Abstract: Digital portfolios have become a standardized tool for the collection and presentation of evidence of a teacher’s knowledge, skills and practice. This doctoral research project has used two types of digital portfolios to understand how teachers pedagogically reason with technology. The two types of portfolio are: digital teacher education portfolio (DTEP) and digital pedagogical license (DPL). Each portfolio is constructed differently; the teacher education portfolio has used professional standards to explain teacher practice whereas the digital pedagogical license has used an evidence focused description of practice to explain digital competence. The message for teacher education is use stories of teaching practice with professional standards acknowledged through the discussion as a means to focus on the evidence of professional achievement.

Introduction

Portfolios are not new. Artists first used portfolios to show prospective buyers their best work and teachers use portfolios to store and show their best work (Bird, 1990). Teacher portfolios are carefully selected samples of a teacher’s work or as Shulman (1992) suggests:

*A portfolio is the structured documentary history of a [carefully selected] set of coached or mentored accomplishments substantiated by samples of work and fully realised only through reflective writing, deliberation and serious conversation (p111 [bracketed changes in original])*

In-service and pre-service teachers, for the purpose of evaluation or assessment, have prepared paper-based portfolios from the 1980s (Elbow & Belanoff, 1986). Evidence of their teaching was collected from the range of documents that are typical of the teaching process, for example: lesson plans; unit plans; assessment tasks; student work; and observations. The importance was placed on the personal collection of evidence to support growth towards becoming as a teacher.

Professional portfolios have become integral to initial teacher education experiences and assessment practices. They are receiving considerable scrutiny by the Australian and State teacher registration authorities and are mandated as evidence of achievement by many pre-service teacher programs. Higher education institutions use a range of assessment tasks to ensure that the best evidence of the professional knowledge, skills and attributes expected of a graduate is able to be provided to the range of stakeholders – including employers and registration bodies, locally and internationally. For these reasons, the professional portfolios have become a rich source of evidence to demonstrate achievement at the point of graduate teacher.

With availability of the Internet, the paper based professional portfolios have been now become digital portfolios. There are a wide variety of tools that are available on the Internet that can be used to construct these. For some pre-service teachers, their digital portfolios facilitate their interests in seeking teaching positions anywhere in the world as they can if they choose make them available to a wide audience through on-line access. The electronic mode also facilitates the important task of continuously updating their professional profiles with the latest and fullest evidence of their achievements post-graduation.

For research purposes, these digital portfolios provide researchers with access into the nature of the novice teachers’ knowledge and practices by providing opportunities to examine these early career teachers’ explanations and reflections of their experiences. This chapter reports on a doctoral research project that used two types of digital...
portfolios as data to examine how teachers explain their teaching practices specifically in relation to the role that technology is playing. The focus of the research is to identify the nature of pedagogical reasoning with technology. The two types of portfolio are described in this paper as the digital teacher education portfolio (DTEP) and digital pedagogical license (DPL). The DTEP is distinctive by its focus on professional standards to organize the explanations and evidence of teacher knowledge and practice. The DPL documentation is an approach, which has an evidence-focused description of knowledge to explain professional practice specific to incorporating technology. The approach adopted for the DPL used two to three restories of teaching practice in a designated format to explain professional knowledge and practice.

Using restorying (Clandinin & Connelly, 1989) to present and explain teaching practice enables the reader to see a wider picture of how the evidence was collected and the context in which the teacher collected it. The retelling of their stories of professional practice subtly facilitates critical reflection by teachers’ of their practices. Developing the capacity to reflect is an important skill in the development as a teacher (Shulman, 1992). Often when preparing a digital professional portfolio that is organized by professional standards, novice teachers can become focused on the pieces of evidence as a checklist rather than the explanation and reflection on those items. The suggestion in this chapter is that a professional standards based organization approach can inhibit growth by limiting attention to selection of pieces of evidence rather than to the contextual story around that evidence which can better demonstrate achievement not of just one standard but of the interrelatedness of several in relation to one piece. It is argued that a restorying approach involving the evidence in context where references to relevant professional standards are intermingled can more successfully provide insights into the professional achievements of teachers.

This paper presents a discussion of the literature explaining the digital portfolio strengths and challenges. Following is a description of a DTEP and DPL portfolios that were used in the doctoral research project. The DPL teacher digital portfolio has been described in more detail by the authors in various refereed conference papers (Smart, Sim, & Finger, 2012, 2013a, 2013b). The paper concludes with recommendations for teacher education.

The literature

Professional portfolios are personally constructed evidence of work. As such they are considered to be representative of professional experiences and are created for the purpose of one or more of the following: archives of learning; assessment; part of resumes for employment (Karsenti, Dumouchel, & Collin, 2014). Wolf (1994) suggests that portfolios should not be: resumes listing activities and accomplishments; overflowing containers of evidence indiscriminately collected; or scrapbooks of assorted mementos filled with personal meaning. He purports that portfolios need to be places of serious self-reflection and allow opportunities for critical examination by self and others. Karsenti et al. (2014) suggest the following advantages of using digital portfolios over paper portfolios:

- Enhanced social function – better opportunity for others to comment/input;
- Flexibility of content organization – reorganisation when need arises;
- Flexibility of content – ability to show/modify various items;
- Enormous storage capacity – large amounts of data can be stored and accessed with ease;
- Aesthetics – wide choice of templates and uniform legible text;
- Accessibility – universal and immediate access; and
- Development of ICT skills – user must know a wide variety of ICT to be able to prepare.

Karsenti et al. (2014) claims that using a web-based platform access is simpler, reflections can be captured quickly and collaboration is made easier.

The format of teacher portfolios is based on the premise of showing teaching competence. Currently, among many Australian higher education institutions, the format and approach for preparing digital portfolios are most commonly conceptualized and organized using the Australian Professional Standards for Teachers (AITS, 2011). Having a strong framework is “needed to equip teachers to investigate their learning with a greater sense of purpose and value in the e-portfolio reflective process” (Lee & Pohio, 2012, p. 553). As part of the reflective process teachers can identify opportunities to expand professional knowledge and experiences. Pre-service teachers can look at the standards to identify what evidence to collect and where they have weaknesses in their knowledge or experience. This approach can facilitate the development of digital portfolios that not only explicitly provide a
nationally recognized representation of the professional expectations, but also can provide current evidence of what constitutes teaching in the 21\textsuperscript{st} century. The next section presents digital portfolio strengths and challenges.

**Digital portfolio strengths**

Shulman (1992) suggests that portfolios “permit the tracking and documentation of longer episodes of teaching and learning” (p.396) than other forms of teaching evidence for example observation by an evaluator. He goes further to explain that most work on teaching is of lessons or fragments of lessons, which are only small snapshots in time, whereas teaching is something that takes time and teaching intellectual work can take time to unfold. Through a carefully constructed digital portfolio a teacher can provide evidence of the intellectual work behind his/her teaching such articulation – making the invisibility of teaching visible requires the teacher’s written reflection of their evidence to be clearly well presented. Shulman (1992) goes further to suggest that the portfolio task changes the relationship of the teacher and learner. Through the use by the university teacher of a digital portfolio as an assessment task, the requirements of such a task will move the pre-service teacher’s identity from student/learner to emerging teacher. Shulman (1992) suggests that portfolios give teachers “portable residency” by providing “structure to their field experience” (p.396). In this way, the development and continuation of personal professional portfolios by teachers provide a preparatory framework to learning to become a teacher. The evidence can be selected from learning and assessment tasks from campus courses and authentic school settings.

Portfolios can be developed as a solo exercise in evidence gathering. However they have the potential to be used to generate conversations around teaching, professional standards and obtaining suitable evidence. This would facilitate professional dialogue between the pre-service teacher and peers, supervising teachers and academics. Wolf, Whinery, and Hagerty (1995) emphasized the importance of professional conversations around portfolio development focusing on artifacts and using portfolios “built around a specific and extended teacher enterprise” (p. 30). Pre-service teachers can include the feedback from peers, formal and informal comments from other teachers, or their own personal reflections from these conversations as part of their evidence. These professional interactions are evidence of the importance of being part of professional communities. Shulman (1992) suggests that portfolios “institutionalize norms for collaboration, reflection and discussion” (p.396). They give these professional conversations shape and scope to enable them to happen rather than starting from nothing.

Karsenti et al. (2014) use the concept of **reflective triangulation**, explaining it as the “thoughtful consideration of the required professional competencies, awareness of the degree to which these competencies have been developed and selecting the materials that would most aptly and appropriately represent these” (p. 3488). The ‘thoughtful consideration’ then needs to be translated into written word as “it helps them extrapolate from their experience, take a step back, and adopt a critical stance” (Karsenti et al., 2014, p. 3488). Reflection enables rich learning or what Aristotle termed **phronesis** which means the weaving together theory, context and practice (Parkes, Dredger, & Hicks, 2013). This reflective practice enables students to bring together the theory of education study to their practices as a teacher. Shepherd and Skrabut (2006) acknowledge that electronic portfolios “can increase reflection, develop content and pedagogy skills and facilitate communication between teachers and administrators” (p.31) as they make it easier to collect and share with others teacher’s work. Pre-service portfolios have the “potential to make unique linkages, connections and reflections among multiple experiences and artefacts” (Parkes et al., 2013, p. 101). Shulman (1992) suggests that reflection should go further than the personal but should be in a “reconnection”, as in reconnecting the process with the product. He suggests that the focus of teaching is student learning and a documentation of teaching should include evidence of student learning and teachers’ reflections on student learning.

Reflection can lead to personal improvement with a move towards a model of a quality teacher as defined in the standards. When a portfolio is maintained past graduation, incorporating a continuous process of reflection and redefinition, it will provide an opportunity to collect evidence over a career of personal growth and improvement. It therefore becomes a valuable resource for individuals as they aspire to new positions within the profession. Further, for researchers, access to such digital portfolios provide rich data representing the experiences and reflections of teachers as they pass through the various career stages. The next section discusses the challenges of using digital portfolios.

**Digital portfolio challenges**

For at least two decades, the student portfolio has become a popular assessment tool, argued as providing more authenticity and a contextualized overview of a student’s achievements through reflection and evidence (Bloom & Bacon, 1995). There is research literature to suggest that portfolios in pre-service education programs have become an integral assessment item (Çimer S. Odabaşı, 2011; Davies & Willis, 2001; Napper & Smith, 2006;
Ryan & Kuhs, 1993; Willis & Davies, 2002). Authentic learning takes place when there are “rich and complex processes of planning, synthesizing, sharing, discussing, reflecting, giving, receiving and responding to feedback” (JISC, 2008, p. 6). In teacher education the school placement (or practicum) is considered a critical and mandated assessment task, which occurs several times across a program. The digital portfolio facilitates this authentic learning environment by focusing in particular on synthesizing and critical reflection. Assessment can focus on the product or the process (Barrett, 2011). The product is the completed digital portfolio submitted as assessment as the process shifts the focus to building and designing. The process entails the thoughtful selection of evidence, the explanation that goes with that evidence using frameworks of professional knowledge to articulate the learning. Tensions can develop between the two focuses, because as a product, the portfolio is an institutional tool for accountability, and as such, because of time restraints associated with assessment items, a pre-service teacher may not give time to selecting and then examining in a critical way the evidence his/her journey (Lee & Pohio, 2012). For educational research both would provide differing views, the product view allows the researcher to view after the process was completed but the process view would require researchers to participate in the process to capture the process as data.

Nodoye et al (2012) suggest that as an employment portfolio which “aims to showcase a candidate’s competencies for the position” (p.1), teachers preparing an employment portfolio want to capture the positive of their experience to showcase them as a competent teacher. This view doesn’t necessarily capture the realities of learning to become a good teacher and therefore reflections based on the real story of teaching might be omitted for fear that it doesn’t cast the teacher in a positive light.

There is research that suggests that teachers updating of their portfolios after graduation does not continue, and so portfolios quickly become out-of-date. Shepherd and Skrabut (2011) explain that “research on e-portfolio retention suggests that teachers quickly abandon practices following career milestones” (p.32). However there is also research by Rolheiser and Schwartz (2011) and Grant and Huebner (2001) that did identify early career teachers have maintained their portfolios for a number of years after graduation. Lee and Pohio (2012) suggest that digital portfolios offer “the opportunity to take learning into the future. When teachers engage in experiences that have meaning, and provoke further inquiry, they are more likely to sustain the engagement long term.”(p. 557). The challenge is to create a teaching culture where portfolios are maintained over a teacher’s career.

Once employed, it is not a standard practice for employers and supervisors, through the processes of teacher recruitment, selection, and career progression, to request that a digital portfolio be provided. There is still a tendency to seek a paper-based application including evidence, followed by an interview. Embedding the digital portfolio process in the recruitment, selection and career development would benefit teachers and their employers. For educational research digital portfolios offer the opportunity to view the changing nature and complexities of the work of teachers over time. This next section introduces the two types of portfolios used in the doctoral research project. For this research project, the researchers were allowed access to the DTEP of three graduate teachers and fifteen digital pedagogical licenses.

The digital teacher education portfolio (DTEP)

The approach and processes described are drawn directly from the digital portfolio evidence provided by the participants. One of the study’s graduate teacher participants – Viviana (pseudonym) - prepared her digital portfolio has part of her pre-service teacher education studies. Her portfolio was used for assessment in her practicum course in her pre-service teacher education program. The framework consisted of three levels: at the core is the pre-service teachers teaching philosophy with references to relevant literature to support their argument; the outside circle represents the teaching evidence collected from their practicum, wider professional experiences and university studies that is relevant to show that they meet the teacher professional standards; and finally connected between these two components are their responses to the teacher professional standards. The pre-service teachers responses were filled with reflective thinking linking their teaching philosophy to the evidence she had collected to showcase her development as a teacher. The portfolio was constructed with a page for each standard with relevant evidence attached to the webpage.

Viviana was a mature aged career change student who completed a one-year postgraduate teaching qualification at a metropolitan university in Queensland. She completed her digital portfolio on the university advised secure website in 2011. Viviana’s teaching philosophy was a total of 518 words with references to relevant literature (references to literature was a requirement of the assessment). The idea of the teaching philosophy was to mix research with practice, what she has learnt through her university studies and how she has applied that learning in her classroom practice. Viviana wrote in her teaching philosophy about her beliefs around challenging her learners to develop higher order thinking skills.
Students are more likely to be engaged when their learning is challenging, this can be achieved through effective planning, which enables students to feel extended through academic challenges and the use of multiple intelligences (Pendergast & Bahr, 2005). Allowing students to feel in control of their learning helps them to feel engaged and develop high order thinking skills. Pendergast (2005) believes that the use of research tasks encourages students to learn new knowledge and skills. Research activities help students to develop the skills required for higher order thinking. (Viviana, Digital portfolio – Belief Statement, paragraph 5)

Viviana’s philosophy includes her view on the importance of reflection:
To be able to critically self-evaluate through self-reflection is an important strategy for improving your teaching, as there is always room for improvement (Killen, 2009). Through reflection, the teacher is able to become aware of the teaching decisions made and the consequences of these decisions, providing opportunities for pedagogical improvement. I am a believer in personal growth and learning, which is why I am committed to continually improving my skills and abilities as a teacher. Ongoing professional development through both formal and informal opportunities will help me to improve and adjust my teaching strategies to ensure I inspire my students to be lifelong learners. (Viviana, Digital portfolio – Belief Statement, paragraph 7)

Viviana selected a variety of evidence for her digital portfolio. These included photographs, resources (handouts, PowerPoint presentations), assessment, references, notes from a meeting, certificate of attendance and an observation by her supervising teacher. Viviana’s portfolio was organized using each of the professional standards as a separate ‘page’. For each she provided a written personal professional interpretation of the standard, explaining the evidence she has attached to support her achievement of that standard. In preparing their response, it was suggested to the pre-service teachers to use the keywords in each standard’s statement to inform their responses and evidence of how they have applied that in their practice. For example Viviana wrote the following partial response for standard ‘Design and implement engaging and flexible learning experience for individuals and groups’:

During my practicum I wanted to offer a flexible learning experience through an inclusive activity, so the “Human Square” activity was structured around the thinking skills (Killen, 2990) the students learnt in the classroom. The activity involved the students going outside to an open space where they were then required to make square numbers, out of the students in the class. Due to the physical nature of the activity, one student was not able to be involved in the actual square, so I gave him the job of taking the photos and ensuring that the students had made a square, ensuring that he was still actively involved in the activity. All the students enjoyed this activity and I noticed that some students, who were having trouble understanding the concept in the classroom, developed an understanding of the concept through this activity. I have included this photograph because it demonstrates my commitment to designing and implementing flexible learning experiences for individuals and groups. (Viviana, Digital portfolio – Response for Standard 01, paragraphs 2-4)

Viviana was awarded her teacher education qualification at the end of 2011. She was offered a teaching position at a regional school by the end of 2011. The DTEP is a valuable source of evidence of her knowledge and practices as a graduate teacher. In her DTEP, Viviana did include evidence of her capacity to include technologies as part of her pedagogy, and to explain her reasons.

The Digital pedagogical license (DPL)

Unlike the DTEP which focused on all aspects of professional knowledge, the DPL is a portfolio with the specific focus on evidence of abilities to incorporate digital technologies as integral to effective teaching. The format of the DPL was determined as part of the Smart Classrooms Professional Development Framework (SCPDF) (Department of Education Training and Employment, 2012b) as shown in Table 1. Another teacher who participated in the study – Marcelia (pseudonym) – prepared her DPL to obtain the DPL accreditation. Her DPL’s contained a

<table>
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<tr>
<th>Digital Pedagogical Licence Layout</th>
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<tr>
<td>1. Context Statement (500 words)</td>
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<td>2. Reflective Statement (500 words)</td>
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<tr>
<td>3. Items (Explanation to support evidence – format in Table 2)</td>
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<tr>
<td>4. Evidence (using predetermined headings as shown in Table B)</td>
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</tbody>
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variety of items including: context statement; belief statement; evidence (items including unit overviews, assessment tasks, virtual classrooms screen shots, links to learning objects, lesson plans, photographs, blog details, student work, audio recordings and student movies); and a support statement from her principal.

The objective of the DPL was to “acknowledge teachers who demonstrate and reflect on how learners use ICT purposefully” (Department of Education Training and Employment, 2012b). “It is a collection of carefully selected or composed professional experience, thought and goals that are threaded with reflection, evidence and self assessment” (Department of Education Training and Employment, 2012a). Marcelia’s DPL contained two items of evidence covering the indicators. Each item of evidence was to be completed in line with the headings shown in Table 2.

<table>
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<tr>
<th>Evidence Item Headings</th>
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<tbody>
<tr>
<td>a. Title</td>
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<tr>
<td>b. Date of implementation</td>
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<tr>
<td>c. Evidence</td>
</tr>
<tr>
<td>d. Year level and student context</td>
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<tr>
<td>e. Item overview</td>
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<tr>
<td>f. Reason for inclusion</td>
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<tr>
<td>g. Development and planning</td>
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<tr>
<td>h. Curriculum links</td>
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<tr>
<td>i. Central focus of the student learning (curriculum intent)</td>
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<tr>
<td>j. Sequence of learning</td>
</tr>
<tr>
<td>k. Teaching and learning approach</td>
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<tr>
<td>l. My learnings</td>
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<tr>
<td>m. Further reflections and information</td>
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</table>

Each teacher was responsible to ensure all indicators were covered in their DPL and was checked by the reviewer before the issue of a certificate. The indicators fell under one of the four headings: professional values; professional relationships; professional knowledge; and professional practice.

Marcelia first prepared her DPL in 2008 with three items of evidence (Item 1 Claymation, Item 2 Gecko Virtual Classroom and Item 3 Online readers challenge). In Marcelia’s item 1, she referred to her professional values in terms of her professional learning and her willingness to trial new ideas. This tied into the Professional Value statement PV1 – “I am committed to developing my digital pedagogy to improve student learning opportunities” (Education Queensland, 2011). For Professional knowledge, Marcelia highlighted her technological knowledge in describing here professional knowledge linked to indicator PK1- “I understand how ICT can support and enhance what students learn, how they learn, and when and where their learning takes place” (Education Queensland, 2011). For Professional Relations, Marcelia explained how she had participated in professional conversations with peers. Finally for Professional Practice, Marcelia explained in depth her work with the students to develop a Claymation movie. Throughout her DPL, Marcelia explained that core to her belief was allowing her students to participate in deciding what they could learn:

_I believe that teachers and students can negotiate the learning to combine something of interest and meeting the curriculum needs. When students have input and contribute to the planning of an investigation, they take ownership of it. (Marcelia, Belief statement, paragraph 4)_

This was reflected across all of her answers for each of the evidence item heading (shown in Table 2). The item explained in details the claymation project to research endangered animals with her preparatory/year 1 students (ages 4.5-7 years old). She used a variety of technology to complete the unit including Interactive Whiteboard, CD presentation, desktop computers and photographs. With teacher help the students were able to construct a claymation video that was shown to parents and other school members on the school open day.

From her item there were many places where she explained the decisions she made to prepare and undertake the claymation task. She showed the curriculum linkages, detailed description of the planning, the focus
of the learning and how the students were assessed. She included each teaching strategy and explained why it was used. Included in (l) - My learnings and (m)- Further reflections and information, she was able to what she had learnt about teaching young students how to develop a claymation video. Marcelia explained that she learnt how to use software, the process of animation and developed a better understanding of the technology skills of these very young students. Although most would consider this an inappropriate task for young students, she sensed their satisfaction of completion when over 2000 people and parents viewed their movies on the school open day. With the use of technology she was able to create a digital record of student work that was shared with the students at the end of the school year.

Marcelia story of teaching practice in her DPL documented her process and thinking of teaching this topic with her class. The item headings ensured she covered many aspects to enrich her re-story of practice. Reading the item it is easy to gain an understanding of her teaching practice, knowledge, values and relationships. The DPL provided Marcelia with the headings and format to ensure she explained many aspects of her teaching including her pedagogical reasoning. Her digital portfolio included two full items that explained two very different units of work using technology.

Conclusion

This paper has provided a discussion of the strengths and challenges for digital portfolios. It is suggested that digital portfolios should be viewed as a career-long and lifelong investment from graduation, registration, and career promotional advancement in developmental and leadership career stages, and not as separate digital portfolios, but conceptualized and supported as a continuous process of reflection and renewal. It is important that the teacher has a sense of agency to update, review and improve their digital portfolio over their teaching career. Because digital portfolios offer this great opportunity to capture teacher’s work over their professional careers, they can be used as rich and valid data sources for educational research. Digital portfolios allow researchers to see the selected good work of teachers.

Two approaches for digital portfolios were described in this paper. The DTEP was focused collecting evidence of teaching practice before entering the profession with focus on the teacher. The DPL on the other hand was all about the holistic view of teaching and the teacher retelling their story in their digital portfolio. The restory is holistic in its recount as there is a predefined structure to ensure a full story is told. The restory is designed to include details of the students and their learning along with what the teacher had learned from the process. This approach for digital portfolios ensured a richer reflective view of the teacher was captured in the digital portfolio. This approach is recommended as an organizing framework for all portfolios pre-service and in-service.

As a final note of caution to researchers intending to use teachers’ portfolios for research data, digital portfolios offer opportunities for researchers to access teachers’ work, which can include sensitive information about the teacher and their students. For the richest portfolios, that can include video, photographs, ‘real’ student assessment and maybe even access to students through linked student based digital portfolios. Educational researchers need to treat this evidence with respect for the teachers and their students. The Internet and available technology have made capturing teacher’s work on video or in a photograph very easy. Issues of access, confidentiality and ethical use must be an important consideration before using a digital portfolio. For this doctoral research project, all digital portfolios were located on a secure platform where the researcher was granted access by the portfolio owner. All participant teachers have given and signed ethical consent forms to use their digital portfolio and the researcher is selective in presenting evidence to ensure anonymity of teacher, and students, in line with the ethical approval given by the university.

References


