SOTL IN THE SOUTH

A journal dedicated to the scholarship of teaching and learning in the 'global South'

Volume 8, Issue 3 December 2024

Pages: 25-43

Exploring the effectiveness of e-portfolios in a first-year undergraduate Project Management course

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ABSTRACT

This study explored the effectiveness of e-portfolios as pedagogies in teaching and learning for undergraduate Project Management students at a rural university in the Eastern Cape Province, South Africa. The outbreak of COVID-19 resulted in institutions of teaching and learning adopting digital tools to teach and assess students. For some lecturers, it was their first time using digital tools in their classroom practices, and the tools' effectiveness was unknown. Therefore, this study explored the effectiveness of e-portfolios as pedagogical devices in the teaching and learning of undergraduate Project Management students. Social constructivism and community of inquiry (CoI) frameworks guided the study. In this study, qualitative data was collected from an undergraduate class with a cohort of 35 students. Data was collected through focus group discussions and a semi-structured interview was used. The collected data was analysed using the thematic approach. Ethical considerations were adhered to. The findings revealed that using e-portfolios as pedagogical devices resulted in the development of 21st-century skills, such as communication, collaboration, and creativity, through conversations and social interactions. This study highlights the importance of equipping students with digital skills before designing e-portfolios. Challenges associated with the use of e-portfolios include poor internet connection and load-shedding.

Submitted: December 5, 2023
Accepted: November 19, 2024

Introduction

Globalisation and digitalisation have changed higher education institutions (HEIs), and students' life-long learning, digital literacy, and career management have become important (Kunnari & Laurikainen, 2017). Strengthening such competencies and skills should be done by engaging students in authentic activities, which e-portfolios can support. In the year 2023, e-portfolios were used as pedagogic and learning devices for a first-year undergraduate class with a cohort of 35 students. However, studies have not yet explored the effectiveness of e-portfolios in teaching and learning. The students' voices are important, and there is a need to maintain their quality. Therefore, this study aims to explore the effectiveness of e-portfolios as pedagogic and learning devices in the teaching and learning of undergraduate Project Management students.

An e-portfolio is a collection of portfolio items, such as text and audio-visual, that are stored electronically (Barrett, 2001). A detailed explanation of e-portfolios is posited by Jenson and Treuer (2014), who argue that an e-portfolio is a digital tool for compiling and managing learning over a period to enhance authentic and continuous learning. Though e-portfolios are student-centred, teachers are vital in designing the learning environment and approaches employed therein (Mudau & Modise, 2022). Several scholars have opined that using an e-portfolio in teaching and learning has many benefits. Scholars such as Elshami, Abuzaid, Guraya and David (2018: 522) posit that using portfolios improves "students' self-confidence, academic achievements, and their ability to integrate theory with practice". Similarly, Carter (2021) postulates that HEIs assist in shaping students for the world of work. Students should be afforded opportunities to develop their future professional identities, and e-portfolios can be designed to show students' desired skills and competencies.

Literature indicates that there is limited research conducted on teaching and learning of project management courses to undergraduate students. Most research on e-portfolios centred on stakeholders, such as parents' and students' perceptions of e-portfolios' effectiveness and teachers' observations (Walland & Shaw, 2022). Walland and Shaw further posit that inadequate research has been done on how e-portfolios influence learning outcomes. In line with Walland and Shaw are Scully, O'Leary, and Brown (2018), who postulate that limited empirical evidence supports the effectiveness of e-portfolios. This study, therefore, focused on the effectiveness of e-portfolios as pedagogical devices in teaching and learning Project Management for undergraduate students. Furthermore, this study seeks to inform future pedagogical practices and technology-enhanced teaching and learning within the course. This research contributes to the knowledge in technology-

enhanced teaching and learning of Project Management undergraduate students in line with the digital skills required in the 21st century.

Literature review

The literature was examined in two areas: the benefits of e-portfolios in teaching and learning, and the challenges of using e-portfolios in teaching and learning.

Benefits of using e-portfolios in teaching and learning

Several studies have been conducted on using e-portfolios in university learning and teaching. Research conducted at Northwest University in China about students' experiences with e-portfolios revealed that e-portfolios promote productive learning and information literacy, enable formative assessment and critical thinking, and stimulate students' desire to learn (Mei, 2022). Similar findings were obtained from a study conducted to determine the impact of mobile e-portfolios on student outcomes and interest in the context of project-based learning in Physics education (Anh & Truong, 2023). Anh and Truong found that mobile e-portfolios improve students' interests and learning outcomes. A study conducted at a private university in South Africa revealed that e-portfolios facilitate and provide opportunities for entrepreneurial skills, such as creativity, innovation, self-analysis, and communication (Mapundu & Musara, 2019), among students. Furthermore, Mapundu and Musara postulate that for an e-portfolio to be an effective learning tool, students should be actively engaged in creating their e-portfolios.

The uses of e-portfolios vary from showcasing achievements to supporting employment applications. E-portfolios are prepared for assessment purposes and for supporting learning. This study used e-portfolios to support learning and can thus be termed learning portfolios (Scully et al, 2018). Students can present their "academic requirements in an interactive, visual, and flexible manner" (Madden, Bowes, Miller & Porter, 2021:1). In line with Madden et al's argument, interactive learning and teaching activities were included in the e-portfolio and my students co-created evidence of competencies, used different digital applications in their e-portfolios, and reflected on activities done in the e-portfolio. Additionally, an e-portfolio is "not a haphazard collection of artefacts but rather a reflective tool that demonstrates growth over time" (Chaudhuri & Cabau, 2017). It is opined that reflection is "one of the foundational skills for life-long learning" (AAC&U 2009, cited in Sultana, Lim & Liang, 2020: 278). E-portfolios provide students with

opportunities to develop reflective judgement. This aligns with the United Nations' Sustainable Development Goal (UNSDG) 4, which "ensures inclusive and equitable quality education and promotes lifelong learning opportunities for all" (UN Educational, Scientific and Cultural Organization (UNESCO), 2021). Students should immediately receive feedback after reflecting on their e-portfolios. Constructive, timeous feedback is critical in sustaining and optimising learning support of e-portfolios (Sultana et al., 2020).

Furthermore, there is a growing demand that universities should produce "T-shaped graduates," that is, students equipped with both disciplinary specialisation and cross-curricular skills (Scully et al, 2018:2). The vision of the university where this study was conducted is to deliver versatile graduates, therefore, using e-portfolios as a teaching tool enhances the acquisition of lifelong skills. The e-portfolio is a digital pedagogical tool supporting students' personal growth and lifelong learning (Donaldson, 2018). E-portfolios are a platform through which students can demonstrate communication, collaboration, creativity, and critical thinking (Sitthimongkolchai, Viriyavejakul & Tuntiwongwanich, 2022). In line with Sitthimongkolchai et al. (2022), De Jager (2019) posits that compiling e-portfolios provides opportunities for students to develop evaluation, synthesis, analysis, creative, and communication skills. Lu (2021) found out in their study in an Introduction to Biology course at a college in New York City that e-portfolios were effective and could increase student engagement and improve student performance.

Challenges of using e-portfolios in teaching and learning

Despite the mentioned benefits of using e-portfolios in learning and teaching, the use of e-portfolios has its challenges. High to moderate digital skills are needed to create e-portfolios, which might be challenging in some learning ecosystems (Lam, 2020). Research conducted at HEIs in Denmark, Finland, Portugal, and Belgium revealed that two digital competencies are needed in the e-portfolio process (Kunnari & Laurikainen, 2017). These are technical and editing competencies. Technical competencies are required to create e-portfolios, and editing competencies are required in the editing process. Communication, collaboration, and visualisation skills are needed for students to create content in the e-portfolio. Kunnari and Laurikainen (2017) further argue that preparing and supporting students before using e-portfolios is paramount. This is relevant in my learning ecosystem, where some students were schooled at disadvantaged schools and had little to no computer access (du Plessis & Webb, 2012). Access to infrastructure such as the internet and portfolio software might cause concern for poor students (Lam, 2020). Therefore, there are

disparities in skills, motivation, usage, and physical access (Van Deursen & Van Dijk, 2015). Students with little information and communications technology (ICT) access are thus less prepared to use digital tools in university. To close the digital skills gap, this researcher introduced her students to e-portfolios and showed them tools that can be used to create e-portfolios. Students also get ICT skills support from the Department of Learning and Teaching (DLT). For this article, my students used Google Sites to create and design e-portfolios. Google Sites is "a free platform that allows users to create and share websites" (Anh & Truong, 2023:21).

Kok and Blignaut's 2009 study in South Africa, cited in Poole, Brown, McNamara, O'Hara, O'Brien and Burns (2018:6), revealed that of the schools that participated in the study, only 10 per cent had access to the internet. Kok and Blignaut (2009) further point out other barriers to e-portfolios, such as unstable ICT infrastructure and socio-economic status. Each student has a laptop, access to computer laboratories and Wi-Fi, and their residences at the university under study. Thus, the physical access gap to ICT is closed at the university under study.

Theoretical frameworks

To get an in-depth understanding of the aim of this paper, theoretical frameworks that best suit the study were selected. This study is, therefore, informed by Lev Vygotsky and Cole's 1978 social constructivism theory and the CoI framework that supports the teaching and research of online teaching and learning practices (Siemens, 2004). The proponents of the CoI framework are Garrison, Anderson and Archer (2000). Col builds on social constructivism. Col and social constructivism are relevant in this study because they are both social and promote student-centred learning (Kim & Gurvitch, 2020; Carter, 2021). This aligns with Web 2.0 social (constructivist) tools and enriches learning by allowing students to learn from various perspectives (Basu, 2019). Therefore, a social constructivist classroom coupled with digital tools, and in this study, e-portfolios, promotes critical thinking, reflection, communication, creativity, collaboration, and problem-solving, among other skills (Basu, 2019).

Social constructivism

Social constructivism is a student-centred form of learning based on student interaction and knowledge sharing (Akpan, Igwe, Mpamah & Okoro, 2020). The teacher's role is to facilitate teaching and learning by employing pedagogy that promotes collaboration. Vygotsky and Cole (1978) opined

that language and culture are important in intellectual development and how humans perceive the world. Hence, concepts are transmitted through language and understood by interactions within a cultural setting. Cognitive structures are constructed by people who share a language and a culture. Thus, knowledge is socially constructed and co-constructed. Vygotsky and Cole view knowledge as what students do in collaboration with other students and teachers. Therefore, activity is the basis of learning and the development of thinking (Akpan & Kennedy, 2020). It is thus important to actively engage students in the learning process and social interactions, which promotes the creation of new meaning from self-regulated new knowledge. Social constructivism emphasises the collaborative nature of learning under the guidance of a teacher who facilitates learning (Carter, 2021). Another tenet of social constructivism is that it acknowledges the social aspect of learning, conversations and interactions among people, and the application of knowledge as a crucial aspect of learning and a way of achieving learning objectives (Vygotsky & Cole, 1978). Vygotsky and Cole postulated that social learning leads to cognitive development. This implies that students can perform any task under the teacher's guidance or through collaboration with peers, regardless of difficulty level. Social constructivism facilitates enactive representation, which, according to Bruner (1960), is a stage of learning. This implies that the teacher should provide opportunities for students to learn by doing. The social construction of knowledge can be achieved through interactive methods and groupings, such as a group of students working on a project, problem-based learning, research projects, and case studies (Kapur, 2018). Interactive methods promote acquiring communication skills, critical thinking, reflective thinking, and evaluating diverse opinions among students. The teacher is therefore expected to provide a social constructivist classroom, provide necessary support and resources, encourage collaboration, consider students' ideas, and provide scaffolding ideas (Akpan et al, 2020).

The Community of Inquiry (CoI)

As alluded to earlier, this study is also informed by the CoI framework, built on a social constructivist learning perspective (Kim & Gurvitch, 2020). The proponents of the CoI framework, Garrison et al. (2000), posit that the framework has three core components of learning: cognitive presence, social presence, and teaching presence.

The CoI framework supports "the design of online and blended courses as active learning environments dependent on instructors and students sharing ideas, information, and opinions" (Picciano, 2021:175). The social phenomenon of "presence" manifests through interactions among

students and instructors. Social presence is the development of student interactions and is measured by open communication, affective expression, and group cohesion (Kim & Gurvitch, 2020). On the other hand, teaching presence outlines the teacher's role before and during teaching and learning. The teacher's roles include course design, instruction, and facilitation (Garrison et al., 2020). A key component of learning advocated for in this framework is cognitive presence. Cognitive presence is students' ability to construct and confirm meaning through sustained reflection (Kim & Gurvitch, 2020). Kim and Gurvitch add that cognitive presence focuses on students' critical and higher-order thinking development. Students identify a problem for enquiry, explore the issue (generate ideas), integrate (knowledge synthesis), and lastly resolve (applying new skills and knowledge acquired from the previous phases into real-world applications) (Garrison et al., 2000).

Methods and design

This section describes the context and the research methodology, including the population and sampling procedures followed in this article.

Context of the study

This study is situated at a technology-infused university in the Eastern Cape, a rural South African province. The university under study has several parts: people, technology, learning culture, technology and people, technology and culture, and technology and content (Health and Safety Institute, 2023). Students were schooled at disadvantaged secondary schools, so some joined universities with inadequate digital skills. The medium of instruction is English, a second additional language for most students. There is access to digital devices such as laptops, smartboards, overhead projectors, and desktop computers at the university under study. Internet connectivity, a Learning Management System (LMS) and Microsoft Teams are available to students and teachers. Therefore, the blended mode of learning and teaching, which is defined as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004, cited in Müller & Mildenberger, 2021:2), is adopted at the university under study.

Qualitative phenomenological research

This article employed a qualitative phenomenological research design emphasising the participants' meaning, views, and experiences (Shorey & Ng, 2022). The goal of phenomenological research is to describe the lived experiences of a phenomenon (Delgado & Arellano, 2021: 9). This study sought to explore the lived experiences of first-year undergraduate Project Management students in their use of e-portfolios. Cilesiz (2011:495) opines that phenomenology is suited to build "a research agenda on experiences with technology…" and, in this article, refers to students' lived experiences with e-portfolios as a digital tool and pedagogy in their learning of Project Management. Digital tools have become part of teaching and learning; thus, experiences with the tools are part of students' and teachers' lives (Bond, Buntins, Bedenlier, Zawacki-Richter & Kerres, 2020). Exploring students' experiences with digital tools, such as e-portfolios, which are integrated into their learning, is consistent with phenomenology.

Population and sampling

This study involved an undergraduate cohort of 35 first-year Project Management students. The 35 students were purposively selected to participate in the focus group interviews. Purposive sampling is "widely used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest" (Mudau & Modise, 2022:429).

Data collection and analysis

Focus group discussions were employed with an interpretive phenomenological lens to enhance knowledge and understand the participants' experiences with e-portfolios. Semi-structured interviews were used to collect data from five focus groups. Semi-structured interviews permit the "interviews to be focused while still giving the investigator the autonomy to explore pertinent ideas that may come up in the course of the interview" (Adeoye-Olatunde & Olenik, 2021:1360). Each focus group interview comprised seven students and was 30 minutes long. The gathered data was transcribed verbatim and analysed using the thematic approach (Adeoye-Olatunde & Olenik, 2021). Data was manually analysed; this researcher immersed herself in the data, identified themes and sub-themes, and presented the findings. A key concept of interpretive phenomenology is that researchers cannot remove themselves from the phenomenon they are studying (Bush, Singh & Kooienga, 2019). This researcher avoided bias by including verbatim participant quotations and

diligent reflection in her data analyses. Interpretation is critical in interpretive phenomenology, and this researcher explains the verbatim quotations (participants' experiences), linking the experiences to literature and deriving meaning from the lived experiences. Participants' experiences are interpreted within the context of the university where this study was conducted. Participants shared their experiences with e-portfolios, and this researcher protected their confidentiality and privacy. Codes were used to identify participants and their focus groups.

Ethical considerations

Ethical clearance for this study was obtained from the Research Ethics Committee at the university under study. Each participant was requested to complete and sign an informed consent form.

Findings

Themes related to the study emanated from the focus group discussions. These themes include the development of digital skills, collaboration skills, reflection skills, and challenges faced when designing the e-portfolio.

Theme 1: Development of digital skills

Carter (2021) opines that HEIs assist in shaping students for the world of work. Students should be afforded opportunities to develop their future professional identities, and e-portfolios can be designed to show students' desired skills and competencies.

Participant F from Focus Group 4 said that:

> The e-portfolio has so many features to use. I learned how to upload pictures and locations. My group members and I had to think about the best pictures closely related to our project. Each of us shared pictures that they searched on the internet, and we chose the best pictures. I could add content to our project and see what my group members did in our portfolio.

Echoing Participant F from Focus Group 4, Participant 3 from Focus Group 6 said:

> I improved my typing skills and learned to use a consistent font type and size. I saw many font types on the e-portfolio that I never knew. Adding pages and sub-pages was fun, and I used to wonder how our university website was created, but I now know. I can add information, photographs, maps, contact numbers, and many other things to our e-portfolio, which is interesting. I did not have to be in the same place as my group members when developing our portfolio, so it was fun.

These findings reveal that students engaged with the e-portfolio and developed collaboration and e-portfolio development skills, as emphasised by social constructivism, i.e., that learning occurs through collaboration (Kim & Gurvitch, 2020). The e-portfolio facilitates information sharing and communication among students. E-portfolio flexibility and practicality permitted the students to work in groups and contribute from different locations. This resulted in students acquiring and improving computer skills, such as typing and searching for relevant information using search engines; they can use these skills in the world of work. Participant F and Participant 3's sentiments align with Madden et al. (2021:1), who opined that students could present their "academic requirements in an interactive, visual, and flexible manner." The participants emphasised the features available within the e-portfolio platform that allow them to upload pictures and add locations. The findings further reveal that students actively engaged in creating their e-portfolio, which is a requirement if an e-portfolio is to be an effective learning tool (Mapundu & Musara, 2019).

Participant 5 from Focus Group 3 had this to say:

> You taught us how to be creative, so we designed a beautiful e-portfolio. Yes, we were doing that for our module, but I can apply what I have learned somewhere else, even after graduating from this university. I think I can create a website now.

Participant 5 from Focus Group 3 echoes the transferability of the skills learnt during the e-portfolio development; these skills can be used in work. The participant notes web design basic skills and content organisation. These views indicate that the student has mastered the e-portfolio creation skills and is confident in applying the skills to other modules and the world of work, suggesting the development of critical and higher-order thinking (Kim & Gurvitch, 2020). This aligns with Scully et al. (2018:2), who argue that universities must produce "T-shaped graduates" with both disciplinary specialisation and cross-curricular skills. Furthermore, the student is confident that they can independently create an e-portfolio, a sign of personal growth and the acquisition of lifelong skills (Donaldson, 2018).

Sub-theme 1: Electronic library search skills

It emanated from the focus group discussions that students developed skills to search for information in the university electronic library, as said by Participant E from Focus Group 7:

> I not only developed skills in designing an e-portfolio but also in searching for information in our e-library. Remember, we were required to include things like the project charter

> and the SWOT analysis of our project, so we had to search for information on our e-library and then share the ideas.

These findings indicate that the participant developed digital and information literacy skills when navigating the university electronic library. Including the project charter and the strengths, weaknesses, opportunities, and threats (SWOT) analysis encouraged students to engage with various academic resources. Searching and sharing information enhanced research and collaborative skills. Also, these findings depict student interaction and knowledge sharing, key tenets of social constructivism (Akpan et al., 2020). Furthermore, the findings align with those obtained at Northwest University in China, where e-portfolios promoted productive learning and information literacy, enabled formative assessment and critical thinking, and stimulated students' desire to learn (Mei, 2022). This consequently results in the cognitive development of students, which is a crucial social constructivism and CoI tenet.

Theme 2: 21st-century skills

Most participants stated that they gained the confidence to communicate and develop relationships. Participant F from Focus Group 6 said that working in groups made learning easy because participants shared ideas and assisted one another when necessary, as opined by Vygotsky and Cole (1978). Similarly, Participant C from Focus Group 4 said it was easy doing the tasks for the e-portfolio because they worked as a group and incorporated one another's ideas. This depicts the development of social presence among students (Kim &Gurvitch, 2020). Additionally, these findings align with Sitthimongkolchai et al. (2022), who posit that e-portfolios are a platform through which students can demonstrate communication, collaboration, creativity, and critical thinking.

Sub-theme 2: Self-reflection

In line with the UNSDG 4, which "ensures inclusive and equitable quality education and promotes lifelong learning opportunities for all" (UNESCO, 2021), students continuously reflect on their learning. Self-reflection is a life-long skill, and students were asked to reflect on their learning as they designed their e-portfolios. It emerged from all groups that it was their first time to reflect, and self-reflection was initially difficult, but the students gradually mastered the skill.

Participant D from Focus Group 2 stated:

> It was my first time reflecting on my learning, so it was difficult to understand. Reading my first reflection, you will see that I only narrated what I had done in the e-portfolio. I think I have now improved.

In a similar vein, Participant A from Focus Group 5 said that:

> I found it difficult to reflect, though I understood the instructions. When you explained it to us in class, I thought it was easy, but I struggled to write my first reflection. With your comments and more practice, I have improved my reflections. I had to think about the knowledge and skills I had or did not have before we started doing the e-portfolio, what I have gained so far, and how that helped me as a university student and later in life. Eish, it was not easy.

These findings indicate that the participants initially struggled with reflective writing. The participants revealed that reflections were difficult and confusing, which is normal since they are first-year students. Participant D's sentiments indicate that with practice, they progressed in reflective skills and engaged with their learning. Participant A highlights that the reflective skill evolved through feedback and continuous practice. Moreover, these findings reveal that teacher presence is important for students to learn and achieve meaningful module outcomes. This study explained self-reflection, and the rubric was interpreted to the students before they reflected on e-portfolio tasks. Thus, in this study, the lecturer's role was to instruct, guide, and facilitate the teaching and learning of students (Garrison et al., 2020). Furthermore, Participant A's (Focus Group 5) sentiments suggest the cognitive presence of students, which is students' ability to construct and confirm meaning through sustained reflection (Kim & Gurvitch, 2020). Students in this study gradually developed critical and higher-order thinking skills.

Theme 3: E-portfolio as a digital tool

Teaching and learning through an e-portfolio as a pedagogy was advantageous in our context, where sometimes there are student riots on campus. Students who were not interested in joining student strikes continued working on their e-portfolios, as argued by Focus Group 4 Participant E, who posited that:

> Some of us were uninterested in student strikes, so we never went to campus. We continued working on our e-portfolios when the university was shut down due to students' strikes, so e-portfolios are good.

Focus Group 7 Participant D added:

> We never stopped learning when the university was closed to student strikes, unlike before when we had to wait for the strike to end. We had more time to work on our e-portfolios during students' strikes.

E-portfolios proved advantageous in my context, where student riots occur, and physical and online classes are disrupted. As indicated by the participants, the e-portfolio platform provided a flexible and independent platform for students to continue developing their e-portfolios during student strikes. Furthermore, the participants' sentiments highlight how digital tools can mitigate the impact of class disruptions by enabling them to continue developing skills and designing their e-portfolios.

Theme 4: Challenges faced when designing the e-portfolios

It emerged from all five focus group discussions that students faced challenges when designing e-portfolios. The challenges experienced were poor internet connection, load-shedding, poor time management, and group dynamics.

Participant A from Focus Group 3 detailed challenges that students faced when learning through an e-portfolio and had this to say:

> The internet connection was bad, especially when our residences had no electricity. So, we could not do our work as planned. Sometimes, we would divide work amongst ourselves, but others would not do that on time, so it was disappointing to realise that a group member had not done their part. Some students were unwilling to accept others' ideas, and we would waste time arguing about that.

Concurring with Participant A, Focus Group 3 was Participant B from Focus Group 1 who said:

> I sometimes failed to connect to my group members on the internet due to poor internet connection. So, sometimes, I could not access the e-portfolio due to a weak internet connection. I would log in, but the e-portfolio would not open because of a poor internet connection, and that frustrated me a lot.

These findings suggest that access to the internet and portfolio software are important for students to develop 21st-century skills and successfully create e-portfolios. Thus, skill disparities and physical access to infrastructure might deter students from completing their e-portfolios in time (Van Deursen & Van Dijk, 2015). I applied the teaching presence and the social phenomenon of "presence" throughout my students' creation of e-portfolios. I constantly interacted with them and assisted them whenever they needed help. Students were able to complete their e-portfolios despite load-shedding frustrations. Additionally, the participants emphasised that poor internet connectivity, compounded by electricity outages, disrupted individual and group progress. However, load-shedding and poor internet connection impacted students whenever they were off campus. Group dynamics were noted by Participant A, who pointed out challenges associated with group work, such as failure to meet deadlines and unequal contribution towards the e-portfolio development.

Sub-theme 4: Solutions to the identified challenges

This study found it crucial to determine how students designed their e-portfolios regardless of the mentioned challenges. Participant C from Focus Group 2 stated that her group met on campus, with access to Wi-Fi and generator-powered computer laboratories. In this study, participants were told they would not receive marks if they did not do tasks assigned in their groups.

Theme 5: Students' views on the future use of e-portfolios

When asked if they wanted to learn through e-portfolios, students agreed to do so again. Participant 2 from Focus Group 3 had this to say:

> I like learning through e-portfolios because all our work is there. I can see where we started, what we did, and the changes we made to improve. I will keep our e-portfolio; I might need it in the future, but you never know.

Concurring with Participant 2 from Focus Group 3, Participant 1 from Focus Group 1 voiced his desire to continue learning through e-portfolios and had this to say:

> Yes, I would like to learn through an e-portfolio again because, as students, we do not know each other, so we managed to build relationships through working together, and I now have friends.

Most students agreed they would want to learn through an e-portfolio because they can document and manage their learning over a lifetime (Jenson &Treuer, 2014). E-portfolios demonstrate growth over time, and in this research, students took a year to complete their e-portfolios, which contain text, images, and audio-visual, among other things. E-portfolios are a reflective tool (Chaudhuri & Cabau, 2017), and students can reflect on and improve the contents of their e-portfolios. Working in groups also allowed students to build relationships; thus, the e-portfolio was an educational tool and bridged social gaps. Participant 2 views an e-portfolio as a comprehensive record of their work that can provide progress timelines. The e-portfolio is valuable to the participants who might want to reference it in future, possibly for personal, professional, and academic purposes.

Discussion

The findings suggest that e-portfolios are beneficial to teaching and learning. With proper skills, students can create e-portfolios and develop 21st-century skills needed in the fourth industrial revolution (4IR). Using e-portfolios as a pedagogy enhances the acquisition of module objectives and promotes the acquisition of life-long skills. Participants described their digital skills, such as

communication and reflection. They added that they would use the skills in other modules even after graduating from university. Thus, creating authentic teaching and learning activities that "promote lifelong learning opportunities for all" (UNESCO, 2021:17) is important if students are to become effective and efficient members of society.

The findings indicated that students developed skills in searching for information in the university electronic library. The DLT teaches first-year students how to navigate the university electronic library. The implication is that lecturers must harness the skills that students acquire from training done by the DLT. This can be done by designing authentic teaching and learning activities. This aligns with Elshami et al. (2018: 522), who posit that using portfolios improves "students' self-confidence, academic achievements, and ability to integrate theory with practice."

This study is informed by social constructivism and CoI frameworks that are both social and promote student-centred teaching and learning (Kim & Gurvitch, 2020). Thus, to enhance the acquisition of 21st-century skills, students in this study created e-portfolios in groups. Most participants revealed that they gained the confidence to communicate and develop relationships. Similar findings were obtained at Northwest University in China, where students' experiences with e-portfolios revealed that e-portfolios promote productive learning and information literacy, enable formative assessment and critical thinking, and stimulate students' desire to learn (Mei, 2022). Participants in this study applied the knowledge learned from one another to accomplish e-portfolio tasks (Vygotsky & Cole, 1978). Students developed 21st-century skills, such as collaboration, communication, creativity, and critical thinking through conversations and social interactions.

Furthermore, this study showed that participants faced challenges when designing e-portfolios. The challenges included group dynamics, poor internet connectivity, and load-shedding. Some of these findings concur with Lam's 2020 argument that access to infrastructure such as the internet and portfolio software might be a cause of concern for poor students. Students' access to e-portfolios depended upon the availability of electricity and internet connection; physical access to portfolios was a challenge (Van Deursen & Van Dijk, 2015). Thus, students relied on university Wi-Fi to create e-portfolios.

Conclusion

This study sought to explore the effectiveness of using e-portfolios as pedagogical devices in the teaching and learning of undergraduate Project Management students by examining the students' experiences with e-portfolios. The results suggest that e-portfolios are effective pedagogical devices in the teaching and learning of Project Management. The research findings show that group e-portfolios enhance the acquisition of 21st-century skills, such as collaboration and communication, needed in the global society, and promote students' cognitive growth. In addition, group work, a student-centred teaching methodology, enhances social cohesion, and students can build relationships. Context plays a crucial role in using e-portfolios as a pedagogical device. The results further suggest that teaching and learning institutions should have a backup plan for students in areas with electricity cuts, poor internet connection, and limited physical access to digital devices such as laptops (du Plessis & Webb, 2012; Lam, 2020).

Future research opportunities

This study can be expanded to other courses since it only focused on a cohort of 35 Project Management students.

Acknowledgements

I acknowledge all participants who participated in this study and my university for paying my scholarship of teaching and learning study fees at the University of KwaZulu Nata

References

Adeoye-Olatunde, O.A. & Olenik, N.L. 2021. Research and scholarly methods: Semi-structured interviews. *Journal of the American College of Clinical Pharmacy*. *4*(10): 1358-1367.

Akpan, B. & Kennedy, T.J. (eds.). 2020. Introduction—theory into practice. In *Science education in theory and practice: An introductory guide to learning theory*. Princeton, New Jersey: Springer. 1-13.

Akpan, V.I., Igwe, U.A., Mpamah, I.B.I. & Okoro, C.O. 2020. Social constructivism: Implications on teaching and learning. *British Journal of Education*. *8*(8): 49-56.

Anh, T.T.N. & Truong, N.N. 2023. Mobile e-portfolios on Google Sites: A tool for enhancing project-based learning. *International Journal of Interactive Mobile Technologies*. *17*(11).

Barrett, H.C. 2001. Electronic portfolios. In *Educational Technology.* cholar.google.co.za/scholar?q=Barrett,+H.C.+2001.+Electronic+portfolios+in+educational+technology&hl=en&as_sdt=0&as_vis=1&oi=scholart

Basu, R. 2019. E-portfolios: An integrative learning tool. *Shodh Sanchar Bulletin*. *9*(34): 46-49.

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O. & Kerres, M. 2020. Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education*. *17*(1):1-30.

Bruner, J.S. 1960. *The Process of Education*. Cambridge, Mass., USA: Harvard University Press.

Bush, E.J., Singh, R.L. & Kooienga, S. 2019. Lived experiences of a community: Merging interpretive phenomenology and community-based participatory research. *International Journal of Qualitative Methods. 18, 1609406919875891*

Carter, S. 2021. ePortfolios as a platform for evidencing employability and building professional identity: A literature review. *International Journal of Work-Integrated Learning*. *22*(4): 463.

Chaudhuri, T. & Cabau, B. (Eds.) 2017. *E-portfolios in higher education: A multidisciplinary approach*. Singapore: Springer.

Cilesiz, S. 2011. A phenomenological approach to experiences with technology: Current state, promise, and future directions for research. *Educational Technology Research and Development*. *59*: 487-510.

De Jager, T. 2019. Impact of e-portfolios on science student-teachers' reflective metacognitive learning and the development of higher-order thinking skills. *Journal of University Teaching & Learning Practice*. *16*(3): 3.

Delgado, J.E. & Arellano, J. 2021. A phenomenological study of the lived experiences of graduate students adapting flexible learning modality due to COVID-19 pandemic. *Asian Journal of Education and Social Studies*. *15*(4): 7-16.

Donaldson, L. 2018. E-portfolio Based Assessment–Inspiring Exploration and Supporting Evaluation for Practitioners. *National Institute for Digital Learning, Dublin City University. https://read. bookcreator. com/czHiWg1mbURBt6XGEriXdgYJEr62/j09MDQqZTXGthHfmyzsU0Q*

du Plessis, A. & Webb, P. 2012. Teachers' perceptions about their own and their schools' readiness for computer implementation: A South African case study. *Turkish Online Journal of Educational Technology-TOJET*. *11*(3): 312-325.

Elshami, W.E., Abuzaid, M.M., Guraya, S.S. & David, L.R. 2018. Acceptability and potential impacts of innovative e-portfolios implemented in e-learning systems for clinical training. *Journal of Taibah University Medical Sciences .3*(6):521-527.

Fiock, H. 2020. Designing a community of inquiry in online courses. *The International Review of Research in Open and Distributed Learning*. *21*(1): 135-153.

Garrison, D.R., Anderson, T. & Archer, W. 1999. Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*. *2*(2-3): 87-105.

Health and Safety Institute. 2023. What is a Learning Ecosystem? And How Does it Support Corporate Strategy? https://hsi.com/blog/what-is-a-learning-ecosystem-and-how-does-it-support-corporate-strategy

Jenson, J. & Treuer, P. 2014. Defining the E-Portfolio: What It Is and Why It Matters. *Change: The Magazine of Higher Learning*. 46. 50-57. 10.1080/00091383.2014.897192.

Kapur, R. 2018. The significance of social constructivism in education. *Obtenido de https://www. researchgate. net/publication/323825342_The_Si gnificance_of_Social_Constructivism_in_Education*

Kim, G.C. & Gurvitch, R. 2020. Online education research adopting the community of inquiry framework: A systematic review. *Quest*. *72*(4): 395-409.

Kunnari, I. & Laurikainen, M. 2017. Collection of Engaging Practices in E-Portfolio Process–Publication of the Empowering Eportfolio Process project. *Häme University of the Applied Sciences: Hämeenlinna, Finland*.

Lam, R. 2020. Why reinvent the wheel? E-portfolios are for learning. *ELT Journal*. *74*(4): 488-491.

Lu, H. 2021. Electronic portfolios in higher education: A review of the literature. *European Journal of Education and Pedagogy*. *2*(3): 96-101.

Madden, K., Bowes, K., Miller, M. & Porter, S. 2021. What value do e-portfolios bring to students? *Kai Tiaki: Nursing New Zealand*. 27(2): 26-27.

Mapundu, M. & Musara, M. 2019. E-portfolios as a tool to enhance student learning experience and entrepreneurial skills. *South African Journal of Higher Education*. 33(6):191-214.

Mei, D. 2022. What does students' experience of e-portfolios suggest? *Applied Mathematics and Nonlinear Sciences*. *7*(2): 15-20.

Mtshali, T.I. & Ramaligela, S.M. 2020. Contemporary employability skills needed for learners to succeed in the civil technology field in the 4IR era. *Journal of Technical Education and Training*. *12*(3): 29-40.Mudau, P.K. & Modise, M.M. 2022. Using e-portfolios for active student engagement in the ODeL environment. *Journal of Information Technology Education: Research*. *21*: 425-438.

Müller, C. & Mildenberger, T. 2021. Facilitating flexible learning by replacing classroom time with an online learning environment: A systematic review of blended learning in higher education. *Educational Research Review*. *34*: 100394.

Picciano, A.G. 2021. Theories and frameworks for online education: Seeking an integrated model. In *A guide to administering distance learning*. Boston, Mass., USA: Brill. 79-103.

Poole, P., Brown, M., McNamara, G., O'Hara, J., O'Brien, S. & Burns, D. 2018. Challenges and supports towards the integration of e-portfolios in education: Lessons to be learned from Ireland. *Heliyon*. *4*(11): e00899.

Scully, D., O'Leary, M. & Brown, M. 2018. The learning portfolio in higher education: An integrative review. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://doras.dcu.ie/24455/1/Scully%20et%20al%20%282018%29_The%20Learning%20Portfolio%20in%20Higher%20Education%20.pdf

Shorey, S. & Ng, E.D. 2022. Examining characteristics of descriptive phenomenological nursing studies: A scoping review. *Journal of Advanced Nursing*. *78*(7): 1968-1979.

Siemens, G. 2004. Elearnspace. Connectivism: A learning theory for the digital age. *Elearnspace. org*, 14-16.

Sitthimongkolchai, N., Viriyavejakul, C. & Tuntiwongwanich, S. 2022. Blended experiential learning with e-portfolios learning to enhance creative imagination. *Emerging Science Journal*. *6*: 25-39.

Sultana, F., Lim, C.P. & Liang, M. 2020. E-portfolios and the development of students' reflective thinking at a Hong Kong University. *Journal of Computers in Education*. *7*: 277-294.

UNESCO.2021. *UNESCO and Sustainable Development Goals*. https://en.unesco.org/sustainabledevelopmentgoals

Van Deursen, A.J. & Van Dijk, J.A. 2015. Toward a multifaceted model of internet access for understanding digital divides: An empirical investigation. *The Information Society*. *31*(5): 379-391.

Vygotsky, L.S. & Cole, M. 1978. *Mind in society: Development of higher psychological processes*. Boston, Mass., USA: Harvard University Press.

Walland, E. & Shaw, S. 2022. E-portfolios in teaching, learning and assessment: Tensions in theory and praxis. *Technology, Pedagogy and Education*. *31*(3): 363-379.