literature review the healthcare student’s electronic portfolios can have just one function or be a combination of two or more.

Having established the form and function of the students' electronic portfolios, the following section presents the results exploring the social construction of knowledge and their associated artefacts found in healthcare students electronic portfolios.

4.3 Socially constructive processes

When describing the socially constructive processes and the artefacts they produce (discussed later), the interviews, portfolio analysis and questionnaire all provided evidence of the creation of these both within and external to the portfolio. For example, when beginning the interview, I reminded the students that the research was exploring the use of electronic portfolios in learning and that I was interested in how the electronic portfolio supported this. I then asked them to describe an aspect of learning on the course about this opening statement. Every student that I interviewed initially described a learning process that occurred outside of the electronic portfolio. It was only when prompted to link the electronic portfolio to course outcomes that they made the link.

Hilary, for example, said mentors contributed ideas that were incorporated into the artefacts in the electronic portfolio, but not that they were directly entered via the electronic portfolio; discussions would occur outside and then be written up by the student.

This might be explained because of access rights of others to the student's portfolio. **Hannah** said that although the practice mentor contributed to learning this was not facilitated through the electronic portfolio because, as the student believed, they did not have access to the electronic portfolio. **Hannah** suggested that a way around this might have been to be able to

scan the ‘paperwork' into the electronic portfolio but that this did not happen.

However, to some extent, the unanimous response of students reflects their initial limited view of what electronic portfolio learning consisted of and reflected their initial resistance to portfolios. Nevertheless, such learning outside the portfolio does have significance for the use of electronic portfolios in socially constructive learning, and this will be discussed later. In what follows all the analysis will focus on what is evidenced inside the portfolios even if some of the processes and artefacts referred to were outside of them.

The data was analysed to find the different occasions in which knowledge was being constructed by the students. These fell into three broad categories: community knowledge building; course centric; and student-centric. This is summarised in Table 10 which shows the knowledge creating activities that were associated with those categories. The sources indicate how many students discussed the activity and the references how many times it was discussed by those students. As an example, eleven students referred to ‘communities of practice’ 39 times in all the interviews.

Table 10: Example of nodes associated with socially constructed processes

Categories	Knowledge creating activities	Sources	References
Community Knowledge Building	Communities of practice	11	39
	Discourse communities	11	37
	Collaborative knowledge construction	12	43
	Networked learning	3	5
	Working with others	12	45
Course Centric	Assessment	8	19
	Feedback	11	30
	Reflection	19	24
Student Centric (Examples identified with literature review)	Expressing ideas	11	35
	Information giving	12	24
	Linking to other forms of knowledge	13	40
	Proposing knowledge	12	26
	Questioning	7	12

Inspection of the knowledge creating activities the students mentioned suggested three main groupings that contributed to the social construction of knowledge, namely community knowledge building, course driven processes and the student interaction.

What should be noted with these results is that although they are described here as individual knowledge creating activities, it is their interactions within

students' learning that make each portfolio unique. So, when understanding the socially constructive elements, this may be as a result of communities of practice, assessment and student questioning

4.3.1 Community knowledge building

All the students in the sample used community knowledge building as identified through the analysis of the electronic portfolios, questionnaire, or interviews. The data suggested that this could be seen as being part of face-to-face learning interactions or arising through computer-supported collaborative learning.

Hannah, for example, suggested that the sharing of the electronic portfolio allowed collaborative knowledge building:

> "It's good … that you can share things rather than say having to email and you, I like the fact that you can share it and like I can share say for instance something with my [academic tutor] and but then you can continue to work on it, and it does sort of like update like the other person of the changes, and I do like that side of it"

While the literature differentiates communities of practice, discourse communities, collaborative knowledge construction and working with others, these distinctions were not utilised by students. When exploring their understanding of the processes, it was clear that they focussed on what

learning took place with others, i.e., how that learning occurred and who with. It became apparent in the data analysis that the students were identifying a range of knowledge creating activities.

As an example when coding the student's responses, it was found that the coding of discourse communities closely matched that of communities of practice., explained by discourse communities being identified as specialised forms of a community of practice (Swales 1990a). As with 'working with others', 'collaborative learning' and 'networked learning' this suggested that there are social processes involved in student learning and differentiating between these added little to acknowledging that collaborative knowledge construction took place. The individuals involved and what they contribute can be identified as either a community of practice or a discourse community depending on the level of knowledge that is developed. So, generalised knowledge would be as part of a community of practice and specialist knowledge as a discourse community. What became apparent as the data was analysed, was that it is more important to understand the nature of the collaborative knowledge processes by identifying the individuals involved and what they contributed.

Next, the data from the interviews, electronic portfolios and the online questionnaire were interrogated to find the range of individuals involved in the students learning. While the online questionnaire showed that students believed they were the main contributors to the portfolio, Table 11 shows

the strength of the contribution of others in the students' community of practice.

Table 11: People contributing to the social construction of knowledge in the electronic portfolio

Person contributing	Number of respondents from the sample
Academics	70
Staff in a practice setting	52
Student peers	40
Service user	17
Family member	2

The data showed that academics contribute most to the student's knowledge, followed by practice staff (which includes mentors and members of the multi-disciplinary team), student peers, service users and lastly family members. While the contributions will be discussed shortly, it is useful to note at this point that the prominence of academics and practice staff is directly associated with the needs of the Healthcare Professional Bodies who require, through registration and post-registration qualifications, that 'qualified' individuals pass-on and validate the student's learning and knowledge. Alongside the academics and practice staff, student peers were also significant contributors to the student's learning, but there was a

relatively little contribution from service users, carers and family who are considered to be outside of the healthcare student's community of practice. Nevertheless, there were contributions to learning, although not directly related to course outcomes, by the service users, carers and family members identified by the students.

The data in Table 11 supports the idea that the students construct their knowledge within communities of practice as defined by Wenger (1998) or the more specialised discourse community (Swales, 2008) as suggested in Chapter 2. What this research has shown is that the participants of the healthcare students' community of practice and the contribution of each member are as defined in the next subsections.

4.3.1.1 Academic and practice staff contributions

The analysis identified that students believe that academics, mentors and practice staff, contributed to learning by providing feedback, through recording and commenting on the student's progress towards meeting the course outcomes. Students also said that academics directed the students' learning by setting learning goals within the electronic portfolio. This, the students said, was achieved through the creation of templates, action plans and the creation of assignments within the portfolios.

For example, **Rachael** said:

"there is a couple where they've [academics] added comments, so there is a paper trail of comments, so I've achieved that, I've achieved that, ok, so I can look back and say well this was the first feedback you gave me, this is where we are now, so I know I've covered everything".

4.3.1.2 Peer contribution

Over half of the students described the contribution of peers as a supportive process. Fellow students helped each other get the best use of the electronic portfolio in achieving the course requirements. Common ways in which students supported them was through sharing resources and ideas through group work, collaboration, feedback and the sharing of ideas. The interviews with the 16 students also confirmed the importance of peer contribution and support to the students' learning. This was initially identified within the questionnaire and was subsequently confirmed as a strong theme in the interviews. The significance of peer contribution was despite fears, as expressed by **Elizabeth** (for example), of accusations of collusion and collaboration. **Elizabeth** said students were "all quite reluctant to help [each other] in any formal way." Instead, she suggested defensively that what happened was that the students discussed goals with each other "loosely". Other students were not so cautious or concerned in detailing their experiences of collaboration. Students described the contribution and

support of other students who were involved in a shared module regarding both its content and the support in the use of the electronic portfolio e.g. in what ways to best reflect within the electronic portfolio. For example, **Hannah** gave described learning with other students through an inter-professional module. During this module, the students discussed inter-professional group work that resulted in the production of an artefact that demonstrated learning. Dialogue was facilitated through a discussion board which the student then selectively imported into the electronic portfolio for the academics to comment on. **Stephanie** gave more detail on the way that students shared their work as a group who could then feedback on the content of the artefact shared. Each student could contribute, and content could be "constantly monitored", "constantly updated" and "tracked" by the other individuals in the group.

The contribution of peers was even clearer in the responses to the open question of peer support in the questionnaire. More often than in the interviews or electronic portfolio analysis respondents mentioned a range of socially collaborative processes such as “group work”, “sharing documents”, “feedback”, “collaboration”, “discussed with peers”, “share ideas” and “mutual support” in the electronic portfolio use. Students were describing discussions and the sharing of learning, with other peers, that they claimed contributed to further or deeper understanding of concepts and practices.

While peer group learning is supported through various educational initiatives, including Wikis in some electronic portfolios, the finding that peers contributed nearly as much as practice staff to knowledge building was unexpected as most courses are heavily dominated by academic and professional requirements.

4.3.1.3 Service user and carer contributions

Compared with the input of academics and peers, the input of service users and carers was limited, though arguably no less important in the context of healthcare courses (McMahon-Parkes, Chapman, & James, 2016). For example, **Hilary** and **Catherine** identified that communicating with service users had allowed them to meet competencies set within the portfolios. However, this was not uppermost in the mind of most respondents until they were prompted in the interviews or questionnaire.

4.3.1.4 Family contributions

Contributions from family were not often mentioned and when they were this was related to helping with the technology or arising serendipitously from family conversations. For example, two students, **Linda** and **Rachael**, discussed the input of family members to learning within electronic portfolios. **Linda** described how her teenage son would help her with "the technology" which she admitted she was not "good on".

Linda and **Rachael** also highlighted how family members helped them with developing knowledge. **Linda** stated that her husband who was also a nurse had helped her in "pinpointing things and …. process something in reflection that I can't just quite get straight in my head, talking through with him helps." **Rachael** said her parents also contributed. **Linda** said, "I discuss a lot with them, obviously not confidential stuff, but I discuss a lot with them." While there is literature on the contribution of academics, peers, practice staff, and service users and carers to students learning, there is less on the input of family members and friends. What **Linda** and **Rachael** suggest is a form of informal learning and is highlighted by Madge, Meek, Wellens, and Hooley (2009)

4.3.2 Course centric socially constructive processes

Table 12 presents the results of the analysis to identify the course led socially constructive processes from the interviews. The table shows that 11 students discussed feedback, 19 reflections, and 8 assessments. No other socially constructive processes were named by the students.

Table 12: Course led socially constructive processes found within electronic portfolios

Categories	Unique Students in sample	Number of times coded
Feedback	11	30
Reflection	19	24
Assessment	8	19

4.3.2.1 Assessment and Feedback

Assessment and feedback have been combined here as most the students linked the two in their discussions. Students described assessment and feedback as a two-part cyclical process where the students would be assessed and then receive feedback. This was then fed into answers in future assessments.

As an example, **Olivia** described the following scenario when a lecturer

> "gave advice and offered practical solutions I could use to improve my technique. They encouraged me to persevere with learning this skill and informed me of other clinical skill sessions which were available to me. I was also told to keep practising and that I would get to know [what to expect]. I took their advice on board and decided to buy my

own [piece of equipment] to enable me to practice [the skill] at home in a more comfortable [….] environment."

The students acknowledged that the electronic portfolios they used were designed to meet course outcomes which were influenced by professional body requirements. This was summed up by **Nichola** who said

"The main aim of the portfolio, in my opinion, was to consolidate learning and provide evidence to support my studies, this formed the basis for part of the assessment process. Learning outcomes were clearly stated, and I used these as a guide to my learning, it gave an additional communication method between myself and my mentor to ensure he was fully aware of my learning and progress. The written work supported the discussions we were having in practice."

4.3.2.2 Reflection

Reflection was found to be a major element student's portfolios as they applied this to their learning in practice and theory as well as in the learning process and their personal development.

Students described how the electronic portfolios helped them to reflect on learning and the learning processes, whether this was in practice or on the academic content of their courses. Reflection was found across three main

areas: reflection on learning in practice; reflection on learning in theory; and reflection on the learning process itself. Reflection, as described by **Catherine**, was primarily a means by which the student was:

> "To show evidence of learning and support it with reflections and proof of training needs met".

Hilary also stated that it was to:

> "provide evidence for module outcomes, to reflect on your learning, log personal activities, record personal outcomes and document course goals."

The way in which reflection was structured within the electronic portfolios ranged from 'open' free-form text input, to highly structured using templates within the electronic portfolios. The electronic portfolios reflections were based on several structured processes but mostly limited to Gibbs reflective cycle (Gibbs, 1988).

4.3.2.2.1 Practice

A few students discussed how their reflections were related to practice. This included **Olivia** who was required to write a reflective piece for her tutor about learning a new clinical skill; **Hannah and Stephanie** who reflected on inter-professional working and incidents in practice; **Robert** who reflected on issues of safety in that practice; **Hannah** also completed reflections for

both academics and mentors for feedback for both on her progress. **Hannah** went on to summarise this by saying that reflection

> "looks at things like the skills on placement and it looks at knowledge; it looks at sort of positives and negatives of sort of what we've got out of placement".

4.3.2.2.2 Theory

Similar in structure and format to the student's reflections on practice the student's reflection on theory ranged from both formal to informal and unstructured to structured. It is believed that this is because the electronic portfolio format was constant for both practice and theory and as such only the context of the reflection was varied. By this, it is meant that the students sampled accessed only one electronic portfolio each and that it appears that the format of that electronic portfolio's reflection was not varied from theory to practice. Reflection on theory did, however, vary between HEI and the courses that the students were taking part in. The reflections on theory were completed through case studies, getting the students to examine critical incidents or structured templates in the electronic portfolios. These approaches would, for example, ask the students to address learning outcomes or direct the self-directed learning. Examples from the student interviews included:

Linda who said that the reflection could:

"help you process what you're doing and where the gaps in your knowledge are because when you write it down, you think well I've done that and that and that".

Olivia said

"[the academic] highlighted areas of my work that was relevant and this enabled me to write in a more appropriate manner suited to the module descriptor. [Their] feedback enabled me to have a clear idea of what was expected of me in relation to critiquing research papers. Because of [their] feedback, I was able to submit my work with confidence knowing I had acknowledged [their] recommendations and altered my work accordingly."

4.3.2.2.3 Learning Process

As well as students reflecting on their practical and theoretical work a theme that emerged was that the students were also using the electronic portfolios to reflect on the process of learning itself.

Most this evidence was supported by academics in this sample. For example, **Olivia** described how her personal tutor

"gave constructive criticism on my writing, for example how I could improve upon my reflective writing and he suggested specific books which I could use to help me".

Also, **Rachael** said they could review comments from academics as they had progressed with their learning in that there was "a trail of comments" from the academic that helped them develop their learning.

Some students discussed how the electronic portfolio itself impacted on learning processes. **Linda** described how the electronic portfolio would prompt them to explore a subject more deeply by simply recording a piece of information. **Linda** said

> "but how I learn; it sorts of prompts me onto oh I need to know more about that, so that gets jotted down [in the electronic portfolio]. So, it is a platform for something else or if something gets me curious and I go off on a tangent, which isn't always a good thing."

This might not just be at the time of writing; as **Linda** went on to explain

> "Even though you're just, you feel like right this is for this to pass when you think back on it, actually it prompted me to learn more, having steered me off, to say I need to know more about that, more about that."

In addition, **Hilary** described a process in practice when they were "learning to learn", and broke this down into

> "looking at that initial period of how you settle in somewhere, how you identify how to go about getting the most out of it, a place, how you, how you work out how to learn within that situation."

Rachael said they would record this by first reading up on something and then making "a few notes" in the electronic portfolio.

4.3.2.2.4 Students' reflection

While it is acknowledged that reflection is course related, there were two students, **Hilary and Rachael**, in the sample who disclosed the use of the electronic portfolio for personal reflection that was not shared with anyone else but was for their personal use. **Rachael** said she saw parts of the electronic portfolio as

> "not marked work, it's just for your learning".

This suggests that while portfolios are used for course, related outcomes these exceptions suggest the possibility that other students can, and may be using electronic portfolios for their personal notes not connected to the course. It also shows that Baumgartner's (2009) definitions of the use of electronic portfolios do not reflect the extent to which electronic portfolios are being used and requires modification to encompass this element.

Students were asked to identify the ways in which they recorded learning within their portfolios, to which the most common way was by entering text.

This may have been directly within the portfolio or cut and pasted from word processors. These textual artefacts have been identified in the interviews in stage three as being assessments, reflections, descriptive accounts of learning, and feedback.

4.3.3 Student-centric socially constructive processes

Having identified that healthcare students socially construct knowledge through their communities of practice and that the healthcare courses provide a range of activities that support socially constructive processes, this section turns to examine the role of students in such processes. This is done through applying the literature discussed in chapters 1 and 2 through the grounded theory methodology as discussed in chapter 3. This has resulted in an understanding of student participation in their community of practice, how they socially collaborated and then 'institutionalised' their knowledge through the development of artefacts. The results describe how the students did this with their electronic portfolios as part of the social construction of knowledge.

In the initial stages of the research, the data was explored using Erpenbeck and Heyse' (2004) competence explorer; Gunawardena et al. (1997) interaction analysis model and van Aalst (2009) knowledge explorer. The results are presented in Table 13 and Table 14.

Table 13: Competence achievement in electronic portfolios following Erpenbeck and Hayse' framework

Origin	Student	Demonstrate personal competence	Ability to make decisions and act upon them	Develop knowledge and professional competence	Socio-communicative competence
UK	Ann				
	Becky				
	Charlotte				
	Andrew				
	Danielle				
North American (The USA and Canada)	Munoz				
	Kheluram				
	Navitskaya				
	Kea				
	Williams				
	Graham				
	Amalfitano				
	Pryce				
	Binder				
	Cargill				
	Walker				
	Hawkins				
	Steinkopff				
	Allan				
	Bakidis				
	Hu				
	Terill				
	James				
	Messman				

Achieved
Not achieved

Table 13 shows that both the UK assessment and learning electronic portfolios and the North American showcase portfolios allow the students to develop social-communicative competencies that are required for the social construction of knowledge. In the case of the two students who did not have evidence, **Andrew** and **Danielle**, this was found to be because none of the assessments they were asked to record at the point of analysis required them to do this.

Table 14 presents the results of the analysis of the students' portfolios using a combination of Gunawardena et al. (1997), and van Aalst (2009) approaches to identify collaborative learning.

Table 14: Dimensions of social collaboration within electronic portfolios

Origin	Student	Ideas: opinion	Ideas: factual	Community	Questions	information	Linking	Agency	Meta-discourse
UK	Ann								
	Becky								
	Charlotte								
	Andrew								
	Danielle								
North American (The USA and Canada)	Munoz								
	Kheluram								
	Navitskaya								
	Kea								
	Williams								
	Graham								
	Amalfitano								
	Pryce								
	Binder								
	Cargill								
	Walker								
	Hawkins								
	Steinkopff								
	Allan								
	Bakidis								
	Hu								
	Terill								
	James								
	Messman								

Evidence that socially constructive activity was undertaken

Socially constructive activity was not demonstrated

Table 14 shows that irrespective of origin or type all the healthcare student's electronic portfolios had evidence of 'agency'. Agency, as described in section 2.5.2, is where students provide evidence of working with others to build knowledge. This was, therefore, an indication that the electronic portfolios could socially construct knowledge.

There were, however, noticeable differences between the UK and North American electronic portfolios. The UK portfolios, because they were both

assessment and learning portfolios had a wider range of responses to the eight dimensions. The North American electronic portfolios, on the other hand, were more uniform in the dimensions despite the broader range of institutions and courses they represented. This is an important observation because it demonstrates that the purpose of the electronic portfolio, defined by healthcare course outcomes, *does* affect the socially constructive processes.

The greatest differences between the showcase and the assessment and learning portfolios were in ‘community' and ‘questions'. The UK portfolios were not able to demonstrate the ‘community' dimension where the North American portfolios could. The North American portfolios were unable to demonstrate ‘questions’, but the UK portfolios had some capacity in this respect.

‘Community’ and ‘questions' are closely linked as they ask if the student has expressed and sought views on a community and questions are where a student seeks answers to get clarity on their learning. These two dimensions were not found in Becky, Andrew, Charlotte or Danielle's portfolios. This on further analysis was because these portfolios were assessment portfolios and therefore did not need to demonstrate negotiation. The North American portfolios, on the other hand, did have to prove this as part of their course or module outcomes.

Further evidence to support the finding that social collaboration occurs between the student and others was also identified in the interviews with the students. For example, questioning, expressing ideas and knowledge were mentioned by the following students:

Nichola:

> "it gave an additional communication method between myself and my mentor to ensure he was fully aware of my learning and progress. The written work supported the discussions we were having in practice."

Hannah:

> "but if there were any like conflict, I suppose, on ideas, that like you can problem solve."

Hilary:

> "how you identify how to go about getting the most out of it, a place, how you, how you work out how to learn within that situation."

Linda :

> "it was good to give that evidence, so just thinking what I had to, I had to evidence time with a 'X", another 'Y'" and "she said what do

you think I could do to change my practice, is there anything. So, she used it as a learning experience as well”.

Rachael :

"So we do a piece of work, we share it, and then we get instant feedback and it'll come into my email, you've had feedback on this piece of work, so you click it in and read it, so it's almost that instant all the time feedback, which is really good."

The interview data also showed that linking knowledge was clearly defined by the students, not as an act of sharing knowledge with others, but of linking knowledge that they had already created or accessed within their electronic portfolio. **Rachael** for example stated,

“I write everything down. It’s part of how I do things, so I write everything down, separate them all up and then what we have is we have blended learning at the end of the day after our, following our lectures, and so then we go, I go through it again underneath the lecture notes, do it altogether and then at the end, when I come to type it up and put it on the electronic portfolio."

Hilary also explained

"So you could link it into other reflections, or you could link it into pieces of work that you'd done that showed something."

The analysis of the electronic portfolios has shown that students are involved in socially constructive processes and that these take a specific format in healthcare courses but are also dependent on the reasons electronic portfolios are being used.

4.4 Socially constructive artefacts

The results, up to this point, have demonstrated that there is a range of socially constructive processes that are governed by the healthcare course requirements. However as discussed in Chapter 2 (section 2.5.1) socially constructed knowledge can also be identified through the presentation of artefacts.

Drawing on the work by Blackler (1995) the identification of artefacts are seen as some of the ways in which the students institutionalise the knowledge which is also seen as a process of the social construction of knowledge (Berger & Luckmann, 1966). According to Blackler knowledge becomes institutionalised by being embodied, embrained, encultured and encoded (see section 2.4.1). Examples from students' electronic portfolios where this has occurred can be seen in Table 15 and indicate that their identification is important when considering the social construction of knowledge.

Table 15: Key topics of artefacts that students recorded in their electronic portfolios

Student	Topic
Joseph	Observing a birth
Nichola	Consolidate and provide evidence for learning
Andrew	Provide answer for assignment
Elizabeth	Presentation of learning
Hannah	Demonstrate participation in group work
Hilary	Development and application of learning plan
Linda	Evidence of learning and learning outcomes
Megan	Evidence of working with others
Rachael	Summarising learning and describing group work
Stephanie	Collaborative practice and reflection

How these artefacts were then recorded in the electronic portfolios is also important to understanding how knowledge is socially constructed. So, for example, if the artefacts were recorded in Wiki's that had contributions from a range of individuals then it may be possible to identify this as a socially constructive process.

4.4.1 Text

The entry of textual artefacts was the way most UK students demonstrated their acquisition of knowledge, for example in the form of assessments, feedback and reflections as described in section 4.3.2. The North American showcase electronic portfolios did not always contain these elements but did have some of personal statement in an ‘about me' section. All the North

American electronic portfolios also included textual narratives that explored how the students applied learning to wider experiences e.g. in the experiences of volunteering, or how they enhanced their professional roles. Students were however frustrated with the way electronic portfolios worked with text, especially when they compared this to their experiences with other applications such as Microsoft Word. **Andrew** and **Hilary** said that although they could write straight into the portfolio, there were no basic functions like a spell checker or text formatting capabilities. They thought this led to text that contained errors or even that the text that was so small that students could not work with it. This became such a frustration for **Andrew**, **Hilary** and **Rachael** who said they prepared their text in Word and then imported it into the electronic portfolios. They saw this as defeated the object of using the electronic portfolios.

4.4.2 PDF's

There were two kinds of PDF's used by students. In the first case, these were simply documents they saved in PDF format and were essentially indistinguishable from the text discussed in the previous section. This included student generated posters and information leaflets. The second kind was PDF's acquired from other sources e.g. certificates or professionally written artefacts like journal articles or information leaflets that the students collected during their theory or practical experiences to evidence learning.

Rachael discussed this within her interview saying that she "would upload PDF's of things they found useful in practice" and "certificates to show they had attended" compulsory sessions during training.

4.4.3 Images and Video

In an age where students' are at ease with social media such as Instagram and YouTube, it was surprising that there were relatively few pictures and almost no videos in students' portfolios. While this may be attributable to practice and Professional Body policies that discourage the use of content related to patient care this does not explain why students do not use images and videos from other contexts.

File size may also be an issue where electronic portfolios and their infrastructure are unable to host large file sizes. However more recently, with the introduction of cloud computing and being able to link to files hosted on other platforms (e.g. YouTube), their underuse is hard to understand.

The use of images though was more common in the electronic portfolios where **Hilary**, for example, was an advocate for using pictures in her electronic portfolio. She said:

> "I suppose a lot of stuff around nursing is, if there's a visual, it makes it easier to understand something if you've got, you can talk about the heart, but without a diagram of the heart, it's hard to grasp it and I

suppose humans are more naturally visual picture orientated than written. So, I've been able to bring those things in and so you can play with it more".

Other images that were used to demonstrate learning in the electronic portfolios included hand drawn images related to anatomy and photographs of presentations the students completed e.g. poster presentations as part of group work.

All the North American showcase electronic portfolios had at least one image, commonly an image of the individual, but many had a range of images that showed personal or professional development e.g. pictures of participation in voluntary work. This was the case across University and College hosted and the individually hosted electronic portfolios.

The lack of use of images and video, and audio for that matter is also puzzling with the dislike students expressed for the word processing abilities of the electronic portfolios discussed previously. If the students disliked inputting text, I would have expected to see other forms of artefacts being used.

One final point to note about the artefacts found in the electronic portfolios is that many students described how the artefacts were generated externally to the electronic portfolios. Examples of these included the use of Wikis,

blogs, and Yammer. In the students' electronic portfolios these were either referred to using a hyperlink or by cutting and pasting text or importing whole documents from these sources. The most common usage of linking to external artefacts by students was to make a link to a journal article rather than importing them as a PDF. **Nichola**, for example, described this linking when she noted that:

> "Any references used were automatically linked to the web [copy] if they had been accessed in that manner".

Indeed, data analysis showed limited functions for creating artefacts within electronic portfolios with only a small number of electronic portfolios in the sample included any Web 2.0 type social media tools as a core function. This, however, was not a surprise as literature has only recently begun to identify the potential of Web 2.0 as a means of constructing knowledge in electronic portfolios, e.g. Stephensen and Dillon (2013) and Tur and Urbina (2016).

What is important to note is that other than audio or video the types of artefacts are not any different from paper-based portfolios though the electronic form they take is.

4.5 Student views on the use of electronic portfolios

Up to this point, electronic portfolios have been identified as supporting socially constructive learning for healthcare students through a specific range of processes and artefacts. Now, after applying constant comparative analysis methods, the data from the student interviews, portfolio analysis and online questionnaire describe the views of students towards the electronic portfolios they use. Throughout this section, the emerging themes discuss socially constructive learning which is sometimes referred to just as learning and uses the most significant student quotes.

From the outset, it should be noted that I have taken into account that some students who wanted to take part in this research might have wanted 'to let people know their dissatisfaction' with electronic portfolios. Indeed these were certainly some of the most forceful views. **Elizabeth** and **Hilary**, for example, encapsulated these views when they stated I "don't think the students like it [the electronic portfolio]" (**Elizabeth**), and that people "hiss and spit" at the mention of the electronic portfolio (**Hilary**). Other students added that "[The portfolio] is a waste of time and money" and "Everyone I have spoken to in a clinical setting has said that they do not see the point in an electronic portfolio".

An effort was made therefore to ensure that these, and any views for that matter, did not become the prevalent view and through the application of the broad grounded theory methodology that the relevant themes emerged.

These themes address the impact of the electronic portfolios structures on student learning; the impact of the electronic portfolios features and hardware on student learning, the impact on interactions; and how some students highlighted a 'preference' for paper and saw limited uses for the portfolio beyond their course end date.

4.5.1 The impact of the electronic portfolios' structures on student learning

The following section discusses the impact of templates, tagging and the limited range of artefacts impact on student learning.

4.5.1.1 Templates do not reflect the complexity of student learning

The main category discussed by the students, with both positive and negative views, was the use of templates or structures within the electronic portfolios. These are commonly used within electronic portfolios to structure and guide students' learning in pre-defined spaces. Examples of these templates were assessments, feedback and reflections.

The ways in which the templates restricted the students' learning because of the areas the students were 'forced' to discuss was a common area for discussion. **Stephanie**, for example, said:

> "I find the templates too restrictive, do you know what I mean, and obviously when you… it's so dependent on what you're reflecting on,

it's sometimes difficult to fit it into those boxes if you get what I mean, it doesn't work for what you're talking about."

Linda also discussed this concerning completing a case study where the pre-defined spaces required the students to think in a linear way that was not how she thought her thinking or learning developed. **Linda** also believed these structures became discreet areas that did not capture all the steps she might have used. **Linda** said the structures were:

> "just [a] step-by-step process, sometimes thinking about, well, how do I answer this question when it's broken down into very small questions already, rather than how do I answer this question and that thing of having how did I develop my end answer, where's all the steps along the way, can I see them".

Sometimes these structures made the students feel their learning was being overcomplicated by the ways the templates were being applied, that the templates were introducing a way of thinking that was not understood regarding how the students were thinking. **Rachael** explained that learning "becomes more complicated for me using templates". She went on to say that the portfolio templates

> "hinder your learning, in the sense of it, there's no freedom in what you're learning, they're looking for a very specific answer, which actually hinders, I think a lot, I've learnt a lot from just pulling on different bits and my own attitudes, that way, whereas I think in those

forms, you get quite disheartened because you think oh no, this is a really good bit, but actually it doesn't fit in with what you're asking me."

Rachael added that she though the structures stopped you from exploring outside of what you were being asked to evidence:

" any time you're learning some things, there's the box in which they want you to be learning it and playing too much outside that means that you don't have time to meet the criteria of what's inside the box."

Stephanie also described how the 'set questions' used in the templates did not always reflect the learning that they went through and that she:

"ended up writing the reflection to fit the template rather than properly reflecting on the thing in practice that I was doing" … "it's kind of like I'm going to have to write something for the template rather than for my own learning."

Robert, perhaps the harshest critic of the templates, said that the structure of the "electronic portfolio templates do not reflect the entirety of the self-directed learning" and that he would "still accomplish the same outcomes without using" the templates "and therefore I don't consider it [the templates] as supporting my learning".

Robert added that because of this he

> “found that [their] electronic portfolio has [not] in any way helped or supported me with my learning but rather it is a useful place to store evidence towards outcomes and competencies which can be accessed by my personal tutor rather than handing in a large paper portfolio for inspection at the end of the year”.

This was also echoed by **Andrew** who said

> “it is just a repository of information that demonstrates I can undertake certain aspects” and “So it comes back to the idea, for me, of the portfolio being a repository of evidence rather than anything else”.

Despite these criticisms, the use of templated learning was seen as being a positive aspect of electronic portfolios by some students. **Nichola**, for example, said "learning outcomes were clearly stated, and I used these as a guide to my learning”, while **Jane** said, "you go onto your front page, it's clearly set out, I can clearly see what needs doing, what's waiting." Importantly **Hannah** discussed how the effective use of structured learning plans within her portfolio was designed to show how her learning was achieved and evidence diverse learning experiences that

> “weren’t evidenced academically anywhere else, and the learning that I was getting through being involved in those [other] activities”.

Hannah went on to say that the electronic portfolios encouraged her to

> “start with identifying a growth area, learning area and then what you were going to do about it and what timeframe and then you had a space to fill in once you’d done that and evidence kind of what you’d done about it.”

Hannah thought this seemed

> "to be a very easy way to record those things and to make use of them in my assignments. So even though that's not necessarily the reason to go to these things and to do these things, but it's another outcome of it that is being facilitated by the use of the electronic portfolio, to be honest."

Jane also found the templates guided her learning and felt that the electronic portfolio helped her

> “process what [she was] doing and where the gaps in your knowledge are, because when you write it down, you think well I’ve done that and that and that, but how I learn, it sort of prompts me onto oh I need to know more about that, so that gets jotted down.”

Examining the use of templates within the electronic portfolios, it appears that it is not the use of templates themselves that is the issue but how students prefer to learn. So, in the students described above **Stephanie, Linda, Rachael** and **Robert** appear to prefer learning where they can explore and write about the subject without structures. **Jane, Hannah,** and

Nichola, however, found the structures focussed their thinking allowing them to target what was required.

4.5.1.2 Organising artefacts to evidence learning

Many students found the ways in which the electronic portfolio allowed them to search for and manipulate artefacts was a useful feature that was not possible in paper formats. **Joseph,** for example

> "put a high value on search functions which allow me to instantly recall a post or find a relevant section of the portfolio."

However, it was the use of tagging, a way to collect artefacts based on keywords to indicate meaningful groups for the students, which was the most common way students organised their artefacts. This was seen as a significant benefit to their learning allowing them to avoid duplicating artefacts and enabling them to use one artefact to evidence learning for other areas. Reflections were the most common application of this approach where for example a clinical reflection may also have been used to evidence personal development.

Rachael described how she tagged placement experience reflections as she progressed on her course and when she was required to complete a larger reflection on her practice experiences she could search for those tags within her portfolio. The portfolio would then bring all those tagged artefacts

together in one new artefact that she could present with a narrative for assessment. **Rachael** explained

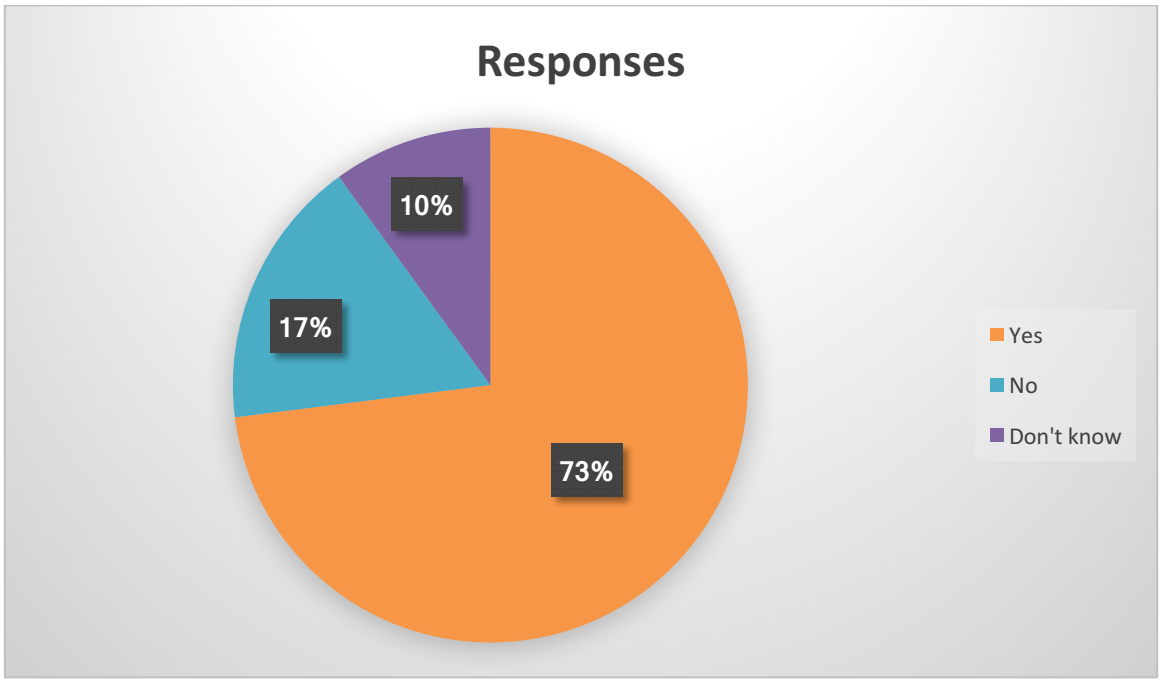
"so we tag our assets, so we put in [part A], all the [part A] year X work. If I type into the search 'part A' year X work, it will bring all my work up straight away. Instead of me having to go through my paper copies of books and flick through and they're all in different orders, it's a visual, I've got everything there from the year X. I can flick back through on it. I've also got a little bit, so on a paper copy normally, I would put the title, the date and what it is, a lecture, whereas on these you can tag as much as you want. So, I would put Unit Y [course element] and then I'd probably quote an author that there's a lot on there. So, it's actually, I can find things a little bit easier on there."

4.5.1.3 Limited range of electronic artefacts

As part of the structure of electronic portfolios, the text, PDF's and images and video artefacts, described in section 4.4, were found in the students' electronic portfolios.

These electronic artefacts were acknowledged, in the online questionnaire, as being something that significantly supported the students' learning and Figure 9 shows that nearly 75% of students stated this.

Figure 9: Does being able to add electronic artefacts support your learning



Despite the importance attributed to the inclusion of electronic portfolios students discussed how restrictions on the file size and the inability to incorporate a wider range of artefacts limited the potential of electronic portfolios.

Hilary, for example, would have liked to use mind maps and **Stephanie** diagrams to evidence their learning and these in their original forms could not be included. **Hilary** also added that restrictions on the types of files that could be 'read' by the electronic portfolio meant that there was a limitation on how learning could be demonstrated. This, in particular, suggests that

the ability of electronic portfolios to incorporate diverse forms of evidence is limited.

Both **Hilary** and **Stephanie** saw these types of files as being useful artefacts to evidence their learning but said they would have to convert them into PDF's and import them. This discouraged them from including these artefacts in their portfolios.

Limitations on the size of files also caused problems for some students. Although some manufacturers allow linking to external sources where the students can upload their artefacts, YouTube and Google Drive, for example, some artefacts needed to be uploaded directly. This, some students said, meant that they had to refine what they presented to fit in with these limits.

Students were also expressing concerns about how some artefacts were created within the portfolio as well as the limited range that was possible. As discussed previously this was most noticeable with text, the most prevalent form of artefact that was created by students.

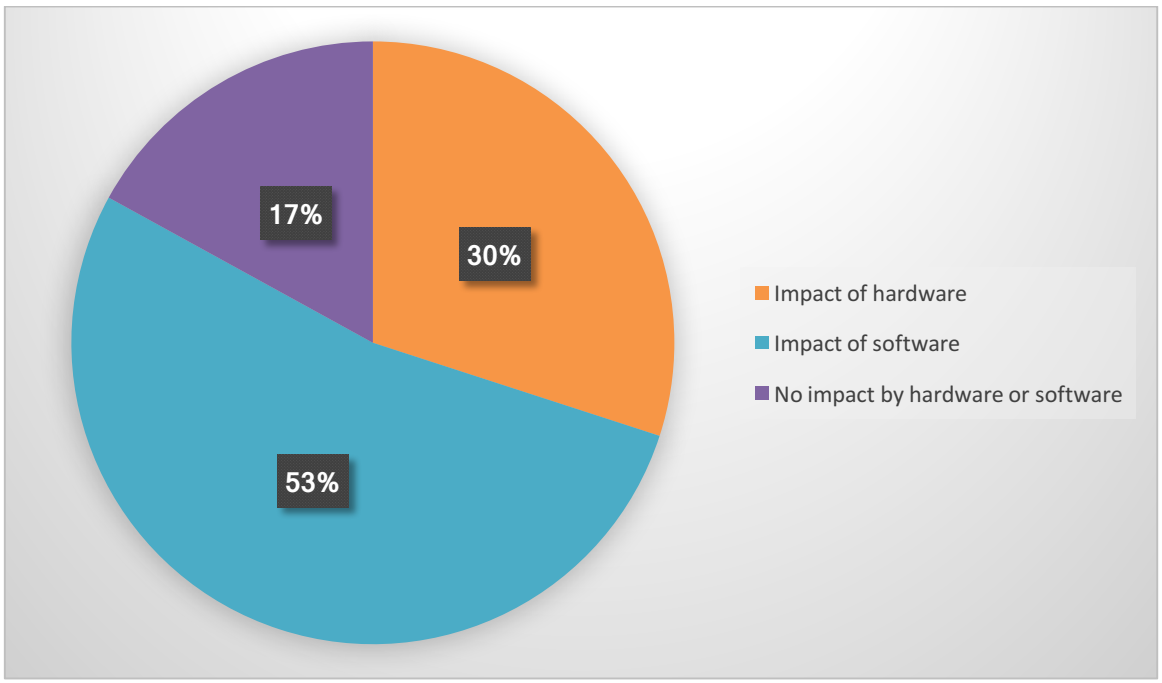
4.5.2 Impact of the electronic portfolio features and the hardware that students use to access the portfolios

This section builds on the theme of how the structure of the electronic portfolios (templates and the limitations and organisation of artefacts) to describe the features of the software and software affect learning. The

features are differentiated from the structure in that these address accessibility, safety, and navigation and the impact that this has on the time it takes for students to complete their electronic portfolios.

As an indication of the effect of the features of the software and hardware Figure 10 shows the results of the online questionnaire that explored this question. The figure shows that over half of the students believed the software had an impact and a third thought hardware impacted on their learning.

Figure 10: Do the electronic portfolio features and the hardware influence learning?



4.5.2.1 Ease of access and security through the use of the internet

When students discussed what it was about the software and hardware of the electronic portfolios they considered that the electronic portfolios were easy to access across a range of devices that made their portfolios portable.

Joseph said:

> "I now rarely carry around anything more than a single piece of paper, yet I always have my iPhone and often my iPad, this means that I can access an e-portfolio anywhere and contribute to it on the go. This is not possible with a paper based system."

Elizabeth added

> "I mean I can see how it is advantageous, you know, everything's on the web, you're not fiddling around with bits of paper anymore, etc., etc "; and Hilary said "I suppose that thing of having it in one place, that I can, I can access at university, I can access it at home, it's just somewhere there. But I can bring in a whole load of other things that I'm doing onto it, even if it's not a requirement of the course to be doing it."

The main way that this accessibility was achieved was being stored in, and accessible through, the internet. This also meant that the students believed there was a greater security of heir artefacts over paper versions that could be lost or destroyed more easily.

Joseph stated:

> "despite some concern about security and data corruption, I think that an electronic record is safer and more private (this may be naive)" sic.

Nichola also agreed saying:

> "By using this method if something had gone wrong with the system I always had backup copies to fall back on".

4.5.2.2 Impact of hardware on the student learning experience

Notably, **Elizabeth** was the only student in the sample to highlight major concerns over the potential of the hardware on which the electronic portfolio sits to hinder learning and appeared to reflect her general unease in using "the electronics". For **Elizabeth**, access to the electronic portfolio was being dependent on being able to log on to the hardware hosting the software and to be able to connect to the Internet to add artefacts. **Elizabeth** expressed this as a disadvantage of the electronic portfolio in that "it was computer based" and that you had to "log-on" to start the electronic portfolio and start to evidence her learning. **Elizabeth** also acknowledged

> "whilst an increasing amount of people have got things like tablets and PC's, it also requires an Internet connection at some point, and many practice areas don't have easy access to either Wi-Fi or access points".

This lack of concern, by the remainder of the sample, is significant, because the early literature on the impact of technology often cited the instability of

hardware as a major barrier to the implementation of electronic portfolios. The change reflects the work companies like Apple have done to ensure that hardware is safe, stable and reliable allowing the focus to be on the uses of the technology.

4.5.2.3 Navigation

Students found that the electronic portfolios' features, or lack of them in some cases, caused difficulties in how they navigated the portfolio finding it counter-intuitive and 'clunky'. **Linda**, for example, was frustrated that there was no

> "option to organise our files into set folders [similar to a computer], as I find [the way the electronic portfolio structures things] very confusing and annoying to find work."

Linda is at odds here with some of her fellow students who in section 4.5.1.2 who praised the electronic portfolios for the ways they organised artefacts. Instead, **Linda** focuses on the issues with the way the portfolio arranges artefacts which were confusing for her and her portfolio.

Rachael was more specific in her criticism of her electronic portfolio's interface. She said it was the way the electronic portfolio

> "pops up everywhere and when you press, the design of it, when you press return to go back, it just is a nightmare."

Ruth also found the electronic portfolio

"quite hard to like navigate round, it's not, it's not sort of easy to, for instance, change something and sort of it has its like limits" and "not ideal".

4.5.2.4 Time

The problems with navigation and previous discussions about adding artefacts also led the students to believe that their electronic portfolios were time-consuming. Students often expressed that the time spent on electronic portfolio activities did not justify the outcome of the exercise, academic credits towards a module, or the passing an assessment, for example. Students thought these outcomes could be achieved more quickly in other ways.

The reasons why healthcare students said the electronic portfolios were time-consuming were related to the ways students had to add artefacts to the electronic portfolios. **Stephanie, for example,** the way she had to add artefacts was:

"not user-friendly, I find myself spending an awful lot of time sorting out, you know, like sorting out, like having to add assets here, there and everywhere and having to just deal with the software rather than getting on with the actual work."

and

> "I can do it, you know, I'm quite capable of doing it, but like I say, it's all time consuming and I just think this is just inefficient, really, to me."

4.5.2.5 Competence in using the hardware and software

While the students undoubtedly expressed some dislike for the software and structured learning within electronic portfolios, one theme that emerged for some students was their lack of competence with using ICT. When broad attitudes to technology were explored in the data, there was a link between those students who appeared more at ease with technology and positive attitudes to the electronic portfolios and vice versa. For example, **Sophie** said that she has

> "always had to challenge myself and know that sitting down with technology, something like the ePortfolio could sometimes fill me with dread. But I've always seen it like I'm going to crack it and we will get on with this and it will be done. So, I think because of my mind-set, I'm a technophobe, I would never actively seek out to do something like that, but once it's put in front and so there you go, we sit down and try and work it out."

Although the sample size and composition meant that there was no substantial evidence for any demographic differences, there was a strong

correlation between how the students felt about their electronic portfolios and their personal competence with hardware and software in general. This is an important finding for the research as it suggests that it is not the electronic portfolio as a pedagogic tool that is problematic but rather the students comfort with using the software and hardware. This is picked up in section 5.2 of the discussion.

4.5.3 Impact of the electronic portfolio on interactions

As this thesis is examining the role of electronic portfolios, it was disappointing to note that, other than conventional methods of supporting socially constructed learning, the potential of the technology and Web 2.0 these were not used in the portfolios. There was also no evidence of the sharing of the students' learning beyond a limited community of practice. There is evidence from the interviews that some students believed the electronic portfolios interfered with collaborative learning. **Linda** for example said

> "but other people who aren't used to technology, erm, who have learnt it as older and they're not as confident, I think they would struggle with [the electronic portfolio]".

Elizabeth also said

> “I’m currently waiting for two of my [assets] to be approved and its purely I’m waiting for my mentor to log onto the computer, pick it up, reply and send it back.”

also, **Andrew** who said

> “but again, still waiting for approval as [they haven’t] been shown where to click the button. What I will do is arrange a meeting with [them], send [them] an email and then [they] can click on the link there”.

Students did, however, discuss the positive ways in which the electronic portfolios supported the individuals who were carrying out assessments enabling those assessors to give instant feedback to students, for example when questions were asked or issues identified. **Andrew** stated:

> "so you can contact them through the E-portfolio, sending them an email from it and in a way, this tells them they know where you are from, what it's about, and that you are the on the course and it is a formal process. This is a big plus and not something that you can necessarily get through a paper portfolio."

and

> “when you have done the placement visits and uploaded the information they get an email to say it has been uploaded and they have to validate to confirm that this did happen”. Hannah added “I like the fact that you can share it and like I can share say for instance

something with my (academic tutor) and but then you can continue to work on it and it does sort of like update like the other person of the changes and I do like that side of it."

Hilary also noted that she

"used to evidence what I'd done were ones that I, that my, [personal tutor] had seen and kind of ticked as yes I'd done that and [they were] happy with the reflection I'd done on it."

One unexpected finding was that for those students who required their work to be signed off or verified by another individual e.g. clinical mentor/supervisor, the students saw the electronic portfolio as providing a safer mechanism than a paper portfolio in verifying identities.

If an artefact required a sign-off, the student believed that it would only be possible for the approved person to do it and that, unlike paper portfolios, a signature could not be forged or the approval falsified. **Elizabeth** said that by asking mentors to log into the portfolio "cuts down on fraud, then yes, because anybody could just write a submission" otherwise.

Hannah also said that having the academic tutor's feedback in the electronic portfolio could help with any disputes further down the line, for example, if they did something the tutor said but the tutor later contradicted this there is evidence in the electronic portfolio.

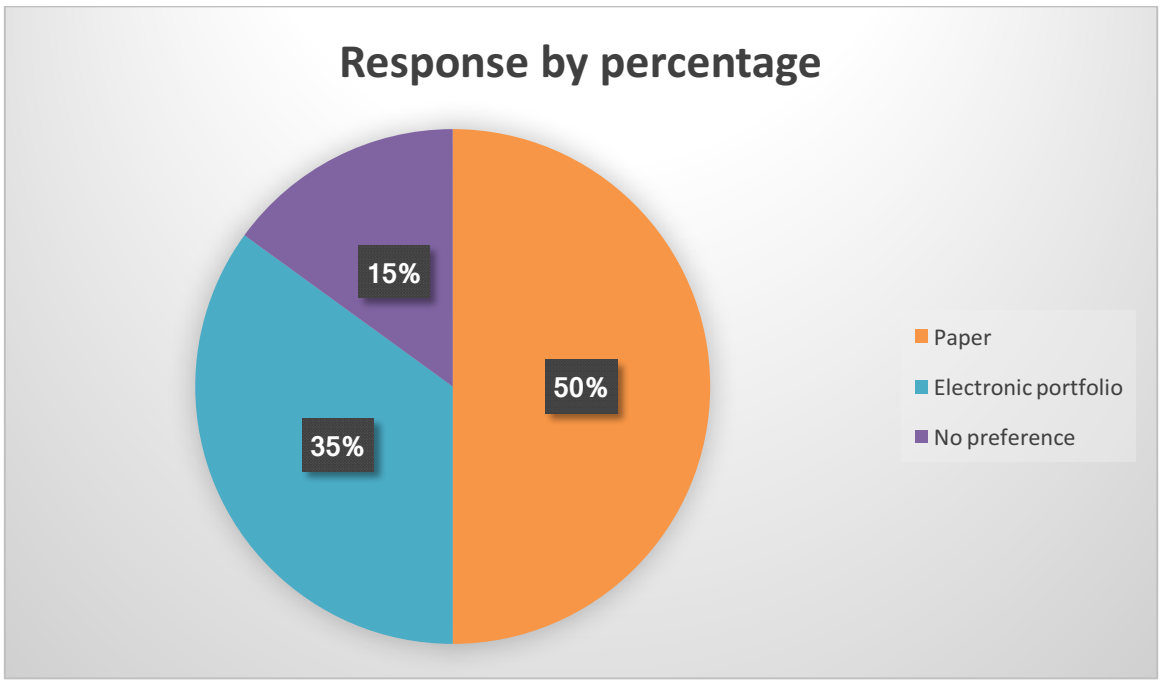
4.5.4 Preference for paper portfolios over electronic

Many of the students concerns about the use of electronic portfolios became apparent when they began to compare them with paper portfolios. **Hannah** stated that she found it easier to use a mixture of paper and electronic resources to evidence their learning saying:

> "but as a resource for myself and I sort of tend to, I do a mixture of both really, I've got a paper copy as well because if I see something on placement and it's something I've not come across before and there's leaflets or there's". Some students saw this as a duplication of work."

Indeed, when the students were asked in the online survey if they would prefer future learning to be evidenced in paper or electronic portfolios 50% of students said that would prefer paper compared to only 35% who said an electronic portfolio would be the best format to evidence learning (see figure 11).

Figure 11: Questionnaire and interview responses to "would you prefer to use paper-based or electronic portfolios for your learning."



Reasons for liking paper were given by **Ruth** and **Catherine** whom both said it was because they could easily 'flick' through the paper copy and see the whole portfolio in one folder.

Hilary described how she found the use of paper, in contrast to some aspects of electronic portfolios:

> "fun because you have your previous thinking, so you have your final piece on top, and you can have a folder with how I got there behind it and I do then have to have somewhere else I keep all my research, which has been quite good because I've now got quite a good folder on my research."

For other students, it was the difficulties that were experienced by the people who assessed, or had to feed back to the student, through the electronic portfolio. **Elizabeth** said because "you've got to put in the computer and you've got to wait" for the computer to boot-up, and people would just be sitting and waiting for this to happen. **Andrew** and **Elizabeth** pointed out that because of the ability of some mentors a paper copy would be "easier and less stressful". **Elizabeth** also thought this was an issue

> "for example I'm currently waiting for two of my visits to be approved, and it's purely I'm waiting for my mentor to log onto the computer, pick it up, reply and send it back. Whereas before, previously, you'd have just given them a piece of paper and said can you write on there".

Stephanie said that she would

> "love to do [her portfolio] on paper, or a Word document, but you know, also they're more generic as well, do you know what I mean, they're, everybody can access those, everybody can look at them, everybody, you can give them to anybody, any computer will open those documents, do you know what I mean?"

4.5.5 Limited use beyond the course

Students expressed frustration about the electronic portfolio just having a utility for the duration of the course and not being used once the course had

completed. **Stephanie** gave the strongest statement when she said "I think you get it for a year or something. You'll never use it again, so why learn all this weird stuff about moving assets into web folios and creating a collection, I don't know what they're on about, like why do all that when we're not going to use it, its not going to be relevant to our own practice.

Hannah also though "I'm going to have to either save everything off my electronic portfolio and then I'm not sure how sort of like user friendly and how interactive its going to be when I, like I say, put them all onto my own computer, into Word documents or something and then like still places want a paper copy. So, when I start looking for jobs, I'll probably have to have a paper copy as well."

Hilary said that it "depends on what its used for and it depends on how long I'll have access to this or what happens to my electronic portfolio afterwards, do I keep paying afterwards to maintain my [electronic portfolio], can I take all that information away, do I have to, I mean at the moment I do keep a copy on my own computer of everything I've got on there."

4.6 Conclusion

The results that have been presented in this chapter have addressed the aim and answered the questions that were set at the start of the thesis.

In understanding how electronic portfolios support the social construction of knowledge it has identified the unique forms and functions of healthcare

students’ electronic portfolios and their associated socially constructive processes and artefacts. It has also been able to explore student views on the use of electronic portfolios in their courses.

The results have shown that the uses of electronic portfolios in healthcare education are similar in many respects to other educational courses. However, within the range of these uses, there is a predominance of a hybrid of learning and assessment type portfolios in the UK structured around the requirements of professional bodies and course outcomes rather than showcasing portfolios. The results showed that within the UK there is little evidence of the students showcasing their work to a wider audience including potential employers. The use of showcase portfolios in the UK is in sharp contrast to the North American portfolios which were used in ‘capstone' modules where students were expected to produce public-facing portfolios. In contrast in the UK, the portfolios were all private. The range of portfolios that were used by the students had an impact on the socially constructive processes and artefacts that were found in all the students' portfolios.

The social construction of knowledge occurred within a community of practice that was limited to the student, academics, practitioners, service users and carers with very limited input from people outside of the professional community. Only family members indirectly contributed to the

electronic portfolio by offering advice and support on the use of the portfolio or ‘talking things’ through. This was seen in all the types of healthcare portfolios and although the North American showcase portfolios allowed people to comment or contribute it was noticeable that no-one did.

The socially constructive processes were driven by the healthcare course outcomes, which in turn were driven by professional body outcomes, and they were limited to assessment, feedback and reflection in all the portfolios in the sample. The students’ involvement in these processes involved their collaboration in the community of practice to gain competence and institutionalise their knowledge.

This institutionalisation of knowledge occurred in part through the students creating artefacts in the portfolio or by importing externally created material. Despite the possible range of digital artefacts that could be set up by healthcare students the main one that was present was text created by the student either individually or as a community of practice. Other artefacts created were limited to PDF's in the form of published articles or artefacts that were then saved as a PDF and images and video. Other than video and the fact that content was digitised, healthcare electronic portfolios did not differ significantly from what could be achieved in their paper counterparts.

Overall students expressed slightly more negative than positive views of the use of electronic portfolios in their learning and their portfolio use beyond the course. While students' lack of competence with ICT, in general,

contributed to this negative perspective, the results indicated that this was mainly because the software remains ‘clunky' and non-intuitive. The lack of competence and poor student/portfolio software interface then led the electronic portfolios to being time-consuming, limiting the students' creativity and, ultimately, restricting their interactions with others. Nevertheless, students did say that electronic portfolios positively contributed to their learning. In this positive stance, there were many similarities to previously published literature where students said electronic portfolios provided a clear structure to their learning processes and described how the artefacts they created contributed to that learning. Students also talked about the ease of access to the electronic portfolio that stored their work in a safe and secure way. Students also explained that feedback was given more quickly. Also, electronic portfolios were being used by a small number of students as a personal journal where they separated personal reflections from their assessed reflections. Where the results of this study deviated from other research was that students thought the electronic portfolio gave them assurances that the people who were assessing them were qualified to do so. They considered this an important part of ensuring that they were being taught the ‘right things by the right people' as they moved towards their qualification.

While healthcare students access the same forms of electronic portfolios as other students the impact of professional body and course requirements

impacts on the socially constructive processes and artefacts within them. This caused the students to have positive and negative views of the electronic portfolio which, while similar in many respects to other courses, has some unique aspects related to the healthcare courses they are on.

Chapter 5: Discussion

5.1 Introduction

This chapter discuss the implications of the results from Chapter 4 in relation to how the healthcare students' learning, as a product of the social construction of knowledge, is affected by the processes and artefacts within their electronic portfolios. The chapter also discusses the impact of the limited use of the potential of the Internet and Web 2.0 even though this exists in most of the students' personal and social lives in the form of social media.

The chapter concludes with a discussion of the limitations of the research based on the sample and the application of the broad grounded theory methodology and methods..

It is only by considering these discussions, alongside the results in Chapter 4, that the theory can be clearly presented in the concluding chapter (Chapter 6).

5.2 Electronic portfolios impact on learning

The results of the research have highlighted how the functions of the electronic portfolios, combined with varying degrees of competence of ICT use amongst students, led the students to believe that the electronic portfolios were time-consuming and interfered with their learning.

The introductory chapters outlined how student users are situated within a socio-historical and socio-technical environment where ICT and the internet play a significant part of their day to day lives. Being situated in the 'digital world' the students in this sample bring with them expectations about what the electronic portfolio's software should offer. They criticise the templates, navigability and compare their electronic portfolios with applications like Microsoft Word. Despite this they were forgiving of these shortcomings and seemed to expect that the electronic portfolio software provided by institutions is 'dated' and 'clunky', an assumption that is also supported by Zaliene and Thornley (2015). There was no mention, for example, of how students liked 'the look' of the software something that is important in other apps and has been shown to have an impact on usability (Borenstein, 2014). Student expectations of the electronic portfolios also explained why so many were critical of the range and types of artefacts within the electronic portfolios. This was not simply that these artefacts were technically limiting but that they were also not intuitive and difficult to use.

Limited by the same expectations, student praise for the portfolio software was reduced to their ability to work with the internet, a basic function associated with many current software applications. Students reported that use of the internet allowed them to access external electronic artefacts and work on their portfolios when and where they wanted. It also meant that students could safely back-up their work to the cloud. This praise is also surprising when considered alongside the general socio-technical environment the students function within and where the internet is almost a given in their day-to-day activities Ofcom (2016).

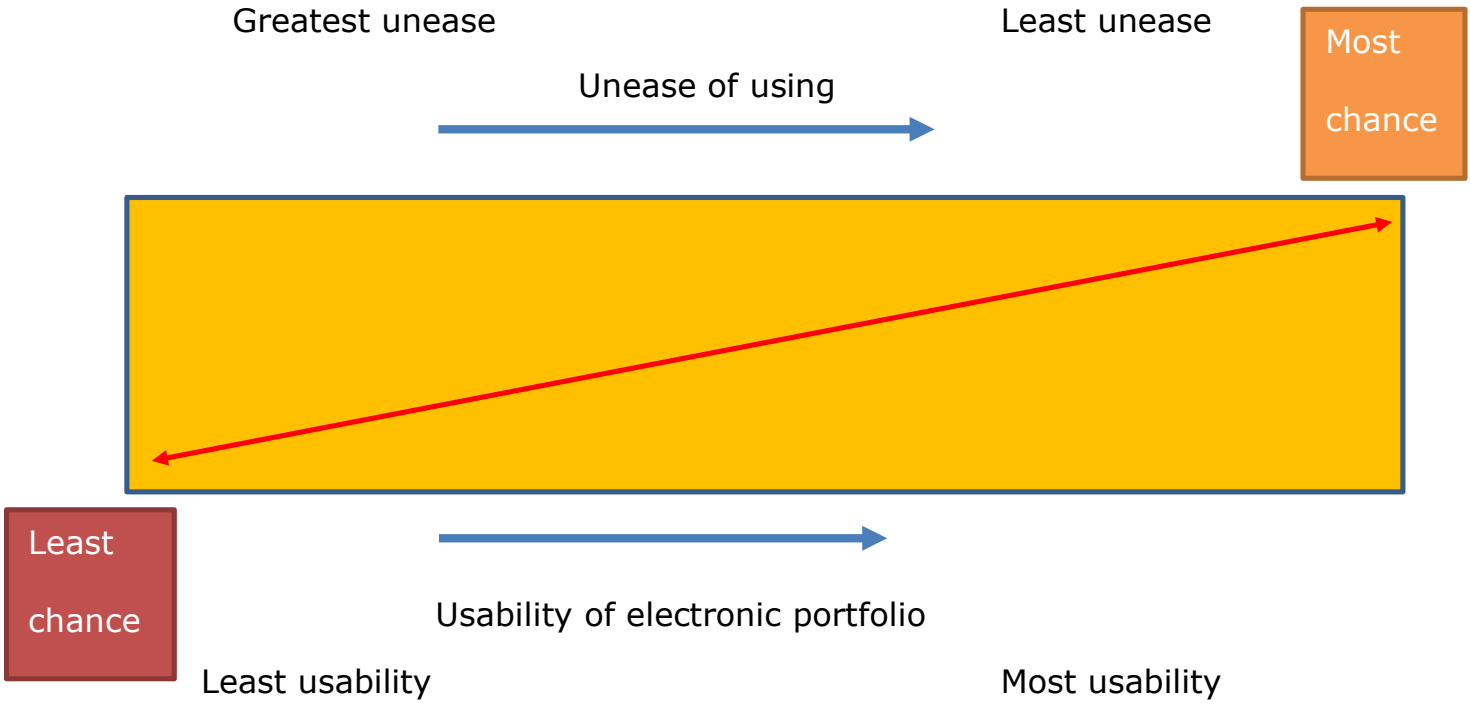
When understanding the reasons for the low levels of expectations of the software the impact of the sample's age demographic may have been a factor. It is acknowledged that a significant amount of qualitative data came from an older demographic that has been linked to poor skills in using ICT (Safford & Stinton, 2016). This could explain why there was a link with low student competence with ICT and dissatisfaction with their electronic portfolio. While this could account for some of the results it is by no means something that can be generalised with confidence because of the sample size. Indeed, the assumption of only older students struggling with ICT is challenged by Hills et al. (2016) who suggests that younger students, often referred to 'Generation Y', and have grown up with technology can also struggle with ICT.

Despite these reservations the theory that emerged suggested that the students in this study, who had previous positive experiences of ICT, either on the course or previous to it, had a positive disposition to the use of electronic portfolios. There was evidence that these 'positive' students were more creative with the electronic portfolio software, the range of artefacts they created, and their computer based networking with academics and peers. For the students in this sample, it was this experience with ICT, more than gender or age, that influenced engagement with the electronic portfolios.

Figure 12 summarises the above points within a graphic that how the greatest chance of electronic portfolios' success is where the students have the least unease of using technology and where the electronic portfolios are considered the most usable by students.

It is suggested that this graphic could be used in further research to assess where students would place themselves and how this could then inform academics and software developers where to target resources and how to improve the learning within electronic portfolios.

Figure 12: Line showing how the possibility of success of electronic portfolio usage is related to unease in using technology against the usability of the electronic portfolio.



Very few students, other than those who have limited ICT, discussed the impact of the hardware that is used to access the electronic portfolios. Early literature, for example, pointed out concerns with the reliability of desktop computers that were needed when electronic portfolios were introduced (BECTA, 2007; Bordoloi & Islam, 2012; Childs, Blenkinsopp, Hall, & Walton, 2005; CLEX, 2009). What has occurred more recently is that alternative technologies such as laptops, tablet PCs and smartphones have become more reliable and easier to use. These changes mean that as this study progressed the electronic portfolio hardware did not feature as a significant concern.

Overall the research has pointed to a remaining resistance to electronic portfolios based on a lower than expected utility of the portfolio software and that this has an impact on the acceptance of electronic portfolios in socially constructive knowledge building.

5.3 Healthcare students' clarity about the purpose of electronic portfolios

The literature review (see section 2.6.2) suggested that in general students did not fully engage with electronic portfolios when academics did not clarify what the portfolios were being used for or made clear the educational purpose. However, this was not found in the responses by the students in this research.

The clarity of purpose expressed by the students might appear to be at odds with the previous section that might be used to imply that the limited use of artefacts would mean a portfolio that struggled to define what is required to demonstrate student learning. However the lack of range of artefacts actually meant that portfolios were only being used in a simple form, and what was created by the academics to assess learning was therefore easy for students to understand. So, while some students previously said that the software interface and range of ways in which they were assessed were limited, they felt this gave a clarity to what they were expected to do. However, it was also the clarity imposed by the healthcare courses having to meet professional body requirements, and how these were applied by the

academics, that had the biggest impact on the portfolios clarity of purpose. Where other studies, described in section 2.6.2, had courses with fewer course requirements, and where electronic portfolios could be used more flexibly, this introduced a degree of misunderstanding within the students. They said that they did not understand why they were using the electronic portfolios and were unsure of what it contributed to their learning. The professional body requirements in the healthcare courses were applied in the learning and assessment portfolios setting out clear knowledge and ability outcomes that the students had to achieve. These, in turn, limited the form and functions of those learning and assessment portfolios so students had less ways to demonstrate that limited learning.

Because of the clear form and functions, students said that they understood the potential of electronic portfolios in their learning believing them to be the 'future' and that electronic portfolios would be part of the future delivery of education in their profession.

5.4 A limited use of socially constructed knowledge building in electronic portfolios

The biggest disappointment in terms of understanding the students social construction of knowledge in their electronic portfolios was the range of processes and artefacts that were identified. Students did describe the social construction of knowledge occurring through their engagement within a community of practice, but this was limited to a small number of individuals.

These individuals too represented only a small range of professionals involved in students' learning.

Processes and artefacts were also limited and, for the UK electronic portfolios, allowed the students to complete assessments, and reflections and receive feedback on their learning. For the North American electronic portfolios, the processes and artefacts were equally limited but focussed on providing evidence that students integrated their learning within a life-wide and lifelong context. So, the limits of healthcare electronic portfolios can be ascribed to the processes and artefacts and how they are used to evidence learning.

While some of these limitations have already been attributed to the electronic portfolios' forms and functions, and academic and student dimensions there still seems to be an under-usage of the portfolios potential. What is difficult at this point however is understanding what other processes and artefacts could be included in electronic portfolios. Just as with paper, the types of artefacts that can be created in electronic portfolios is limited by the format. Where paper artefacts are limited to text and images, electronic portfolios additionally allow audio, video and animations to be included. The only format not seen in this sample was animation. Within current usage across education the only artefact missing from healthcare electronic portfolios that can be found in other courses portfolios would be physical objects such as sculptures or paintings. Including these, while possible, is

hard to conceive for healthcare students' electronic portfolios where assessment does not currently result in the production of a physical artefact. Perhaps the potential of hardware and software may eventually lead to a type of augmented reality where this could be digitally replicated?

5.4.1 An underuse of Web 2.0 and collaborative learning

Although the data showed that many elements of healthcare electronic portfolios mirror the format of the paper versions they replaced there has been little incorporation of the potential of computers and the Internet into electronic portfolios. While assessment, reflection and feedback have been a feature of health courses for several years all that appears to have happened is that these have been ported to an electronic format in electronic portfolios.

So, despite the potential of the internet and Web 2.0 to enhance social networking in the students' learning, this remains limited in healthcare education. Even where online electronic portfolio tools such as WordPress, Blogger or Mahara have the ability to embed collaborative tools such as discussion boards, forums, and wikis within them, these were not identified as being a feature of the student's learning within electronic portfolios.

Of those students who discussed the use of collaborative and Web 2.0 tools, which were mainly discussion boards and online group work the students

discussed how these approaches were used outside of the electronic portfolios and then imported into their electronic portfolios.

This lack of use of Web 2.0 could be accounted for by referring to the earlier discussions how a lack of functionality or academics' skill levels resulted in a lack of diversity in assessment. If the academics do not base the pedagogical use of electronic portfolios on social learning, then the students could default to the individual learning described previously, and if both academics and students lack these skills, then the use of the electronic portfolios would be limited.

It is also suggested that, because of the required outcomes of the professional bodies and the healthcare courses, electronic portfolios focus on learning outcomes rather than the learning processes.

Additionally, electronic portfolios have been said to offer greater opportunities to encourage computer supported collaborative learning (Buzzetto-More & Alade, 2008; Conole & Alevizou, 2010; Erkunt, Erçetin, & Yildiz, 2008; Karsten 2012; Stephensen & Dillon, 2013) and this may lead to an increase in the use of Web 2.0. Bagnall (2004), however, suggests that computer-based learning can encourage 'individual learning' where the student 'interacts' with the computer rather than individuals. This makes it difficult for collaborative learning, generally or as part of Web 2.0, to take place. Applying this notion to the students in this study suggests that the processes used in electronic portfolios encouraged them to engage in self-

directed learning, only engaging with others when they were needed to for course requirements. Add to this the results that showed that students who lack computer and information technology skills also struggled with collaborative learning in electronic portfolios and it is easy to see why the use of Web 2.0 would be limited. Literature has also been able to show similar effects of lack of skills and abilities in students and academics, e.g. Adams and Timmins (2006); Childs et al. (2005); Edwards and O'Connor (2011) and Palloff and Pratt (2007).

However, what was also seen in literature was that even when academics implemented more complex methods of achieving social learning, and students had the required skills, it is suggested that some electronic portfolio software is not sophisticated enough to make Web 2.0 or collaborative learning meaningful for the students. For example, Belcher et al. (2014) found that only 40% of students thought electronic portfolios helped them communicate with their peers and only 35% thinking it had an impact on communications with an 'instructor'. The students stated that they felt the electronic portfolios created a barrier between them and their community of practice, either because of the form and function of the software, or because of problems with the engagement in the collaborative processes by the student or academic staff (Belcher et al., 2014, p. 4).

The research has also shown that irrespective of the methods that were used to engage students in the social construction of knowledge, they only

accessed a limited community of practice that consisted of academics, practice staff, peers, service users and family. Perhaps this, more than any pedagogical or competence issues affected the use of Web 2.0 for these students and their electronic portfolios. If the students can only, or indeed only want to, access a small community of practice, why would they need the full capabilities of Web 2.0?

Again, the influence of the professional bodies, who decide who can assess student's learning, means that only a limited number of people are directly involved in student learning. Add to this the recurrent theme of not wanting to share artefacts that might breach confidentiality, or expose a student's 'weakness', then the use of Web 2.0 may be too difficult to implement effectively.

The other consideration of why students do not use collaborative learning is related to their 'other' personal digital world where they access Web 2.0 for their own formal and informal learning so it is not needed within electronic portfolios (Whiting & Williams, 2013). Examining the most popular Web 2.O technologies, e.g., Facebook, YouTube, Twitter and Instagram people access them for social interaction, information seeking, to pass the time, for entertainment, and relaxation (Whiting & Williams, 2013). Acknowledging these uses, it is possible to understand that the wider population, who could contribute to learning directly or indirectly, would not be motivated to engage with students' electronic portfolios because they do not match these

uses. Most likely, the content of these electronic portfolios are seen as a niche product, and as such, they do not appeal to the wider populations.

5.4.2 UK Healthcare students' electronic portfolios are not shared publicly

At the completion of the thesis, there was still no electronic portfolios produced by healthcare students in the UK that are openly available online. This contrasts with North America and Australia where these electronic portfolios are a common element to a range of courses. Concerns over what is shared, how interested people are towards the shared content and concerns about having weaknesses exposed were identified as reasons for this.

The research has identified that both academics and students expressed concerns about sharing the artefacts within electronic portfolios with people outside their community of practice. The reasons given for this was either the artefacts held personal information relating to the student, practice areas or patients and because the UK electronic portfolios were used for learning and assessment, and not to showcase students' work. Access to the UK portfolios was by passwords in secure systems that allowed collaboration in 'closed' environments but added a barrier to the sharing of artefacts. On the other hand, the purpose of the North American portfolios was to showcase students learning, and these could be found and accessed through a straightforward Google search.

These different uses of the electronic portfolios in healthcare education, therefore, shows a fundamental difference in this pedagogical use of electronic portfolios in the UK compared to North America and Australia. In North America and Australia electronic portfolios were used in capstone courses which are completed by an undergraduate student in the final stages of their course. These capstone electronic portfolios are intended to bring together student's learning and show how the students integrate life skills with their learning (Buzzetto-More & Alade, 2008; Cambridge, 2010; Karsten, 2012; Ryan, 2011; Walz, 2006).

A further explanation, accounting for the reluctance to share, came from students who said that they were reluctant to share their artefacts as they thought it might expose weaknesses in their knowledge or, in the case of healthcare students, breach confidentiality. Students believed that artefacts, shared publicly, might lead to peers or the wider community questioning or ridiculing the content.

Maintaining confidentiality was also a recurring theme in this study not only by academics being wary of me accessing their students' electronic portfolios at the start of the research but also in the students not being willing to share artefacts with me. It was noticeable that in the UK electronic portfolios when I could access the portfolios the information in them named individuals and organisations than paper portfolios. This seems to be because the electronic portfolios in the sample were ‘protected' by a password and were only

accessible to a small group of ‘approved' individuals. This use and its justification might be yet another reason the portfolios were not shared in that they were not intended to be shared so students could feel more able to write in confidence.

Students also said their reluctance to share artefacts, for example, in their personal development plans or reflections because they feared that this would be seen as a weakness. For example, if they found that they did not work effectively with a patient they thought this would be regarded as a problem with their practice rather than a learning experience. Concerns over sharing were also observed by (Woodley et al., 2011) who stated that nearly 60% of the students in their sample had concerns about sharing their content, and had concerns about how people would perceive the quality of the content they might share. Also, (Ruiz et al., 2009) who examined sharing from the point of view of medical students found that some students felt uneasy in sharing ‘personal’ reflections with colleagues and employers. Part of the explanation as (Cotton, 2001) and (Stewart, 2013) suggest is because students have a fear of exposing personal or professional shortcomings.

Although literature, academics and software developers have tried to address all the issues mentioned in the previous section and this, the successful sharing of healthcare students’ electronic portfolios remains limited.

5.5 Limitations of the research

While there is no intention to negate the approach and findings of the research in the thesis the following considers the limitations of the research. In arriving at conclusions of the thesis the limits of the generalisability of the findings must be considered. These limits are related to the use of broad grounded theory methodology and methods, a social constructive ontology and epistemology and of the finding of grounded theory, and the limited sample size.

Understanding social construction, based on social representation, leads to criticisms about how I as a researcher can be confident that my interpretation on the students' social representations can be considered a true 'true reality' (Cromby & Nightingale, 1999; Gergen & Gergen, 2007)? In addition, how can I know that what has been interpreted by myself as the researcher can also be extended beyond the sample I am researching? Gergen and Gergen (2007), for example, suggest that 'true' knowledge can only be discovered by exploring the views of the *whole* population so choosing a sample would result in an incomplete picture.

Added to this criticism, grounded theory itself is also criticised as not producing results that can be generalised. However, it should be noted that grounded theory approaches are only intended to offer a substantive theory, so one that can be applied to the context in which the research takes place (Charmaz, 2014; Corbin & Strauss, 2008). If this is true and the researcher

wants to generalise the researcher must ensure that the theory becomes saturated.

It has to be acknowledged, as outlined in the methodology and methods chapter, that there were issues in gaining a sample of students to participate in the research as well as access to their electronic portfolios. This was a challenge for two reasons. Firstly, because of the use of a questionnaire in the early stages of the research, the emergence of theory did not follow the requirements of the grounded theory. Secondly, the sample size and range itself were limited by access to a suitable population. I have already discussed the impact of the wording in my introductory letter, but this was compounded by several internal and external contacts withdrawing support that had previously been given verbally. These contacts had been developed during my participation in many electronic portfolio projects. Also, the work I was involved with in my own institution, to which this thesis was going to contribute, was also curtailed as institutional priorities changed.

While all these points may have had an impact on generalisability the fact still is that the grounded theory including the categories, themes were all ‘saturated', and no new areas were being identified by the students at the conclusion of the research. However, acknowledging the above points, it should be noted that this research is ‘a product of its time' and as new technologies are introduced, alongside software developments, this will inevitably become more distanced from the prevailing reality. To keep the

findings relevant further research, which is discussed in the following chapter, will be needed.

5.6 Conclusion

This chapter discussed how the findings within the thesis, need to be considered within the limits of how I, as a researcher, explored the extent of the social construction of knowledge, and the limitations in the generalisation of the grounded theory that emerged.

Accepting these limitations, the results have highlighted how students, despite having broadly negative views to the form and function of electronic portfolios, are clear on why they are using the portfolios in healthcare courses.

When examining the social construction of knowledge, which was part of all student learning, this was identified within the processes and artefacts of healthcare students' electronic portfolios. Despite being part of the portfolios the ways that socially constructed learning was developed and recorded used a limited range of processes and electronic artefacts and did not significantly engage the potential of the Internet and Web 2.0.

These discussions are drawn together with the results in Chapter 4 to present a theory to explain the social construction of knowledge in healthcare students' electronic portfolios. This is presented in the following concluding chapter. The concluding chapter will also suggest some areas for further research alongside my reflections on the personal impact of completing this thesis.

Chapter 6: Conclusion

6.1 A theory to explain the impact of electronic portfolios on student learning

This thesis has contributed to the existing body of knowledge about how students use electronic portfolios in education and defined the specific use in healthcare courses. It also builds on understandings of how students view the use of electronic portfolios, adding to previous research while being specific to healthcare education. This was achieved through the generation of a substantive theory that was grounded in the data that was collected and analysed using a broad grounded theory methodology. The theory is as follows.

The research found a limited number of socially constructive processes and artefacts that are used within healthcare courses. These processes and artefacts supported the social construction of knowledge within the students' electronic portfolios.

Even though healthcare students were not at ease with the limitations of their electronic portfolios they found that the pedagogical use of the electronic portfolio defined the range and extent of the learning they were required to demonstrate.

A range of factors, internal and external to the electronic portfolio, determined the use of the electronic portfolios. This included the student's confidence with using technology, the requirements of the professional bodies and the healthcare courses that incorporated them, and the skills of academics in using the electronic portfolios.

The students found the electronic portfolios format allowed them to use a wider range of digital artefacts (i.e. images, video and audio) that were not available in paper portfolios. They also thought the integration of the Internet into their electronic portfolios meant that their portfolio was safe in a digital cloud based repository.

The research found that despite the widespread use of Web 2.0 by most of the students in their personal lives, this was not incorporated into students' electronic portfolios. This appears to be because of the lack of Web 2.0 functionality in the electronic portfolio software, and the lack of Web 2.0 knowledge in those implementing the electronic portfolios in the healthcare courses.

The impact of limited processes and artefacts, and failure to use the potential of the Internet and Web 2.0 has a negative impact on the students' abilities to socially construct their knowledge within electronic portfolios.

6.2 Areas for future research

From the outset, this thesis did not set out to criticise electronic portfolios or the academics and students who used then. It does, however, offer a theory grounded in data that describes how electronic portfolios are used in healthcare education to help students socially construct knowledge. The research identified that electronic portfolios within healthcare courses have a limited range of forms and functions that are linked to course outcomes and

the underuse of the electronic portfolios' capabilities by universities, academics, and the students themselves. In developing this theory, it has raised some further questions, and these are discussed now with the possibility of prompting some further research.

This thesis has suggested an alternative taxonomy in Figure 8 that was used to summarise the uses of electronic portfolios in healthcare education. It is suggested that further research could examine the generalisability of this taxonomy to a wider sample and range of healthcare courses. If it is found to be useful then this can also help those involved with the development and implementation of electronic portfolios in healthcare courses to implement or refine their uses.

Figure 12 also offered a graphic that, if used to gauge if students were comfortable with technology and how they perceived the ease of use of their portfolios, could show where academics and electronic portfolio developers could target resources to maximise the potential of the portfolios. For example, if students felt they were competent users but could not navigate the portfolio then resources would need to examine the electronic portfolio rather than provide training for the student.

More broadly there have been significant developments in the hardware that hosts the electronic portfolio, even since the start of this thesis when computers were the prevalent host. We now have a range of portable digital

devices such as smartphones and tablet devices that are both reliable and able to host sophisticated electronic portfolio software, that supplement the older technologies.

Software has also continued to develop to meet the increasing demands of students learning requirements and developments. Examples would include cloud computing that means the electronic portfolio can exist independently of devices.

Despite these incremental developments the various forms and functions of electronic portfolios remain the same. Software developers and academics are now using technologies that have, with the internet as an example, been around for nearly twenty years. As a result, the adoption of electronic portfolios is slowing as they have, in their current form saturated the educational marketplace.

It is almost impossible to predict what the far future of the electronic portfolio might look like but three areas offer potential.

One is agile software development that although it has been around since the mid-1990's (Dingsøyr & Lassenius, 2016) has potential to break down the barriers between the developers, buyers, implementers and users of the software. Research into the application of agile approaches to electronic portfolios could not only ensure its continued use but also improve its status in healthcare education. Agile development is said to do this through a focus on individuals and interactions over processes and tools; working software

rather than comprehensive documentation; customer collaboration over contract negotiation and responding to change rather than following a set plan for development (Dingsøyr & Lassenius, 2016).

Agile development has the potential to address student expectations of the software, especially for those who found technology difficult, help academics improve the application, and software developers to develop interfaces that allow better use of digital media.

The second area that offers a potential for future research is how to increase the social construction of knowledge. This research has pointed out how it occurs, and the barriers, but more research is needed to maximise the potential. Of interest is how to engage people beyond the students' limited community of practice and to engage the wider population. This might include looking at ways for students to feel less threatened in sharing their electronic portfolio content and academics and professionals, looking at ways of the exchange of information that does not break the professional codes and expectations of the healthcare students.

While this may already occur in a limited way the literature suggests that when this is implemented, in the USA and Canadian electronic portfolios for example, this could be improved. It is suggested that research should focus on how to minimise student's fears in sharing aspects of learning through the development of other processes and artefacts of learning.

One way this could be achieved is to evaluate the effectiveness of introducing showcase elements to healthcare electronic portfolios in the UK, to see the impact on the social construction of the student's knowledge. The adoption of showcase elements may be as part of a model like the use of capstone courses and modules in the USA and Canada or the context of a wider use of collaborative tools within electronic portfolios. Further research should, therefore, explore which collaborative tools are the most efficient when used, within or alongside, electronic portfolios to maximise learning outcomes.

The third and final area that would benefit from further research is the meaningful adoption of lifelong and life-wide into the healthcare students' electronic portfolios. Although this has been proposed and incorporated in some areas (Bauer 2009; Cambridge 2008; Gordon 2014; Huang et al., 2012; InfoNet 2008; Lopez-Fernandez & Rodriguez-Illera, 2009a; Peet et al., 2011; Ravet 2011) this is not as successful as it could be.

This lack of adoption can be seen in healthcare education, education and externally as well for many years so it would be helpful to understand the reasons for this.

6.3 A personal reflection

Throughout the course of completing the thesis, I have had opportunities to engage in a few activities to explore wider aspects of the use and

implementation of electronic portfolios. While the findings did not directly contribute to the thesis they had an impact on my thinking, the combination of all these strands, alongside the thesis, has given me a unique insight into the application of electronic portfolios in health care courses. My interest in electronic portfolios has allowed me to be involved a part-time secondment to the ‘assessment and learning in practice settings' project (ALPS) that was funded jointly by HEFCE and the local strategic health authority (SHA) as part of the Centre for Excellence in Teaching and Learning (CETL). The ‘ALPS electronic portfolio project', that ran from 2009 to 2010, and aimed to involve students in investigating the use, benefits and requirements of electronic portfolios, in health and social care education. It involved five Universities and sixteen health and social care professionals. I was a joint author in the publication of the final report in 2011.

Whilst I was completing the thesis I was also awarded a University funded Teaching and Learning Project looking at the implementation of a University-wide electronic portfolio. I was the main author of this report which was also published in 2011.

During these projects, I have considered myself a ‘distant observer', as I do not currently use electronic portfolios directly in any courses I am responsible for. While having some positives, regarding, being ‘free' of any pre-conceived ideas it does also mean that I may not have common sense

insights into the issues expressed by the students or indeed understand the issues from an academic point of view.

Alongside the outcomes, this thesis has also allowed me to develop the skills to conduct a part-time research project. Specific skills gained were in relation to developing online questionnaires and interview techniques which can be developed in future studies. This, in turn, has been, and will continue to be, a source of rich teaching material for the students I support and supervise, as well as for the development of the roles within the ‘day job'. Writing as a PhD student has been one of the biggest challenges for me and, stepping up, has taught me some invaluable lessons in academic writing. Looking back, I understand the need and place for this in academia and as I go on to complete articles based on this thesis, the lessons I have learnt will, without a doubt, impact on my future publications.

One of the lessons I have taken from completing this thesis is to be realistic about the scope, and extent of the research carried out in similar areas. If I were to approach this research again, I would have established the participants of the convenience sample much earlier in the study modifying my research approach accordingly.

As an academic, one further piece of development that I have experienced is as a ‘digital academic'. Because of the thesis, I believe that a rising use of information and communication technology and e-learning in education is

inevitable, if not always desirable. If academics are to be effective in this environment, we need to develop ways of working with digital artefacts, in a similar way that students in the sample worked with electronic portfolios. I have always used my previous post-basic degrees to enhance my skills in information and communication technology, and this PhD has been no exception. I have used and developed a range of skills across several software packages, and again, while I would not class myself as an expert, this has given me a firm foundation on which to build my skills. These software packages range from computer assisted qualitative data analysis tools like NVivo through reference management software and digital data management tools.

As I bring this thesis to its conclusion, I have found myself reflecting on the impact that this research has had on my academic career and the impact this will have on my work with electronic portfolios.

At the outset, I wanted to understand how electronic portfolios were used in healthcare education and to socially construct knowledge in particular. My involvement with some projects, within my employing University, as well as for a regional and national project, led me to believe that my need to understand was mirrored by others. While anecdotal understandings about who engaged with electronic portfolios and the processes and artefacts and who contributed to the implementation, this was not evidence based. Similarly, literature focussed on discreet elements such as assessments or

reflections but did not always give an honest appraisal of negative views of students. All this needed to be addressed, and so the thesis began.

As the theory emerged, I found that my beliefs about the potential of electronic portfolios, particularly about the opportunities afforded by social media, were severely challenged. I came to a realisation that despite years of development, electronic portfolios are still limited because of the interface between technology and the end user, the student. The focus of the research was then to find out what the issues were, rather than, how social media could be incorporated into electronic portfolios. Concluding that electronic portfolios had a limited range of processes and artefacts to demonstrated students learning was, at times, disheartening. However, the openness of the students discussing the positives and negatives of the electronic portfolios they used assured me that I was beginning to understand the problems the students faced. Also, despite the positives expressed by the students, there were times that I thought the use of electronic portfolios in education did not have a great future. It was at this point that I became aware that my expectations of electronic portfolios were probably beyond their current capabilities. Re-evaluating the place of electronic portfolios, as one tool within and a wide range of possible tools, put things back into perspective.

With the understanding that this research has brought me I have better insights into how to implement electronic portfolios and the best ways to support students using them.

Appendices

Appendix 1: Ethical Approval Documentation

THE UNIVERSITY OF HUDDERSFIELD
School of Human and Health Sciences – School Research Ethics Panel

Outline of proposal

Please complete and return via email to:

Kirsty Thomson SREP Administrator: hhs_srep@hud.ac.uk

Name of applicant: Niall Dew

Title of study: ePortfolios: The impact of information and communication technology (ICT) on the social construction of health and social care student's knowledge.

Department: Health Sciences Date sent: 08/09/13

Issue	Please provide sufficient detail for SREP to assess strategies used to address ethical issues in the research proposal
Researcher(s) details	I am Principal Lecturer and the Head of Practice Education in the Department of Health Sciences, in the School of Health Sciences at the University of Huddersfield. I have worked within higher education since 1996. Previous academic qualifications have included an MSc in Applied Behavioural Sciences, a BSc (Hons.) in Nursing with Education, a Dip HE Nursing, and I originally qualified as a Registered Nurse for the Mentally Handicapped (Intellectual Disability). During this time I have had experience with a range of personal and professional educational portfolios. These have been both paper based and more recently electronic. Examples of the latter include Blackboard's Content Collection; Expo(lx); ALPS Assessment Suite; Evernote; and Pebblepad. Areas of academic interest include the sociology of health, social constructionism and the practical application of educational pedagogies. I am also interested in the interface between technology, communities of practice, and learning and teaching.
Supervisor details	Mr Graham Gibbs (Main); Prof. Janet Hargreaves (Co-supervisor)
Aim / objectives	Aim By examining the use of ePortfolios by health and social care students, investigate the impact of the ePortfolio their associated pedagogy and various hardware and software configurations on how these students build their practical and theoretical knowledge? Specific questions What effect does the use of ePortfolios have on how health and social care students build knowledge? What impact does ICT, and in particular the software and hardware, have on the student's knowledge building?

	Is the quality and quantity of learning that takes place amongst students, influenced by the use of ePortfolios and ICT? Identify any unique elements of the ePortfolio related to health and social care knowledge acquisition.
Brief overview of research methodology	The research will be utilising a broad grounded theory approach (Glaser and Strauss, 1967; Strauss and Corbin 1990) with the aim to develop a theory about how practical and theoretical knowledge develops within ePortfolios. A Bristol online survey tool will be used to explore the specific questions detailed above as well as demographic details of the students. Optional follow up Interviews will be offered to students participating in the online questionnaire to further explore the use of the ePortfolios in professional knowledge construction. These interviews may be carried out through a variety of methods to suit the individual student including SKYPE, email and face to face interviews. I will also employ a qualitative content analysis of the questionnaire and interview responses using Strauss's stages of analysis (Taylor, 2010) and Gunawardena, Lowe, & Anderson's (1997) interaction analysis model (IAM) as a starting point . The latter is a tool "based on grounded theory and uses the phases of a discussion to determine the amount of knowledge constructed within a discussion" Wever et al (2006). The content analysis will be within NVivo software to allow further explorations of the data within the broad grounded theory approach.
Permissions for study	PhD within the School: Line manager.
Access to participants	Through previous projects and current work contacts I have a number of contacts at various Universities within the UK. After ethical approval has been granted I would write to the relevant gatekeepers within various HEI's to gain approval for access to the students e.g. Leeds Medical School, York University, Leeds Metropolitan University, Nottingham University as well as students from within the School at Huddersfield University. A 'confirmation of participation' email or letter would be requested from each gatekeeper. Involving students within Huddersfield University would involve approaching Divisional Heads and Course leaders requesting permission to approach students using ePortfolios. In each case letters or emails that would be used to contact the students would be supplied to each organisation including the "information sheet" below. Participation in the online survey requires agreement (consent) to participate, a repeat of the information sheet contents, the option and right to withdraw from the research at any time without giving any reason, and a right to withdraw their data if I wish. Participation also requires the student to give permission to be quoted, following their approval of the material collected; that they understand that the data collected from the research will be kept in secure conditions compliant with the Data Protection Act. I would also use JISC mailing lists and ePortfolio forums to ask for participation in the online survey. Any agreement to participate in follow up interviews in this case would need the explicit agreement of the student's course representative.
Confidentiality	The information gathered by the Bristol online survey will remain confidential and students will not be asked to give their name. The student will only be able to be identified if they give their permission to participate in a follow up interview and this is explained in the section that requests their consent for a follow up. A second form will be required to be completed by the students at this stage to ensure they are aware of their options regards confidentiality and withdrawing etc as detailed in the online survey. Face to face and online Interviews will be collected with an electronic recorder and again one copy of the transcript will be kept on a password-

	protected laptop. Email interviews will be treated in the same as any other textual information provided by participants and will not be shared with any other people other than my supervisors. Any backups of the interview or email data will also have a secondary password. The supervisory team will have access to the primary data in an anonymised form. Finally they will be told that no person other than myself (Niall Dew) or my supervisors (Graham Gibbs and Professor Janet Hargreaves) will have access to the material obtained.
Anonymity	The information sheet and consent agreement will outline that all participants will have their anonymity protected and that neither they nor their institutions, university or practice colleagues, or academic staff will be identified in any part of the PhD or it's drafts. Strategies for this will include restricting access to original materials to myself, and any transformation or reproduction of the materials will not relate to names or places. Instead a random participant number will represent them. Any demographic information will not be able to be able to be directly traced back to a participant name within the PhD. Participants will be informed that if someone carries out audio transcription other than myself that the transcriber will be subject to the same rules of anonymity as myself.
Psychological support for participants	It is not envisioned that any psychological harm will come to participants of this study, however a clause will be included that if they or I think that psychological harm is occurring they are able to withdraw from the study. If I believe the study is causing them distress then I would also stop their participation immediately and if required contact their academic link
Researcher safety / support (attach complete University Risk Analysis and Management form)	As much of the material will be collected electronically the main issues may be around my prolonged use of IT equipment. Another threat may be during face-to-face interviews and I'd ensure that both participant's whereabouts and myself were known during the interview. These face to face interviews would also take place in as formal yet private environment as was practicable.
Identify any potential conflicts of interest	N/A
Please supply copies of all relevant supporting documentation electronically. If this is not available electronically, please provide explanation and supply hard copy	
Information sheet	Attached
Consent form	Attached
Letters	Attached
Questionnaire	Can be accessed via http://www.survey.bris.ac.uk/hud/eport
Interview schedule	Attached
Dissemination of results	Students will be informed that a copy of the full PhD will be deposited within the university. The PhD will also be disseminated through various employer reports, journal publications, and conference presentations.
Other issues	
Where application is to be made to NHS Research Ethics Committee	N/A
All documentation has been read by supervisor (where applicable)	Please confirm. This proposal will not be considered unless the supervisor has submitted a report confirming that (s)he has read all documents and supports their submission to SREP Yes. G.R.Gibbs

All documentation must be submitted to the SREP administrator. All proposals will be reviewed by two members of SREP. If it is considered necessary to discuss the proposal with the full SREP, the applicant (and their supervisor if the applicant is a student) will be invited to attend the next SREP meeting.

If you have any queries relating to the completion of this form or any other queries relating to SREP's consideration of this proposal, please do not hesitate to contact either of the co-chairs of SREP: Professor Eric Blyth e.d.blyth@hud.ac.uk; ☎ [47] 2457 or Professor Nigel King n.king@hud.ac.uk ; ☎ [47] 2812

Consent form

UNIVERSITY OF HUDDERSFIELD

Title of study: ePortfolios: The impact of information and communication technology (ICT) on the social construction of health and social care student's knowledge.

NAME OF RESEARCHER: Niall Dew

I have been fully informed of the nature and aims of this research and consent to taking part in it. ☐

I understand that I have the right to withdraw from the research at any time without giving any reason, and a right to withdraw my data if I wish. ☐

I give permission to be quoted following my approval of the material collected (by type of participant only – service user/carer or academic). ☐

I understand that the data collected from the research will be kept in secure conditions at the University/Body taking part. ☐

I understand that no person other than the named researchers and supervisors involved in this project will have access to the material obtained. ☐

I understand that my identity will be protected and I will only be referred to as a Student in the research report and that no information that could lead to my being identified will be included in any report or publication resulting from this research. ☐

Name of participant

Signature

Date

Name of researcher

Signature

Date

Two copies of this consent from should be completed: One copy to be retained by the participant and one copy to be retained by the researcher.

Letters to Contacts

Dear

I am writing to ask your permission to involve your students in my PhD studies looking at "ePortfolios: The impact of information and communication technology (ICT) on how health and social care student's build knowledge"

This study has gained ethical approval from the School of Human and health Sciences Research and Ethics Panel (SREP) at the University of Huddersfield and I enclose a copy of the information sheet (also incorporated in the online survey), letter, and consent form I would ask be sent to the students.

The students I would like to include, as the title implies, are any students on health and social care courses (e.g. nurses, medics, or allied health professionals) that use any form of electronic portfolio, either for assessment, showcasing work, or detailing personal development.

If you would be willing for me to contact your students could you let me know the best way of approaching them, please?

Finally, if you have any questions please contact me as per the details below or contact my supervisors who are Graham Gibbs and Janet Hargreaves at the University of Huddersfield.

Thank you and best wishes,

Niall Dew
Head of Undergraduate Nursing
Email n.c.dew@hud.ac.uk
01484 473357

Letters to participants

Subject Line: ePortfolios: How you use them and how they influence your learning.

Dear Student,

I am currently researching ePortfolios as part of my PhD, and would like to invite you to participate in an online survey which should take no more than 20 minutes to complete. It can be found at

http://www.survey.bris.ac.uk/hud/eport

If you would like to answer some further questions, there is an invite at the end of the online survey to do this and **those that do will be entered into a draw for either a £50 iTunes or Amazon voucher as a thank-you**.

Further information about the research and your participation in it can be found at the above link.

The anonymised information obtained from the online survey and interview will provide data for my PhD and may be written up for publication/presentation to inform the future use and development of ePortfolios within health and social care.

Thank you in advance for your participation and best wishes,

Niall Dew
Head of Undergraduate Nursing
Email n.c.dew@hud.ac.uk
01484 473357

Interview Schedule

Recap: Consent, confidentiality, right to withdraw
Get demographic information if not gained from online questionnaire

- "I'd like to start by asking you about the ePortfolio you use, and for this part of the interview it is about the software that you use and the what hardware you need to complete it?" (2)

Prompts around name of software, how they complete their ePortfolio (online, offline, hardware used to access it smartphone, tablet, pc etc).

- "Can you tell me why your course asks you to complete an ePortfolio?" (4)

Possible prompts around if used for sharing/comparing information; discovery and exploration of ideas; negotiating or co-constructing knowledge; testing that knowledge; agreeing applying knowledge. Also, prompts regard content, timing, formality.

- "What kinds of things do you put or record in your ePortfolio?" (4)

Prompt here for things like videos, wikis,

- "Who would you say helps/helped you to learn within your ePortfolio" (1/3)

Prompt with examples from lecturers, patients, colleagues etc

- "Do you use the ePortfolio for anything else outside of the course requirements?" (3)

Prompt e.g. Recording personal non-sharing learning.

- "Do you think the ePortfolio is an effective tool for you in recording your learning as a health/social care student" (1/3/4)

Prompt for explanation and depending on answer follow up with questions around
If the ePortfolio is used for sharing and comparing of information
Exploring conflicting evidence
Co-constructing knowledge with others (who)
Testing newly constructed knowledge
Agreeing the newly constructed knowledge with others

- "I'd now like to ask you how you felt using an ePortfolio helped or hindered your learning?" (1/3)

Prompts around positives and negatives e.g. building content, using social networks, cut and paste, techno-fear, access to Internet, ability to put across learning in a meaningful way etc.

- "Is there anything else you would like to tell me about the use of the ePortfolio in your course?"

- "If you are willing, and I get explicit consent from your course leader, would you allow me to have access to your portfolio to do an analysis of the evidence you have presented in your ePortfolio. This would involve extracting the text and analysing it with NVivo software."

Prompts: Answer questions as they arise.

Information Sheet

ePortfolios: The impact of information and communication technology (ICT) on health and social care student's learning.

Investigator: Niall Dew, FHEA, PhD Student, MSc, BSc, Dip Nursing, RNMH, Head of Practice Education, Room R1/23, Ramsden Building, University of Huddersfield, Queensgate, Huddersfield, West Yorkshire, HD1 3DH. Tel: 01484-473357. Email: n.c.dew@hud.ac.uk

Thank you for your interest in the above project. This sheet should give you the information you require to make an informed decision in your participation of the research. If you need more information, please contact me as per the details above.

How did you get my contact details: I was given your name by your course leader (or similar) who I contacted recently. They are aware of the information and requests I am making and have a copy of this information sheet.

Who can take part: any people on a health or social care professional course that leads to a qualification that is represented or monitored by a statutory or regulatory body. You are also required to have used an ePortfolio as part of your course.

What I would like to do: I'd like to ask you to participate in an online survey exploring the use you make of ePortfolios in your learning. If you are willing I would then ask for contact details and ask you take part in either a face-to-face, online or email interview. I want to find out

- What kinds of things do you record in your ePortfolios?
- What are the most useful elements of the ePortfolio related to learning about health and social care?
- What effect does the ePortfolio's software and hardware have on the quality of your learning?

Then, and only with you and your course leaders consent, would I ask for access to your actual ePortfolio. This would only be if your ePortfolio had elements related to the above questions that I was particularly interested in investigating further.

Confidentiality: If you agree to take part in the research confidentiality will be maintained by restricting access to your original portfolios to myself. After analysis, your contribution will be anonymised and you, your institution, and people you have alluded to in your portfolio will not be identifiable. The University of Huddersfield's School of Human and Health Sciences Research Ethics panel has approved the measures I will use to ensure confidentiality. They will include the anonymising of work; keeping any work or interview material you supply in a password protected laptop with one backup kept on a password-protected server.

Opting Out: You can opt out at any stage of the research process with no detrimental effect on you, or your progression on your chosen course. The research, although studying an ePortfolio produced for your course, will not affect the result (if applicable) you would get for completing the ePortfolio.

Supervisor's report

THE UNIVERSITY OF HUDDERSFIELD
SCHOOL OF HUMAN AND HEALTH SCIENCES – SCHOOL RESEARCH ETHICS PANEL

Please complete and return via email to: Kirsty Thomson SREP Administrator: hhs_srep@hud.ac.uk

Name of student: Niall Dew

Title of study: ePortfolios: The impact of information and communication technology (ICT) on the social construction of health and social care student's knowledge

Name of course (if not MPhil or PhD)

Name of supervisor(s): Graham Gibbs and Janet Hargreaves

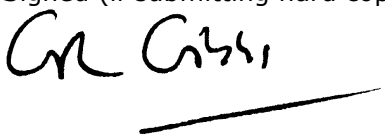
Date: 9/9/2013

I confirm that I have (a) read all documentation submitted to SREP in respect of the above research project and (b) support its submission to SREP. I also confirm that a Risk Analysis has been conducted in accordance with University requirements.

Please identify all documents seen below:

Letters (specify)	To participants and/or their course leader/manager
Participant information sheet	Yes
Participant consent form	Yes
Interview schedule	Yes
Questionnaire	Yes
NHS REC form	
University of Huddersfield Risk Analysis and Management form	Yes
Other	

Signed (if submitting hard copy):



Please note:
No application submitted by a student will be considered by SREP without a fully completed Supervisor Report
If you have any queries relating to the completion of this form or need any other information relating to SREP's consideration of this proposal, please do not hesitate to contact either of the co-chairs of SREP: Professor Eric Blyth e.d.blyth@hud.ac.uk; ☎ [47] 2457 or Professor Nigel King n.king@hud.ac.uk ; ☎ [47] 2812

Risk Analysis and Management

ACTIVITY: PhD Study			Name: Niall Dew	
LOCATION: Various – within and outside of University			Date: 1/2/2011	Review Date: 1/2/2015
Hazard(s) Identified	Details of Risk(s)	People at Risk	Risk management measures	Other comments
Electronically collected information	My prolonged use of IT equipment	Myself	Regular breaks in line with health and safety recommendations	
Personal safety	During face to face interviews	Myself/Interviewee	I'd ensure that both myself and participant's whereabouts were known during the interview and take place in as formal yet private environment as was practicable.	

Appendix 2: Online quesionaire

Electronic portfolios: knowledge and the impact of technology

The survey should take no longer than 15 minutes, and the closing date is XXXX.

This survey, part of a Ph.D. study, will explore how students on health care courses use electronic portfolios to learn. It will look at the impact that electronic portfolios are having on your learning such as the hardware, software and the tools they use.

Ethics Panel Approval and anonymity

The University of Huddersfield's School of Human and Health Sciences Research Ethics panel has approved the measures I will use to ensure anonymity. This includes the anonymising of work; keeping any work or interview material you supply in a password protected laptop with one backup kept on a password-protected server. As a result, all data collected in this survey will be held anonymously and securely. Cookies, personal data stored by your Web browser, are not used in this survey.

All responses to the survey will be anonymous unless you volunteer to take part in any follow up data gathering processes. If you do take part this information will be stored separately from these survey responses to ensure anonymity.

If you have any concerns or would like to know more about the research then you can contact me using the following details.

Niall Dew, FHEA, PhD Student, MSc, BSc, Dip Nursing, RNMH, Head of Practice Education, Room R1/28, Ramsden Building, University of Huddersfield, Queensgate, Huddersfield, West Yorkshire, HD1 3DH. Tel: 01484-473357. Email: n.c.dew@hud.ac.uk

Thank you for your interest.

Consent

1. You must select all options to consent to take part:

    a. I have been informed of the aims of this research.
    b. I understand that I have the right to withdraw from the research and to withdraw my data at any time.
    c. I give permission for data, produced by me, to be anonymously quoted in the presentation of results.
    d. I understand that the data collected from the research will be kept secure and will be compliant with the current Data Protection Act.
    e. I understand that only the researcher (Niall Dew) and his supervisors (Graham Gibbs and Professor Janet Hargreaves) will have access to the raw data gathered.

Demographic information

2. Your gender
    a. Male
    b. Female

3. Your age
    a. 0-20
    b. 21-25
    c. 26-30

d. 31-40
e. 41-50
f. 51-60
g. 61 and over

4. Please enter your course title and year of study (e.g. B.Sc. Occupational Therapy, Year 2)

Information about the electronic portfolio

5. Please select the manufacturer of the electronic portfolio you use in your studies
    a. Pebblepad
    b. Mahara
    c. WordPress
    d. Institutional own
    e. Other (please state name)

6. How do you add content to the electronic portfolio?
    a. Electronic text (e.g. upload, cut and paste or by typing directly into the electronic portfolio)
    b. Blogs
    c. Wikis
    d. Uploading video
    e. Uploading Images (e.g. photographs, diagrams)
    f. Web-links

g. PDF’s
h. Spreadsheets
i. Databases
j. Other (please state)

7. Do you think being able to add this content (electronic text etc.) to your electronic portfolio gives you better opportunities to demonstrate your learning?
    a. Yes
    b. No
    c. Not sure

8. What would you say were the main reasons you used the electronic portfolio?
    a. To show you have met course goals
    b. To show you have met personal goals
    c. To show you have met professional outcomes
    d. To keep a log of your learning activity
    e. To allow you to reflect on your learning
    f. To provide evidence for module outcomes
    g. To record personal achievements
    h. Other (please state)

9. Use the space below to say how you think that the electronic portfolio helped you learn?

10. Use the space below to say how you think the electronic portfolio interfered with your learning?

11. Who contributed to your learning?

    a. You (the student)
    b. Academic staff
    c. Mentors in practice
    d. Qualified staff in practice from your own profession
    e. Qualified staff in practice from other professions
    f. Service user and carer
    g. Another student (peers)
    h. A family member
    i. Others (please list)

12. Use the space below to describe what each of these individuals (e.g., academics) contribute to your learning?

13. Can you tell me one way in which the electronic portfolio's technology (hardware or software) HELPED with your learning?

14. Can you tell me one way in which the electronic portfolio's technology (hardware or software) INTERFERED with your learning?

15. On reflection, what would you have preferred to use in your current learning?
    a. Paper portfolio
    b. Electronic portfolio
    c. Other (please state)

16. Is there anything else you would like to say about using electronic portfolios for your learning?

Invitation to take part in follow on data gathering.

17. If you would be willing to take part in some further research looking at your learning with electronic portfolios, please leave your name and some contact details below.

Thank you for taking part.

Appendix 3: List of USA and Canadian electronic portfolios accessed during the reserch

California State
Munoz - https://smunozcsumb.wordpress.com

New York City
Kheluram - https://openlab.citytech.cuny.edu/members/ekheluram/
Navitskaya - https://openlab.citytech.cuny.edu/tnavitskaya-eportfolio/portfolio/
Kea - https://openlab.citytech.cuny.edu/vkea-eportfolio/

Clemson
Williams - https://sites.google.com/a/g.clemson.edu/carterw/home
Graham - https://sites.google.com/a/g.clemson.edu/tylergraham/
Amalfitano - https://sites.google.com/a/g.clemson.edu/katharine-amalfitano/home

Pryce - https://michellepryceeportfolio.wordpress.com/2013/10/30/hello-world/

Empire State
Binder - http://cbregisterednurse.blogspot.co.uk

Georgetown
Katherine Cargill - https://blogs.commons.georgetown.edu/klb82/

Penn State
Walker - https://blogs.commons.georgetown.edu/klb82/

Northwestern
Hawkins http://nhawkinsmmi13.weebly.com

Alaska
Steinkopff - http://www.epsilen.com/astms45

British Columbia
https://gillianjoyallan.wordpress.com

Florida
Bakidis - Link removed at time of writing- cached version available

Michigan

Ran Hu - Link removed at time of writing - cached version available

New Hampshire
Terrill - https://briana13.wordpress.com/about/

Southern California

James - Link removed at time of writing - cached version available

Messman- http://efolio.lattc.edu/user/view.php?id=156

Appendix: 4 Example of analytic memo

The following is an example of how I used analytic memos

Limitations of research approach.

Early on it was obvious that the issue for a lot of HEI's was when I asked for access to their electronic portfolios. In retrospect this should have been a later request once the students were engaged.

Suggestions, reflections, and amendments

In order to gauge the use of the frameworks used in the pilots I'll return to the original questions posed in the research.
1. What effect does the use of electronic portfolios have on how health and social care students socially construct knowledge?
From the various frameworks it is possible to see that social construction does occur and to varying levels within the electronic portfolios, undoubtably the analysis has allowed me to explore the electronic portfolio reflections in much more depth. The next stage is to start looking for trends within the coding in order to answer the original questions?
What is not so apparent within the electronic portfolios though is what are the variables that affect these differences. The next stage will therefore be to explore how the students socially construct and what those variables are. electronic portfolios in this respect, it could be argued, do not differ from paper based portfolios, so whilst there are these comparisons I need to explore what is different in electronic portfolios.

In regards to the question I removed the "socially construct" from this and subsequent questions as I thought at this stage that it could restrict the knowledge construction to social construction and not allow other knowledge building theories to emerge .
2. What impact does information and communication technology the vehicle for electronic portfolios have on the social construction of knowledge?
Whilst the pilots were good at detailing what was socially constructed and how, there is no indication as to what impact doing it by electronic portfolio and with information and communication technology, rather than by paper for example, had had. It is also noted that I found no research that might guide me in the analysis of the impact of electronic portfolios and information and communication technology on knowledge construction. There was research on how electronic portfolios can do this, but not on the fact that it was "electronic". Whilst this is frustrating on one level it is encouraging in that this is a unique element of this research. One significant

exception to this is where one student has included an embedded web link in their reflection. Again, paper based portfolios can do this, but the fact that the student has an active click-able link that takes the reader to a resource is unique.

3. Is the quality and quantity of learning that takes place amongst students influenced by the use of electronic portfolios and information and communication technology?

What was obvious from the pilots is that a format that is electronic does not diminish the power of reflection; that is from personal experience they are no worse than traditional paper based electronic portfolio. What however is not possible to tell from these pilots is that within a whole electronic portfolio the quality and quantity of reflection is affected. Another aspect that the pilot has highlighted is the need to examine where the students are in their development either by year or using Bloom's taxonomy.

4. Identify any unique elements of the electronic portfolio related to health and social care education.

The dat seem to indicate a number of evolving areas that are unique to reflections in electronic portfolios e.g. That they are personal, tend to be focussed on one situation (rather than global views); interesting as educators we ask them to take a holistic approach. electronic portfolios also seem to demonstrate aspects of being embedded and encultured.

General Observations

After varying degrees of satisfaction and frustration with the frameworks used I returned to my literature review to see if there was anything that would address this. What I have found out is that the pilots have confirmed that students work presents itself in phases similar to Gunawardena, Lowe, & Anderson's (1997) framework. This is a tool "based on grounded theory and uses the phases of a discussion to determine the amount of knowledge constructed within a discussion", Wever et al (2006). This is summarised by Wever et al (2006) as occurring in a number of phases

Phase One

" is sharing and comparing of information, which comprises observations, opinions, statements of agreement, examples, clarifications, and identification of problems.

Phase Two

"is the discovery and exploration of dissonance or inconsistency among ideas, concepts, or statements.

Phase Three

"Is the negotiation of meaning and/or co-construction of knowledge, which includes negotiation, identifications of areas of agreement, and proposing new co-constructions on topics where conflict exists."

Phase Four

"is characterized by testing and modification of proposed synthesis or co-construction. These co-constructed statements are tested against existing cognitive schema, experiences, and literature."
Phase Five
" refers to statements of agreement and application of newly-constructed meaning, and encompasses summarising agreements, applications of new knowledge, and metacognitive statements revealing new knowledge construction' (Gunawardena et al., 1997; Kanuka & Anderson, 1998; Lally, 2001)."

Indeed several studies confirm that portfolios encourage reflective learning, a key to safe practice and self directed learning (Davis, Ponnamperuma et al., 2009)

During the initial stages of the data gathering a number of things became apparent. The first was that despite assurances on the confidential handling of data both academic staff and students were reluctant, in all but one instance, of sharing the content of the electronic portfolios. For academic staff this was due to concerns over the confidential nature of some of the entries the students. It also seemed to to be that in some cases the way the electronic portfolio was set up meant that the student had ultimate control over the content and they had the same concerns in sharing it with someone outside of the organisation. Interestingly in some of the interviews it also became apparent that concerns over sharing the content of the electronic portfolios may lead to an increased risk of accusations of plagiarism.

Next the content of the educational electronic portfolios will be examined for evidence of the social construction of professional knowledge primarily with NVivo using qualitative content analysis and thematic analysis methodologies. In order to identify if social construction is taking place I will look at the role of electronic portfolios in describing or facilitating what Chua (2002) describes as the social processes involved in knowledge construction. These include informal processes within the community-of-practice, informal chats during the social events in the organization, interpersonal relationships, and everyday sense making activities among a group of individuals (Chua, 2002p 375) as well as the formal education focused activities.

Strength of the online survey was that it clearly identified why students were using the electronic portfolio. Interviews indeed identified richer elements in the students thinking.

This broad approach is based on Glaser and Strauss's methodology (Wakimoto & Lewis, 2014), which has subsequently been adapted and

developed between three main approaches Glasserian, Straussarian, and constructivist approaches to grounded theory.
The chapter will show that within the discussion of methodological approach reflexivity is implicit acknowledging, in that whilst I may have particular beliefs about knowledge construction within electronic portfolios, I will remain open to the various approaches on offer.
The chapter will then explain how the research will be used to generate a theory to explain the phenomena observed in the sample group that could be applied to the wider population of health and social care students in the UK.
The chapter describes the early stages of data collection and how this then informed the online questionnaire and latter interviews in respect of understanding how students used electronic portfolios to record their learning and their understanding of those processes. The flexible methodological approach, following the literature review, utilises a constructivist epistemology and as such ontologically it takes a relativistic approach. The data collection consisted of two parts. Part one utilised an online survey to gain insights into demographic details before exploring the type of electronic portfolio, how students added content, the advantages and disadvantages of electronic portfolio use, before looking at who the students though contributed to their electronic portfolio. Part two then consisted of interviewing a self selecting cohort of those answering the online questionnaire to get a deeper understanding of their responses.

Student (interview E) who did offer to allow access to their electronic portfolio in the interview said that they would remove elements of the electronic portfolio as “they didn’t want me to see what they had written” as it was either personal or not developed enough for them to feel comfortable.

Appendix 5: Anonymised interview transcript

I: Just to say that the interview is about your experience of using electronic portfolios on the course and what I'm particularly interested in is how you construct knowledge, you know, how you know the various things that you've learnt on the course and how that's then put into the electronic portfolio and then exploring a little bit about how the use of the electronic portfolio has either helped in that process, or not helped in that process. People are usually on one side of that fence or the other and that's normal as well. So that's the kind of things that I'm going to be asking you, if that's ok. If at any point you want me to stop or you don't want to answer the question, you just say I don't want to answer the question and if at the end of the interview as well or even when you go away, if you think I'm not happy about what I've said, don't feel that, you know, you need to keep it in the loop. So just a general question then to start off. Can you tell me a little bit about the course and the kind of learning that you had to put into that electronic portfolio?

R: I was on the XXXXXX so electronic portfolio is part of the assessment process there. Within that, I had to give evidence of my learning. So I found it was good to give that evidence, so just thinking what I had to, I had to evidence time with XXXXXXX. So you have, the learning outcomes you have,

it helped, because you had that there whenever you were filling it in, it helped focus on what you needed, clarity of what you needed to know. So the role of the XXXX, how it would interlink with my role, how the work on the ward, so recording that against the assessment criteria focused that. But then you learn more around the subject than just that. So its focusing in on, not just on what you need to pass, but what you need to know to actually make your role work when you go into work. Same with the XXXX, you learnt about their experiences, how they work, what they, what they thought were the pros and cons of the role, which you could help put into, again your learning criteria, but also help you process what you're doing and where the gaps in your knowledge are, because when you write it down, you think well I've done that and that and that, but how I learn, it sort of prompts me onto oh I need to know more about that, so that gets jotted down. So it is a platform for something else or if something gets me curious and I go off on a tangent, which isn't always a good thing. The other part of the electronic portfolio was two case studies of related really to your XXXX. So you, and again, it fits in with the criteria, so its about how you XXXX. All the, people think, the lay person would think you just XXXX, it helps them get better, but actually its multi-factual. So it helped you focus on well you're not just XXXX, why are you XXXX, the events that led up to it, erm, examination, your reasoning for XXXX. So it helped you, it gave you structure to focus on that. But then when you start looking at the XXXX, that

can bring up another, a lot of different things. That's not relevant to what you're recording, but it prompts, or it prompts me to go onto other things, well why does that work in that way, erm, looking at your ethical issues, erm, your role, the influences on you, all the things that can go on. Even though you're just, you feel like right this is for this to pass, when you think back on it, actually it prompted me to learn more, having steered me off, to say I need to know more about that, more about that. Then you can come back to it and look at it and think, re-read it and think actually I understand that better now.

I: Ok, so that's really good, that's really good and I'll pick up on some of the other points that you've raised there as well in some of my questions actually. But I'm really interested, when you talked about the learning and that then, that it prompted you to look at other things. Is that something that, you're saying the electronic portfolio helped you do that, but is that something that you then recorded in the electronic portfolio? Or is that something that you did, you know, because you had to fill in the electronic portfolio, you thought oh I'll go away and have a look at that?

R: I don't always record it in the electronic portfolio, erm, there is a comment on mine that said actually I did a bit more work than I probably had to, erm. Maybe that was so, but that helped me clarify things in my

head. So there was that little bit there, that XXXX had put in. But some of the other things, it recorded in my notes that I make before I write things. When I study, I have the computer and my notebook as well. So there are things there that go off. Erm, so that will be recorded in there. It may be that I found a couple of papers on that subject, they're now on a file on my laptop, so I can refer back to it or the consultant at work who was, erm, supporting me through, I could ask him or any other doctors actually, but that's what they're there, that's the process. So it would prompt me, I've been reading this, I don't quite get it and XXXX was really good, well think of it this way, think of it that way, so it prompted, you didn't always record it, but it actually hopefully sticks.

I: Do you think that would have been good if you could have put that in the electronic portfolio then? You said that you, did you look at research, I suppose, did you say or?

R: Yeah, some research articles, erm, so some of them were referenced, but there are others that I didn't use. So maybe a section to say alternative, additional reading, just so that you've read round the subject. Plus I think I've still got access to is, so even though I've got it on my laptop, it would be a resource for the future, oh I remember reading this and going back to it. So it could be that you use it in that way.

I: Do you think the electronic portfolio then was just about showing course outcomes or module outcomes? Do you go back, will you go back to it do you think afterwards?

R: I probably will because one of my case studies was on XXXX, so its about a decision between XXXX. There is a lot around XXXX, so I know I've got some good evidence on there. So if I come up again, I know I've got that resource there now that I can always drop back on.

I: Do you get access to the electronic portfolio when you finish the course, do you know?

R: I'm not sure, I'm not sure whether I do, but I have got it on Word documents as well because you write it in Word, because its time specific, being access to it, everything in a Word document, so I've got it in two places.

I: The time specific thing is about the electronic portfolio then [R: yeah], you have a certain amount of time to get the information in [R: yes] right. How did you find that aspect of it?

R: We were warned beforehand that that happened and advised to use a Word document and then copy and paste into it. Erm, so on the XXXX, I did that. On the other two, because it was more of a reflective piece, with a little bit of evidence in, I had the evidence there before, a piece of paper and then just typed it straight in. So that one was fine, but for the XXX, because they were more complex, Word documents, then I can proof read it, get it proof read and then put it straight in.

I: Right, ok, is that ideal do you think? Is that a good?

R: Probably not, but it depends on how you work I suppose. Erm, probably entering it straight in, straight away, not tinkering with it too much because you, you can go overboard on changing things, because at a certain point you have to say no I'll leave it and hand it in.

I: So you put some Word files in there, cut and pasted them in, did you put anything else in there? Do you put in research articles or is it just references to?

R: Just references and some of them have the web link, so they check those, they went straight.

I: You put web links in there. Can you do things like add photographs or videos into the electronic portfolio or is it a bit more basic than that?

R: It was basic than that, I didn't do that, I'm not that good on technology, I don't know if I'd get that done. But I've got teenage sons who would do it.

I: Yes of course, a great resource!

R: Yes, they know, they're brought up on it, so, erm. I think you could have done, but that never entered my mind really.

I: Right, ok, yeah, great, ok. So there was case studies and then there was evidence as well, that you put in and that, the evidence, would you say that the evidence more than XXXX triggered you to go off in different directions or was it just the whole?

R: I think both did.

I: Ok, right. You've mentioned some people who were directly involved in helping you get that knowledge together. You talked, the ones I've noted down were XXXX, XXXX, XXXX, I don't know, what a XXXX now was, now

that [R: XXXX], XXXX and you mentioned that the academic, XXX in this case, also gave you advice about how to construct electronic portfolio. Would you say that there was anybody else, I mean you talked about your family, about how they could possibly help with putting stuff in there. Were they involved in that process?

R: No they didn't because we went through the electronic portfolio in a session towards the beginning of the course and how to access it and go into it, which was quite easy. I had one problem where I put something in the wrong place, contacted university, and it got moved round for me. But that first experience of using an electronic portfolio, now, learnt from it, won't do it again. If I'm unsure, I'd just double check, erm, and it was easy, it just got unlocked and then I just moved it to the correct place. Erm, peer support from others on the course, who were in the same situation, erm, so its [I: what kind of support did they give you?]. I think its was discussions between, there was four of us, but three of us in particular who met up on the, like on the same sort of pathway and it was, I've done this, I've done that, is that right, that sort of thing. Just clarity between each other, which works.

I: Is that in the use of the electronic portfolio or did you talk to them about the content, about the kind of stuff that you put in there?

R: Both really.

I: Right, because I know that when I ask this question, there's sometimes a bit of worry around things like plagiarism and sharing stuff. Did you feel that that was an issue with e?

R: No because we were doing different subjects, so I suppose its like an action learning set in some ways, that you discuss things, well I found this useful, I mean there's the generic references that everybody will use, XXXX and things like that. So its, they were saying oh I'm struggling with this, have you looked on this site, so there'd be those sort of things. Erm, I found if, if I'd say, well put a search in and put such and such in, you might hit something there, its that sort of discussion, not actually looking at each other's work. I don't think that helps me because you just think no, you put yourself at risk and if somebody's thought processes are different to yours, you can confuse yourself. So it doesn't work that way.

I: So again, those kind of discussions were in, what you said, were action learning sets, but not really part of the electronic portfolio because some portfolios or social media allow you to, you know, to have those discussions and then sort of incorporate that into the electronic portfolio. But you didn't,

you didn't do that particularly [R: no], no, that's fine, that's good. So the XXXX, the XXXX, XXXX and the XXXX, they, what kind of information did they give to you that you then put into the electronic portfolio?

R: The XXXX and the XXXX, it was about, it would be discussing, looking at how they XXXX, why, the discussions how they communicated that with patients. So an example was there was a gentleman, he was started on XXXX, I can't remember what it was and the XXXX went in and he said, explained what he thought the problem was, erm, that there was XXXX that he thought could help, this was the XXX, this is what it would do, this is what the XXXX were, err, and then asked the gentleman would he like to see if it helped him, so that it was a really good example of communication. So incorporated that into how I would communicate management plans with the patient. Erm, but then he came back and he discussed it with the XXXX, so your XXXX, XXXX, it's the equivalent of a XXXX and said related to him, what he'd done and why he'd done it, so he was actually teaching the XXX what should be done, so it is just keeping your eyes opening and listening. But it was a really good example on how actually it should be done because a lot of the time, you sometimes say we'll give them such and such. Now I think I'm more aware of it now and I actually see better communication, especially from XXXX and you can see them guiding XXXX through that. Its

not just a case of XXXX, you've got to get XXX, you've got to get XXX. So those sort of things were easily pulled in, erm.

I: Pulled into the electronic portfolio?

R: Pulled into the electronic portfolio, communication evidence.

I: Was that in the evidence in the XXXX, both would you say?

R: In the evidence, he XXXX really because there's a section on communication, consent, because you have to get consent, so its watching different people do it, people do it in different ways, so and its different from each patient as well, erm.

I: So what do you think the driver for, you mentioned about communication and all those kind of things, what are the things that either they academic or yourself have put that in, does that make sense, it didn't make sense to me when I asked the question, why did you put those things in, was it because you were asked to do it as part of the course or?

R: It is part of the course, but myself, as a nurse, I believe if you have good communication, you can make a scary experience, which going into

hospital is, especially when you work with elderly care, anybody coming into hospital, they're frightened, they don't know what's happening, they're often in pain. If you can communicate well with them, as much as you can let them know what's happening or what we're doing to help, if you can help them relax, see that somebody's trying to help them, it hopefully makes their stay in hospital easier and shorter. Erm, I think it helps prevent complaints from, I was a XXXX on a ward, so XXXX, looking at it from that point of view, if you can communicate you can help people understand what's happening to them and how we can help them over it and how they can help themselves as well, so.

I: So if I'm picking you up right, that the reasons why you put some of those things into the electronic portfolio were because it may be professional drivers or personal beliefs?

R: I think there's the professionalism, I think there's personal belief as well. If I was in, I'd want to know as much as possible so I could make the decisions that are best for me, knowing me, knowing how I work and I think everybody should be given that right, erm.

I: Ok, did you feel the electronic portfolio gave you flexibility to put those kind of things in? Or was it about, you know, passing the module outcomes for example?

R: With the evidence statement, it was XXXX things, so I think you're limited, you can't, communication you could do everything on, but I think I found it, it was getting it in, getting it so that I could get the message across, not waffle, getting my ideas across, getting what I feel across without rattling on too much and saying well its an important part of what you do. So within a two thousand piece, words, but I think within the evidence statements with the XXXX and the XXXX, I probably hit on it a bit more there because it was more free text, it wasn't as niggly.

I: You weren't limited in those XXXX, is it XXXX or the evidence sorry.

R: The XXXX, you weren't limited in, so.

I: Right, but you felt a bit limited with the XXXX then?

R: Yeah and I think some of that was probably my choice of subject on my second case study, I used XXXX there so much.

I: Why do you think there's a XXXX word limit on it?

R: I think some of it is to do with the credits that are allocated to that module. I think if give people feel reign, you're going to have some people that do the bare minimum, some people that would go, on XXXX, I probably could have gone on forever and I think you need to get people to focus on their studies because if you don't get them to focus, you can drift off on tangents and then have to pull in. So if you say right, you've got this word count, you've got these objectives, you can focus somebody in to actually get into the crux of what you need to know without adding things that are unnecessary. I think in any assessment, you've got to be clear on you need to learn these and the learning that that person does on top of it is down to them because people learn in different ways. I'm an adult, I'm responsible for it, I'm responsible for what I know to go into a new post. So I need to look at well this is what I need to know, these are the assessment criteria, I need to know that, but what more do I need to know around it for me. So I tend to look at what the crux is, what do I need to know, what do I need to know to pass, but then what do I need to know from my full understanding, because I don't think passing an essay, it sounds horrible, passing an essay, you can look at the criteria and you can look at the matrix and you can match it.

I: Yeah, I think that's a realistic description of it.

R: But it depends on the person, but for myself, I need to understand it, there's more than what you write in that XXXX paper, that XXXX word paper. So I think we need, you have to have a word limit, or else it wouldn't work, in education and things like that, you need to have a structure.

I: Yeah, I mean some of the things about electronic portfolios is that, on other electronic portfolios that I've looked at, all that stuff that you do outside can also be included in the electronic portfolio and its there and if people want to know, they can look at it. But for you, its there, you know, rather than having your notebook and your laptop separate, its altogether, you know and its there for the whole of your career, if you want. But this sounds a very different electronic portfolio in what its expected, or what the academics expect in terms of the outcomes and so on.

R: Its an electronic portfolio to help you, I think it helps you focus so that you've not just got the academic, you've got the NMC standards and everything, so it helps you focus to reach those standards that are necessary to gain a qualification which is quite a qualification really. It's a bit scary.

I: It is, yeah, yeah, I know a little bit about it, it sounds scary, great. Can I move onto the electronic portfolio itself then. What would you say were the good aspects of the electronic portfolio, what did you really enjoy about it when you used it?

R: I liked, you could always see the assessment criteria, so when you were working, you'd know what you were working against. The XXX, XXXXX, it really helps you focus. Erm, so and it also tells you how much of the work that's set on there, have you completed. So as you have something completed and signed off, it actually not only ticks off the learning objectives, but it actually says you've got so much of your evidence. So you can actually see as you work, it progresses and you know how much. I'm not saying I didn't have it signed off the day before, but that was work and different things, so, erm, but you can actually [I: but it's a good visual], it's a good visual prompt to say you're at the half-way point now, right, how much have I got done and focusing to get it done because even though you may have it, those two pieces that were there just needed typing in. So in a night, I had it sorted up to there. The contact with the people who, like the XXX, the XXXX, the XXXX, XXXX, when you submitted a piece of work, it came back to you via the electronic portfolio, so you just had to access it and I quite liked that because then it didn't get mixed up into the rest of my emails. So it was, like the case study, I submitted it, the first one, (XXXX),

XXXX, XXXX, came back, yeah fine, you could have discussed, which was whether to XXXX or not. On the second one, there was prompts, well think about this, think about, think about this, so that case study went backwards and forwards. So he was prompting my learning as well was me. Erm, so checking that, like knowing when I'd submitted something to somebody, thinking right, they're busy, I'll give them twenty four hours and then another email, so it helped in that way because I could see where they were at and it didn't get mixed up in my work email, so they got documented I suppose. So I quite liked it, it didn't go, people worry that they're going to, its technology, its going to be faulty. It might do, but it didn't. Err, we knew when upgrades were coming, so we knew when it was going to be out of circulation and things like that, erm. I think it was a positive experience, something new, which is something we're looking at now within work, to find some sort of electronic portfolio that we can evidence for learning as we go towards this XXXX. Erm, just somewhere that we can have everything together, as I say, instead of scraps of paper everywhere. So that's on the burner at the minute, looking at something.

I: Any negatives then, about it? You feel, it feels that you're fairly positive about it, but?

R: Me putting something in the wrong place, but that was me just, yeah, made a mistake, but it was quickly rectified, as I said. I'm not the first one, I won't be the last, erm, no, I thought it was fine, I didn't think there was anything really negative. I'd say getting something into a XXXX can be a challenge actually, but.

I: So it was the restrictions on the work rather than the electronic portfolio.

R: Yeah, but it helps you focus, it stops you rambling.

I: Yeah, ok, that's fine. When you were filling out the electronic portfolio then, was there anything that you thought that the skills that you had personally or the knowledge that you had personally, that made using that electronic portfolio better? I mean one of the things that you said earlier was the way that you learn, you know, and it helps structure that learning for you, but it also prompted you to do other things. But I just wondered if there was any sort of skills or background knowledge that you think that you had that made using that electronic portfolio a better experience than maybe some of your other colleagues that might have struggled a bit with it.

R: I think I'm open to new ways of learning, erm, because some, some people are still quite reliant on a lecture and they tell you what you need to know, that sort of thing, which is, go back to when I did my degree, which was in, I graduated in my degree in XXXX. So you sat down in a lecture, you had acetates that they put over and you basically had to copy it down and it was very, you were talked at for two hours and that was the basis of what you learnt and you did, I don't know, it just seemed different or whether at eighteen I didn't think of it in the same way. Coming back and doing my nursing in XXXX, we had Blackboard, reading lists, and I think Blackboard since then has evolved in the way its all structured. So going through so many different ways that education has been presented and I think as you get older, you're more open, well I am more open to it. So I think being open to this is new, let's give it a go. My academic writing seems to be alright. So being able to get the right style to fit in the words to get into that box helps. Erm, the fact that most of the time, if I'm stuck, I'll shout and ask as well. But it may be just confidence in myself to think I can do this, its, its just something new to learn, which is good.

I: You mentioned about you going through different stages. Did you use paper portfolios before? With your nursing course?

R: With nursing, we had a big, I've still got it, a big blue file, which you had your competencies to be signed off. I did the XXXX curricular, so you had your competencies to be signed off, then you had your reflection section, so that's the same in paperwork really.

I: How would the two compare do you think, if you had a choice of this course that you're talking about here and the electronic portfolio, do you think you would have preferred a paper based portfolio or an electronic portfolio?

R: An electronic portfolio would probably be really good because you can work on a document, you can re-work, it gives you flexibility, you do a bit more reading, that's not right, I can add that in. Whereas if you've got paper and you used to type everything out and print everything out and hand it in paper-wise, you're committed to it. So it gives you flexibility in your learning to add extra learning as you go on. Whereas in the past, you'd, you'd write your introduction and think right that's that done, I'll move on. But if you have found something else, it was a bit more, I managed it, but it was a bit more difficult to add things in. Whereas an electronic portfolio would give you that flexibility if it had a section for just extra evidence, personal notes, it gives you that side. Thinking of it as a mentor, and actually having the time to sit down with a student and access the amount of paperwork that

they have, which is the same, its just different, it may, then again, you do it in paper form, you just need to kick somebody off the computer for an hour, don't you. So I think people think oh I've got to sit at a computer, but actually you sit down with them with their file and talk through their learning, talk through their experience and look through their reflections with them, where would it be any different, you just put your pin number in. So I think it would be good, so.

I: Ok, why do you think the university introduced an electronic portfolio for the course? What do you think the reason behind the university or the course introducing an electronic portfolio was?

R: It's a good way to record evidence, erm, I would say from a lecturer's point of view, being able to access them quickly once, once the date, your handing in date is there, they're there, they're ready, you can access it, its, it was, I think in Blackboard you do, but you've got communication with your lecturers. Why did the university do it? I suppose its another learning resource, its another way of assessing, its another assessment tool in some ways. So its looking at people, how they record and how they, how do they adapt to modern technology. The world is using it, the NHS is turning that way, I was at a presentation last week at XXXX, which is having a hand-held device to record your 'obs', so the world is becoming a more technological

place. So if you can have a student used to doing those things for when they go into the workplace, its another skill they're better prepared to do and can quickly adapt.

I: Do you think the NHS is ready for it? Do you think all the people who work with are ready?

R: I think because of this, I think they accept it, I think they learn it, but as with everything, thinking on the ward I was on, there are people that will just go for it and they'll accept it and they'll think yeah, this is great, but other people who aren't used to technology, erm, who have learnt it as older and they're not as confident, I think they would struggle with it. Err, some, like with the XXXX, with everything being linked into a hand-held device, so the XXXX will get alerts on a hand-held device and if somebody is ill and a score goes over five, you've got to go and see this patient, erm, some people welcome it, some people think oh I'm being recorded, I'm being watched. The technology and the backup systems need to be in place, so its reliant on an NHS number, how do you make sure you've got somebody who's racked up with an NHS number, its not something that everybody carries on them, so.

I: Why do you think people aren't up to technology then?

R: Fear of the unknown and fear of breaking it, so, erm, XXXX on the ward, when XXX knows we've got XXXX being rolled out and every day for about a month, she practiced getting on and off her email, religiously, every day, just to make sure she could get it and she could do it and we'd say but you know how to do it, but she's, she's still very nervous about just accessing an email on the work system because she might break something or she might take something off and its like no you can't do that, but if I think, erm, my, going through school, computers were becoming common place, so use of computers, technology, was becoming common place. My mum's generation, she's learnt how to do it and she's still a bit nervous. Children, they'd know nothing else, so that's why you get the roll of the eyes and the tutt when when you're asking how something works. So I think the younger nurses coming through who are just used to it just adapt. Where the people who haven't had to use it, so its [I: right, so its maybe a generational thing]. I think it could be, but then again, it depends individually on the person. Moving from reports, ticking a box on a piece of paper, to requesting it on a computer, and they have a fear of it breaking down, what happens when it all breaks down. Well there's backup systems there, there will always be a backup system, so I think there's some of that with people.

I: Just jumping back, when you put in evidence into your electronic portfolio, do you have to have an Internet connection for that or can you do it?

R: Internet connection, I was on, yeah, I was on live when I did it.

I: So you always have to be online with your electronic portfolio, that's fine, because I forgot to ask that earlier, it just came back to me, thank you. Can I just ask a bit about reflection now. How do you do most of your reflection, do you do it in your head, do you do it through the electronic portfolio, do you write it down, what's the way that you?

R: A combination, my poor husband, if I've got something in my head has to listen to me, erm, in general terms, erm, and he is very good at, I think he's just learning, pinpointing things and saying what about, well, so he, him being a nurse helps, but if I need to process something in reflection that I can't just quite get straight in my head, talking through with him helps. Erm, there, the XXXX and the XXXX visits are very, quite reflective in how I've worked it, this is what they did in my practice, I think I should pay attention to this, this and this. So that is evidenced in there. General day to day within work, at the moment, I have a book. So if I've, its like at the moment I'm looking at history taking and that initial of assessment to a person when

they've been brought into hospital. If there's something different, a really generic, person, age, brought in with this, this was the presenting symptoms, these were the red flags, what investigations, what I learnt from it and then there's a line saying right, you need to look at this, this and this and then when I've looked it up, reflecting back, well next time, I need to remember to do this, this. So and I suppose when I'm talking to somebody, especially the registrars, erm, a couple of them who work in elderly, I can ask them and they'll say well what about, so there's that action reflection actually as you're working as well.

I: So a lot of it then is through discussion, but you also have a book.

R: I have this book that's put away, locked away.

I: Do you think that helped with electronic portfolio? That you work in that way?

R: Yes, it probably did, because you, I think you reflect as you're working, err, because you get somebody with the same presenting symptoms, so you think oh last time he had this, I must remember, so you've got that reflection and action, erm, but you've also got afterwards when you, because you do, you process things afterwards. So within the

electronic portfolio, its like the days I spent with the XXXX, erm, it was sitting down afterwards, now why she did this and she did that, but then afterwards she said what do you think I could do to change my practice, is there anything. So she used it as a learning experience as well and I think I probably put that in as well, I'm not quite sure.

I: But there was nothing in electronic portfolio itself that made you reflect in a particular way then? Some electronic portfolios use like a Gibbs, you know, the reflective cycle and make students work through that.

R: No it didn't have, it didn't have that in, but I think through using that through my nursing, I think my mind has that, you sort of get used to using that way of thinking, don't you.

I: Yeah, it just becomes natural doesn't it, yeah. Ok, well I've covered all the other questions that I had in just general discussion there. But I just wondered at this point if there was anything else that you wanted to add.

R: I think electronic portfolios are good, I think we're going to be using them more. XXXX definitely use them, erm, we are looking for advance nurse practices to have that sort of format so that we can evidence what we've learnt to help underpin (unclear-0:42:33.1).

I: It's the future?!

R: I think it is, I think its going to become more and more. I think nursing students will end up, eventually, I think for the numbers coming through.

I: Yeah, I mean that's obviously one of the things in the research, why we're looking at it, because there are so many questions about how to implement it properly and you know, how students are using it, what students think about electronic portfolios, you know, I think there's still a lot of work about getting it right.

R: Yeah and its, I think students coming through now are so technology minded, I think they'd be open to it. I think some of the work would be on the other side with the mentors.

I: Interesting thing that I find with my daughters and talking to some people during the research is the younger generation, is that yes, they're embedded in technology and they know how to use it, but what I've found with, talking about my daughters, is that if something goes wrong or its not intuitive, its not there, then they're lost, they're totally lost. Where I feel

that my generation, who sit and programmed nerdy-wise, like programmed a computer, I can set things up and I can do things, I think my daughters in particular struggle a bit with that. I don't know whether that's a generational thing, but they're just used, they're just so used to having technology.

R: I think because they're used to it and they're taught how to use programs and systems and things like that, so I did computer studies and you were taught, it was basic, but you were taught everything. XXXX, well XXXX AS level, XXXX just starting his GCSE's and they're taught to use this package, that package, they don't, I don't know what their understanding of how it work is. My youngest especially, he's XXXX, coming up XXXX, from being little, he's been quite intuitive on how to do things. I can remember in infant school, they were being assessed on their, how they taught computers and something had gone wrong. Now they had XXXX in there on purpose and he said to this woman assessor that's wrong, what are you going to do, well I'm going to undo it and she turned round to me and she says how does he know that and I went he just does, he's XXXX and he works it out and he's, I think his mind works that way logically. They're both very good at maths and physics, they seem to work in that way. The XXXX one does music and he does a lot of his composing online and when that goes wrong, he uses XXXX and he can say oh that's, and he just puts it right. But I'm, if something goes wrong, I'm shouting, I'm the one to put my

hands up, but XXXX will sit and work it back and work it out and I think some people, that's how their minds are wired. If they're logical, because it's a very logical system.

I: And these kind of things do have an impact on how people use it, use electronic portfolios, we're looking at that as well, so that's really useful. Ok, thank you very much for your time.

Appendix 6: Examples of nodes, sources and number of references used to generate categories

Node Name	Sources	References
How ePortfolio hinders learning	12	165
No use after course	5	9
Non-student not liking access	4	6
Poor interface	10	17
Prefer paper	8	16
Resistance to use	9	31
Student dislike of technology	6	9
Takes away creativity and individuality	5	11
Technology interfering with learning	11	49
Time to complete	5	14

Node Name	Sources	References
ePortfolios not being socially constructive	5	6
Example of what eportfolio was used for	11	27
How ePortfolio supports learning	13	172
Socially constructed artefacts	5	7
PDF's	2	3
Podcast	0	0
Powerpoint	2	2
Spreadsheet	2	2
Still images	6	7
Text	3	5

Node Name	Sources	References
Blog	3	3
Reflection	3	6
Reflection on learning process	5	5
Reflection on practice	7	9
Reflection on theory	4	4
Video	1	1
Web links	5	5
Socially constructive processes	2	3
Assessment	8	19
Collaborative knowledge construction	12	43
Community	2	2

Node Name	Sources	References
Contibution of peers	8	12
Community of practice	11	39
Discourse communities	11	37
Expressing ideas	11	35
Feedback	11	30
Information giving	12	24
Linking to other knowledge	13	40
Networked learning	3	5
Proposing knowledge	12	26
Questionning	7	12

Node Name	Sources	References
Web 2.0	**0**	**0**
Wiki	0	0
Working with other to them build knowledge	12	45
Student Centric process	2	3
ePortfolio used for	3	3
Suggestions for improving software	6	7
Who contributes to ePortfolio	1	2
Academic	5	5
What did academic contribute to ePortfolio	6	60
-	-	-

Node Name	Sources	References
Family member	0	0
What did family member contribute	3	4
Mentor	4	4
What did mentor contribute to ePortfolio	4	60
Other student or peer	2	3
What did other student or peer contribute	3	56
Others contribution	2	2
Practice staff	2	2
-	-	-

Node Name	Sources	References
What did practice staff contribute to ePortfolio	4	108
Service user or carer	2	2
What did service user or carer contribute	3	106
Student	4	4
What did student contribute to ePortfolio	6	57
Reflection	2	2
Worries over accessing ePortfolio	1	2

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