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A Proposed Framework For E-portfolio Use to Enhance Teaching and Learning: Process E-portfolio

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Abstract: The process e-portfolio is a type of e-portfolio that helps students construct knowledge and familiarise themselves with their learning process through self-and peer assessment. Lecturers and students experienced difficulties when using the e-portfolio because Mahara 2019 was not updated. This qualitative research study proposes how lecturers should design e-portfolios for learning through formative assessment activities. Interpretivism was the researcher's standpoint, aiming to interpret how the study participants used e-portfolios for teaching and learning through formative assessment activities. This exploratory case study used semi-structured interviews and an e-portfolio checklist for data collection. It explored the use of the e-portfolio for formative assessment through the experiences of ten purposefully sampled lecturers. The findings suggest that an e-portfolio facilitates teaching and learning in open distance e-learning because it enables online delivery of the content and administering of assessments that afford students' learning of the module content through completing formative assessment activities. The e-portfolio facilitates co-teaching and co-learning because students become knowledge creators and active users instead of passive learners. This study recommends the use of process e-portfolios to facilitate assessment and learning in open-distance e-learning institutions.

Keywords: *E-portfolio, formative assessment, open distance e-learning*

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Introduction

Assessment of students is an essential part of the teaching and learning process as it is used to identify individual student weaknesses and strengths so that lecturers can provide specialized academic support, educational programming, or social services (Yambi, 2018). Digital technologies are also important in teaching and learning because they simplify instruction for lecturers and students. "E-learning has become an intrinsic element of prospective specialists' training" (Shalatska et al., 2020, p. 1). This e-learning approach to teaching allows students to learn more skills while completing assessment activities online. Open distance e-learning (ODeL) universities use various assessment methods and tools, depending on the lecturer's knowledge and skills. However, innovative formative assessment tools with a more explicit focus on pedagogical strategies can create effective learning conditions required to improve learning, particularly strategies to assist students in becoming self-directed and taking responsibility for their learning. With the introduction of new digital technologies that support assessment for learning, many higher education institutions have adopted e-portfolios as an alternative form of assessment. This is a productive approach that allows users to assess and continuously give feedback, pointing out areas of growth that need to be addressed, and constantly observing the efficacy of instruction (Akhuledian et al., 2020).

The transition to the use of digital technologies has prompted institutions of higher learning to reconfigure and review their assessment practices. Online platforms such as Folio Spaces, Blackboard, Digicotion, Mahara, and Elgg are digital technological application tools designed for assessment and learning as well as knowledge sharing and are accessed by computers and smartphones and support social networking systems to share the link with their instructors and peers.

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Downes (2019) emphasised that student interaction can be enhanced and extended through digital technologies with knowledge being generated by and among students. In this research, the e-portfolio focuses on students' learning processes whereby digital technology enables students to create, share, and use information (Shanaa et al., 2020). This aligns with the principle that the e-portfolio is student-centered, it promotes active learning and reflection and plays a major role in the development of metacognitive skills.

As a result, universities operating within an open distance e-learning (ODeL) stream have adopted the e-portfolio as a method to assess students (Bahati et al., 2019). The e-portfolio is a pedagogical tool that supports project-based and inquiry learning, engaging students through peer collaboration (Song, 2021). The e-portfolio in a pedagogical setting could bring about authentic and reliable means of assessment because it is in sync with the trending use of the internet and digital resources in education which makes the assessment process more interesting and relevant to students (Ngui et al., 2020). The use of e-portfolios before, during, and after higher education continues to rise but Yang and Wong (2024) assert that there are concerns related to technology, policy, pedagogy, artifact quality, privacy, student motivation, academic integrity, and teacher workload.

However, some limitations and challenges impede the proper use and implementation of the e-portfolio. The main limitations of using an e-portfolio are the need for hardware and software skills to manage online resources, acceptance of online learning platforms, higher levels of motivation, the ability to understand the effectiveness of the e-portfolio as well as ensuring that student success is sustained. A lack of digital technological skills prevents the proper use of the e-portfolio as a learning and assessment tool (Syzdykova et al., 2021). Both lecturers and students must understand the e-portfolio for the proper and successful implementation of this learning and assessment tool in ODeL. Jaekel (2020) reports that when creating the e-portfolio, students expressed concerns and fears about not doing it correctly and being graded on their technology proficiency when compared to more technologically advanced students.

Online learning management systems require continuous updates to ensure smooth use and application. When lecturers and students use e-portfolios for assessment at an ODeL university in South Africa, they encounter various challenges. The university studied was using the Mahara 2019 platform, which had not been updated, resulting in several challenges when designing assessment activities for e-portfolios and using them. Liu and Geertshuis (2021) define the learning management system (LMS) as a software application that provides infrastructure that allows lecturers to design and deliver content, supervise learning progress, communicate with students, and create learning experiences in an online environment, which is a non-contact classroom. The LMS enables institutions to effectively develop courses, deliver instruction, facilitate communication, foster collaboration, and assess students (Ayouni et al., 2021). To reap the benefits of the e-portfolio, the university must modify assessment policies and improve its online learning platform. The implementation of the e-portfolio necessitates specialized knowledge of new digital technologies, which is especially important for students from underdeveloped and developing countries. Students must be equipped with relevant technological skills, have support and time, engage in reflective practice, and understand their roles and functions (Harun et al., 2021). Bangalan and Hopana (2020) identify time, technology or IT infrastructure, connectivity, internet cost, and system problems as potential barriers that may hinder student motivation. Lack of control, lack of features, and lack of access and promotion are the major technology-related problems for students (Olstad, 2020) all of which decrease motivation among students. Students are expected to learn from the feedback and reflection as features of formative assessment. They must reflect on each completed activity and discuss it, expressing their feelings and understanding of the activity and content. This will provide the lecturer with an idea of challenges and progress.

Since e-portfolios are mostly utilized for summative evaluation, there appears to be a knowledge gap about their application for formative assessment, according to the literature. Mainly on how lecturers use the e-portfolio to identify the gap in learning and provide feedback. There is a lack of studies investigating students' e-portfolio compilation or keeping experience (Yancey, 2019). Research on the use of e-portfolios in HEIs in Africa, especially in South Africa, is lacking, although they are utilized in numerous nations and industries (Fuglik, 2013). Because of this, very few instructors at the university in question use e-portfolios for formative evaluation.

This article makes recommendations based on a study of the use of e-portfolios for formative assessment to improve efficacy in ODeL. Contributes to the body of knowledge and suggests a framework for designing and implementing e-portfolios for students. It further argues that process e-portfolios facilitate assessment and learning through formative assessment activities. The e-portfolio should not be used as an alternative assessment but rather as a learning tool to increase student engagement. Research that explores how an e-portfolio can be used to develop an understanding of students' learning, assessment, and practice is necessary, claims Devarajoo (2020). The researcher proposed and recommended a process e-portfolio because of its ability to engage students and facilitate formative assessment. A suggested framework for the use of e-portfolios has been created based on the research's findings to support formative assessment, which would improve effectiveness in the context of open-distance e-learning. This framework serves as a guideline for the use of the Process e-Portfolio in the Open Distance e-Learning. Individual modifications can be created to fit the students' technological skills, material, learning objectives, and context. This proposed framework is structured according to the constructivist learning paradigm, with specific theories underpinning it such as connectivism. That is because students are offered the opportunity to create knowledge through activities when developing their e-portfolios (Sui et al., 2019). This framework includes and describes the roles of the university and lecturer, with regards to the

teaching, learning, and assessment process. Hosseini et al. (2019) argue that lecturers are responsible for mentoring and supporting students through a zone of proximal development (ZPD). The zone of proximal development refers to the difference between what a student can do without help and what he or she can achieve with guidance and support from a lecturer. The proposed framework for e-portfolios focuses on the student learning process. The process e-portfolio outperforms other portfolios because it helps students construct knowledge, familiarise themselves with the learning process, and conduct self- and peer assessments (Tsirika et al., 2017). Thus, the research question is: *How do the lecturers design, facilitate, and direct the Process e-Portfolio for assessment and learning?*

Background

ODeL needs to demonstrate that pedagogical principles and learning theories are operating effectivity and efficiently (Shalatska et al., 2020). University policies play a crucial role in ensuring that there is a proper design and implementation of any digital assessment tool. There is a shift in pedagogy in education that has resulted in focusing more on formative assessments than traditional summative assessment methods. Sui et al. (2019) also argue that an e-portfolio is a useful and effective tool to enhance students' soft skills, such as communication and collaboration, which may lead to an effective learning process. Higher Education Institutions (HEIs) have taken note of the importance of supporting the development of 21st-century skills (Spector et al., 2016). The e-portfolio can help students acquire, develop, and use 21st-century skills such as creativity, critical thinking, problem-solving, communication, and collaboration, as suggested by Bangalan and Hopana (2020). The university under study is an ODeL university; therefore, the Council approved the *Open Distance eLearning Policy* in 2008, which was revised in 2018. The University of South Africa (UNISA, 2018) policy on the provision of e-devices for e-learning defined ODeL as an open distance electronic learning of education that bridges time, geographical, economic, social, educational, and communication between students and the institution, students and academics, students and courseware, and students and peers. The University's 2030 Strategic Plan dedicates itself to being the African university shaping futures in service of humanity. The Plan commits the University to an ongoing "programme of curriculum transformation and pedagogical innovation" (UNISA, 2018, p. 1) achieved by a shared understanding of ODeL that directs its implementation within a mope distance electronic learning of online teaching and learning. Pedagogic innovation will play a key role in ensuring that students learn the module and course content.

Theoretical Framework

Adom et al. (2018) assert that the theoretical framework guides research and reflects the hypothesis of the study. The theoretical framework functions as an epistemological guide or an appraisal or evaluation tool, assisting in the interpretation of knowledge or data presented in a study. A field's theoretical foundations describe and inform practice, and they serve as the primary means of guiding future developments. Connectivism and networked learning are identified by the researcher to mirror the use of e-portfolios (Siemens, 2004). "Learning and knowledge rest in diversity of opinions, learning is a process of connecting specialized nodes of information sources, learning may reside in non-human appliances, capacity to know more is more critical than what is currently known, and nurturing and maintaining connections is needed to facilitate continual meaning, as well as decision-making is itself a learning process" (Siemens, 2004, p.5-6). Connectivism underpins the online teaching and learning process that supports the lecturer in the design of the process e-portfolio (Siemens, 2004). This theoretical framework guides the assessment activities design and administration as well as focuses on how to deliver the content and how students will learn the content. In an ODeL context, the lecturer facilitates online learning with online tools and systems such as the e-portfolio features. Martínez Guillem and Briziarelli (2020) state that connectivity naturalizes communication as a transmission instrument, a logical resource that succeeds when useful information is transported from one speaker to another. Students are required to take full responsibility for their learning from their connection to networks (Baque et al., 2020) and the e-portfolio through the university's LMS. Atay and Sumuer (2021) stated that network learning provides students with an independent and autonomous environment within which to achieve their goals. Networked learning facilitates communication between instructors and students as well as among peers, which automatically facilitates the movement of knowledge process to knowledge objectified as a product. According to Taylor (2018), knowledge is identified as a product of human interaction and is not something to be discovered because it is the outcome of the interaction of people within the environment.

Literature Review

e-Portfolio is a means or tool to showcase skills, learning, qualities, and achievements, allowing collaboration and encouraging a sense of personal identity (Hughes, 2008). It transforms how knowledge is taught and presented by enabling the sharing, appreciation, and continuous exploration of learning across all media and literacy. e-Portfolios are increasingly used for assessment in all forms of education. Parker and McMillan (2020) assert that the use of e-portfolios can demonstrate curricular outcome achievement and the journey of the student in the education programme, as it helps in tracking whether students are achieving the outcomes of the institution, their programmes, and their courses. Formative assessment of the sequential activities completed in an e-portfolio offers continuous feedback, allowing students to identify growth and gaps in their learning (Akhuledian et al., 2020). "Empirical studies have shown us the

positive relationship between the use of the e-portfolio and peer assessment" (Tsirika et al., 2017, p.21). This relationship is achieved through active discussion among peers after the completion of the self-assessment. e-portfolios develop reflection skills through self-and peer assessment (Slepcevic-Zach & Stock, 2018). Consequently, the development and use of the e-portfolio is believed to help create an environment with frequent self-assessment and feedback from the student on their work projects.

An e-portfolio is often used for programme assessment. An e-portfolio reveals the institution's ability to enable students to practice the curriculum content and achieve and/or demonstrate general education competencies (Ring et al., 2015). Universities can use the e-portfolio to assess whether their courses are relevant to students and assess whether they have designed appropriate learning outcomes for a course and module (Ring et al., 2015). Shanaa et al. (2020) support this by arguing that universities use e-portfolios to assess how well they are educating their students. "Documenting student learning is a critical component of institutional effectiveness, accreditation, and an institution's commitment to public accountability" (Ring et al., 2015, p.312). The success of the e-portfolio also depends on the skills of the lecturers (instructors) as they need to be equipped with enough knowledge and skills to use the tool, exemplify the use, and be actively engaged with students to provide feedback and support (Ngui et al., 2020). It should be noted that academics (primary and secondary lecturers, e-tutors, and teacher assistants) are a key factor in determining students' satisfaction and achievement.

Rabbani Yekta and Kana'ni (2020) recommend the use of the e-portfolio as a form of assessment designed to develop students' self-regulated learning by focusing on student-centered learning. Self-regulated learning is an active, constructive process whereby students set their learning goals and then attempt to plan, monitor, regulate, and control their cognition, motivation, and behaviour (Alexion & Paraskeva, 2020). Self-regulated learning can be used as a pedagogy and instructional design solution for accomplishing high achievement and aligned performance. According to Händel et al. (2020), an e-portfolio supports self-regulated learning and offers students the tools to construct and manage their knowledge as well as reflect on it with their peers. The design and implementation of the e-portfolio promotes educational affordance based on self-regulated learning, which is a challenging idea. This means that the e-portfolio has a strong connection to an individual's capacity to self-regulate learning and promote the acquisition of hard and soft skills.

There are different types of e-portfolios that lecturers can choose for the students, but this study focused on the process e-portfolio, which predominates other portfolios because it helps students construct knowledge, familiarise themselves and the learning process, and self-and peer assessment (Tsirika et al., 2017). This type of e-portfolio focuses on how the learning procedure is conducted through the students' projects. It is developmental because it is a work in progress. The process e-portfolio links the student's work to learning outcomes and the criteria of assessment rubrics (Song, 2021). It displays the work the owner of the e-portfolio has accumulated over a period. Tsirika et al. (2017) suggest the use of the *process e-portfolio,* which follows a developmental process and helps students familiarise themselves with the learning process and construct knowledge. It is a purposeful framework and a learning method in which the concepts are elaborated and designed to reflect on their users' achievements (Bouzeghaia, 2020). Assessment tasks based on content and problem-solving skills can be completed both individually and in groups using the Process e-Portfolio (Bloom, 1969, as cited in Nishizuka, 2020). Assessment activities should thus be authentic, meaning that they should not deviate from the characteristic of the Process E-Portfolio which is authenticity. "….is mostly associated with tasks that require high order thinking and skills, reflection on values and attitudes, and more complex and dynamic behaviours and ways of being" (Gravett et al., 2019, p.129). the lecturer must design authentic activities thus, involves designing to be student-driven and related to real-life tasks and creating meaningful, useful outcomes. Lam (2023) argues that portfolio pedagogy should dictate how to use technology because currently, e-portfolios lack reflection, deprive student agency, and there is an issue of standardized content. Technological skills, infrastructure, and accessibility to hardware and data are critical concerns for the process e-portfolio, however institutions of learning can train their lecturers and students. The lack of technological skills hampers the proper use of the e-portfolio as a learning and assessment tool (Syzdykova et al., 2021). As part of professional development, lecturers need to upgrade their technology skills so that they can design and administer the Process e-Portfolio. As academic and technology support by lecturers and tutors is time-consuming, videos that explain how to work on the e-portfolio can be made and posted. To support this, Beckers and Merrienboer (2018) suggest that student-led or self-coaching could also assist students in developing their ICT skills, particularly as the efficacy of the e-portfolio is determined by the technical ability of students (Zafiropoulou & Darra, 2019).

Another type of e-portfolio is the *showcase e-portfolio,* which is used to present the best work of the student selected from a variety of activities done during the semester or year. Instructors and students can present projects through a digital platform highlighting students' major accomplishments (Tsirika et al., 2017). This process encourages self-evaluation by choosing the artefacts representing the student's best work. Song (2021) calls it a representational e-portfolio because it showcases the achievement of the owner with their desired goals or learning outcomes. Students are expected to align their activities with specific outcomes to determine whether they are achieved or not.

The *assessment e-portfolio* is another type of e-portfolio that institutions and instructors use to assess the competency of students on a specific topic and standard (Syzdykova et al., 2021). It is created and designed to support a variety of teaching principles and evaluation procedures because it is a lifelong learning tool that aims to set self-evaluation and

help students understand the value of knowledge (Tsirika et al., 2017). The assessment e-portfolio is mainly created for evaluation through critical thinking and reasoning. On the other hand, Jaekel (2020) defines an assessment e-portfolio as a tool that demonstrates institutional accountability and serves as a vehicle for institution-wide reflection, learning, and improvement. This is an *e-portfolio for workplace learning* used to demonstrate the work performed and growth achieved (Green et al., 2014; Mok, 2012). It facilitates the evaluation of the student on the job while learning and assesses student growth, competency, and knowledge through programmes to illustrate the accomplishment of objectives.

The *learning e-portfolio* demonstrates the learning process with a focus on feedback (Syzdykova et al., 2021). This portfolio aims to support student learning with the use of critical reflection (Jaekel, 2020), which can be achieved by allowing students to evaluate themselves, reflect upon their learning and growth, and engage in critical thinking. Gikandi et al. (2011) regard this as an *e-portfolio for classroom learning* because it is used as a means of formative assessment to facilitate deep student learning and engagement with the content. It allows discussion among students, lecturer and peer feedback, and reflecting upon the learning experience and progress. The researcher identifies and acknowledges that learning an e-portfolio is the same as the process e-portfolio. They both facilitate learning through assessment activities but learning e-portfolios mainly focus on feedback.

The *professional/career e-portfolio* affords users a platform to showcase accomplishments and work samples for employment (Jaekel, 2020). This portfolio calls for the students to be systematic and intentional in using and choosing evidence and samples of work gained through academic preparation. Students can send this portfolio to or share it with potential employers, and it allows them to modify it if there are changes in growth and achievement.

Methodology

This research study focused on the qualitative analysis of how lecturers designed e-portfolios for formative learning through assessment activities. A case study approach was used for this research. This research approach investigates a contextualised contemporary phenomenon within specified boundaries (Creswell, 2012). Thus, the bounded phenomenon in this study was the use of online formative assessment strategies when assessing students in an open-distance university. By employing a qualitative approach, the study aimed to fill the existing knowledge gap regarding the use of e-portfolios for formative assessment in teaching. Following the principles of case study research, the study delved deeply into a real-life phenomenon within its contextual boundaries. Purposive sampling, as defined by Etikan et al. (2016), guided the selection process, enabling the identification of information-rich cases and participants possessing the desired qualities. The researcher selected lecturers who are using e-portfolios for formative evaluation in their modules. Purposive sampling, also known as expert sampling, calls for experts in a particular field to be the subject of purposive sampling (Etikan et al., 2016). The researcher designed semi-structured interviews and an e-portfolio checklist. The researcher analysed the e-portfolios of the modules designed for students using a checklist (Appendix A) and interviewed ten lecturers using a semi-structured interview schedule (Appendix B). The researcher designed the checklist for the e-portfolios of students, and it includes 11 content and six evaluation criteria, including a scale of 0-5. The content of the e-portfolio checklist focused on formative assessment activities, content delivery of the module, feedback, collaborative learning, and how self-regulated learning was facilitated. Three lecturers gave the researcher access to the e-portfolios, and they were reviewed using the checklist. A pilot test of the questions was conducted on two lecturers. This testing process provided the researcher with an opportunity to validate the questions, which involved improving or adjusting questions. The interviews were conducted and recorded using Microsoft Teams and the author transcribed them to identify themes.

Thematic analysis was employed to derive themes from the qualitative data collected through the semi-structured interviews, facilitating the identification and analysis of patterns. This approach to identifying and analysing patterns in qualitative data can be used to examine experiences narratively (Ngui et al., 2020). The Microsoft Teams APP was used to conduct online semi-structured interviews and helped with transcribing data/conversation. The researcher then listened and read the conversation to identify themes for the study. The identified themes were then presented as findings and evaluated to check their fit for the research question and problem. The themes reported are supported by verbatim quotations. It involves a systematic analysis of data for patterns of shared meaning leading to findings in the form of analytic generalisations that are supported by excerpts from the transcript's online questionnaire and interviews (Creswell, 2015).

The researcher used two data collection tools (an e-portfolio checklist and semi-structured interviews) to ensure the trustworthiness of the findings. According to Johnson et al. (2020), data triangulation is used to identify the convergence of data obtained through multiple data sources and methods to avoid or minimise errors or biases. Evidence of the data collected is provided to ensure the credibility of the findings. The credibility of the study is developed by a clear chain of evidence, and/or is established through several strategies (Stewart et al., 2017). The themes that emerged from the data generated resulted in findings are supported by the literature and compared with the current existing writing of scholars. Nowell et al. (2017) argue that rigorous thematic analysis produces trustworthy and insightful findings. Ethical clearance was obtained for the doctoral study in 2021, valid until 2026. The insights gained from this study hold transferable value for other instructors considering the adoption of e-portfolios in their modules.

Findings

This section presents the findings of the study through themes derived from data collected by the semi-structured interviews of lecturers using the e-portfolio. The researcher evaluated the e-portfolios for the following modules through the e-portfolio checklist: Instructional Studies in Context (ISC3701), Instructional Techniques and Multimedia in Adult Education (INTMAEU), presented online, and FET Subject Didactics Geography (SDGEOGM), the module for students to become competent Geography teachers against the background of outcomes-based education, Curriculum 2005 and Geography as natural science and a human and social science. Data is presented through a table and themes to demonstrate how findings address the objective of the study by answering the research question and defending the argument. The verbatim quotations are also used to present data and the findings. According to Payne et al., (2020), a thematic approach allows emerging themes to be contextualized with data transcripts and findings from existing literature.

E-Portfolio Checklist Data

A table is used to present the formative assessment activities identified in the students' e-portfolios. Data analysis, presentation and discussion can be done in the form of tables in a qualitative study (Cloutier & Ravasi, 2021) as it helps the researcher communicate research findings and theoretical insights in a parsimonious, easy-to-understand, and convincing way.

Table 1. Formative Assessment Activities

Formative Assessment Activities	
Individual Graded Tasks	**Group Non-Graded Tasks**
Assignments	Quizzes
Essay Writing	Blog
Research activities	Wix site
Presentations	Discussion: forum
Blog	Wiki
Electronic Map Work	
Tests	
Lesson plans	
Classroom observations and mentor observation	
Teaching and critiqued by the mentor Online Discussion	
Practical activities are done outside the e-Portfolio but uploaded on the e-Portfolio	

Themes

Small Chunks of Activities Designed Logically for Learning And Student Support

According to the findings of the analysis through the checklist of the module Instructional Studies in Context (ISC3701), small chunks of activities are designed for learning and not for grading. The first task was to harness digital technological skills. Each task was allocated or aligned to a learning outcome. Other tasks required the student to share videos, pictures, and PowerPoint presentations. Reflection activities were designed to prepare student teachers to be reflective practitioners for the module FET Subject Didactics Geography (SDGEOGM*).*

Individual And Group Tasks Linked to The Module Learning Outcomes

The e-portfolio facilitates online collaboration through Google applications such as Google Meet for knowledge sharing and real-time editing of text, the use of text and images for discussion. Although the Google Blogger application was used to initiate discussions between students, there was an activity for students to create a blog post about their teaching philosophy statement. According to the e-portfolio checklist analysis of the module Instructional Techniques and Multimedia in Adult Education (INTMAEU), there was group work based on using digital technologies for teaching and learning. This was supported by the lecturers during the interview. Here is a comment from one of the lecturer interviews that reinforces this theme.

"The e-portfolio offers authentic, reflective, interactive, and individual assessment" (Participant H).

E-Portfolio Is an Online Classroom For Co-Teaching And Co-Learning

Lecturers and students collaborated in groups, which means that the e-portfolio can be regarded as a tool that supports co-teaching, peer teaching, and co-learning. The e-portfolio was used as an online classroom that encourages continuous collaboration through activities and learning the module content. Participant J claimed that the e-portfolio is a flexible

personal learning management tool to engage students in discussion forums, which thus encourages co-teaching and peer teaching. Lecturers and students initiated the discussions online via blog posts or discussion forums. These activities were graded to compel student participation in the module and knowledge sharing.

"The e-portfolio is an online classroom that encourages continuous working through activities and learning the module content" (Participant C).

"*I chose the e-portfolio because of its ability to encourage and facilitate co-learning; connects students with the institution for a lived experience"* (Participant H).

Ongoing Assessment Process Through Digital Technologies

Participant D referred to the e-portfolio as a personalised report of different curriculum sections, student progress, and learning, as well as acquired skills. Practical modules assessed students via ongoing assessment activities that were kept as evidence via an electronic workbook and electronic logbook. As previously indicated, students were expected to observe and be observed by mentors during their teaching practice. Students shared knowledge through discussions and presentations that resulted in them learning from each other.

"Individual tasks were used for collecting learning and knowledge sharing" (Participant G).

Self-Directed Learning Through Activities Designed for Student Learning

Students need to take responsibility for their learning through reading, research, doing activities, and initiating discussions. Participant D alluded that self-regulated learning is the by-product of the e-portfolio because there is no copy and paste, students take ownership of their learning, forcing them to work hard and find resources and information to complete activities. Participant H reported that an e-portfolio was used to train students in self-regulated learning through activities that involve collecting and presenting items from the e-portfolio, making sense of concrete experiences through reflection, and projecting their learning. Lecturers felt that the e-portfolio encourages self-regulated learning through formative assessment activities designed for the students. Students must complete activities on their own and then evaluate their activities to correct mistakes before submission. Most of the activities were individual tasks and played a crucial role in students' performance in each module. Participant J mentioned that the e-portfolio promotes students' autonomy and self-confidence. The use of e-portfolios in this study encouraged self-regulated learning. Lecturer participants believed that success in online education and compiling e-portfolios depends on the students taking full responsibility for completing the required tasks and activities to deepen their learning. Good performance and success were the results of students taking full responsibility for their learning.

"To excel in the e-portfolio, it is the responsibility of the student to work hard" (Participant B).

Lecturers' Challenges to Administer The E-Portfolio.

It emerged that according to the e-portfolio checklist, the university has not updated the Mahara version as they are still using Mahara 2019. The university uses Moodle as the LMS through which the e-portfolio runs. Students had to do other activities, such as wikis outside the e-portfolio, which was done using Google Docs. Implementation and usage of the e-portfolio were affected by the lack of support from the university's Information Communication & Technology (ICT) department. The following are two comments from the lecture interviews related to this theme:

"ICT is not available for support with the use of e-portfolios" (Participant I).

"*It is difficult to do the e-portfolio on a module with many students, but grouping can help to appoint assistants or administrators"* (Participant C).

Students did not receive training on how to do their tasks using the e-portfolios. This has resulted in missing assessment activities and learning. According to Participant B, some students submitted incomplete work due to a lack of technological skills. This action resulted in students getting a poor mark for summative assessments as many parts of the e-portfolio were missing. The participants also mentioned that student participation in online discussions was poor, as students were hesitant about taking part, which may be an indication of several factors. As a result, it was difficult to get data on participation. For example, *"Some students are reluctant to participate due to a lack of digital skills and data issues, but it is important to teach them for their future careers"* (Participant D).

Discussion

The university lecturers in this research study used e-portfolios for formative assessment activities designed logically to present module content and facilitate learning. This finding aligns with Tsirika et al. (2017) who suggest the use of the *process e-portfolio,* which follows a developmental process, helps students familiarise themselves with the learning process, and construct knowledge. Even though the e-portfolio has sequential activities, deviations did occur as seen by e-mail inquiries and comments on the various fora. The students were confused about what was expected of them, which forced the lecturer to create small chunks of activities to help students learn the content better. Not all students put their

minds to the reflection and self-assessment exercises. The lecturer participants recommended the use of small chunks of activities, assignments, essays, online discussions, feedback, and reflection to identify the students' gaps in learning. Through ongoing formative assessment, students read and researched information relevant to their activities to learn the module content. This logical order involved reading articles shared via web links, researching topics for discussion and answering the assignment questions, essay-type questions, lesson plans, presentations and receiving feedback as well as reflecting on the activity before moving to the next task. Formative assessment of the sequential activities offered continuous feedback, which points out areas of growth and identifies gaps in learning (Akhuledian et al., 2020). The small chunks of activities were used to identify the gap in learning and provide support. The researcher argues that they are designed to mentor and support students through the ZPD and offer students support and the opportunity to close their gaps in learning. Hosseini et al. (2019) argue that lecturers are responsible for mentoring and supporting students through ZPD. The logical order of activities helped students learn the content and pass the module through small chunks of activities designed for learning. The process followed in this study was like that proposed by Bouzeghaia (2020), which would demonstrate the achievement of outcomes.

Students were required to take full responsibility for their learning from connection to networks (Baque et al., 2020) and the e-portfolio through the university's LMS. The e-portfolio formative assessment activities required students to be responsible for selecting and exploring knowledge. The student will struggle in open distance electronic learning if he/she does not understand self-directed learning. The e-Portfolio creates an authentic learning context and supports collaborative learning and assessment (Gikandi et al., 2011), supports self-regulated learning, and offers students the tools to construct and manage their knowledge as well as reflect on it with their peers (Händel et al., 2020). The learning process was student-centered, and students needed to be self-regulated to complete the logical order of activities, both by individuals and groups, required by the e-portfolio. This aligns with Rabbani Yekta and Kana'ni (2020), who recommend the use of the e-portfolio as an assessment designed to develop students' self-regulated learning by focusing on student-centered learning and with Atay and Sumuer (2021), who state that networked learning provides students with an independent and autonomous environment within which to achieve their goals. The design of the e-portfolio for students should focus on how the learning procedure is conducted through the students' projects. It is developmental because it is a work in progress, linking student work to learning outcomes and criteria of assessment rubrics (Song, 2021).

The lack of digital skills, infrastructure, and tools affected both lecturers and students when using the e-portfolio. Data issues such as infrastructure and expensive data to access the e-portfolio affect student participation. The information communication tool department was not available to assist student struggling with setting up their e-portfolios. Student were not trained to work on their e-portfolios, thus, affected their learning progress. The lack of technological skills hampers the proper use of the e-portfolio as a learning and assessment tool (Syzdykova et al., 2021). e-Portfolio use is underdeveloped, and the lack of competent digital skills of students hampers the successful use of the e-Portfolio and the integration of reflection. However, increased pressure on students with limited digital skills, education, and resources for continued education affects students' connectivity. Lack of access is the biggest technology-related problem for students (Olstad, 2020) which affects motivation among students in the use of online learning tools.

Lecturers and students require formal training in administering e-portfolios, and the university must make a serious decision about the use of e-portfolios. Improper administration of the e-portfolio affects self-regulated learning and formative assessment features such as feedback and reflection. Major technical support for lecturers and students is needed to ensure the success of the e-portfolio in the teaching and learning process. The success of the e-portfolio also depends on the skills of the lecturers (instructors) as they need to be equipped with enough knowledge and skills to use the application, exemplify the use, and be actively engaged with students to provide feedback and support (Ngui et al., 2020). In addition, students need to be equipped with technology skills and should be taught how to work on e-portfolios.

In the university under study, the LMS Mahara was used to create, develop, and maintain the e-portfolio (Rabbani Yekta & Kana'ni, 2020). However, what emerged was that according to the checklist, the university has not updated the Mahara version as they are still using Mahara 2019, the MyUnisa Learning Management System (LMS) through which the e-Portfolio runs. Students had to do other activities, such as the Wikis outside the e-portfolio, which was done on Google. Mahara did not allow students to do other formative assessment activities set by the lecturer. The settings Mahara did not allow the use of Wikis.

e-Learning encourages the use of a wide range of current and emerging digital technologies and resources. Therefore, this framework proposes the use of the process e-portfolio, guided by the constructivist paradigm, with formative assessment activities that will enhance student learning experiences. The e-portfolio encourages reciprocal learning and peer assessment, instant and instructive feedback, and encourages the development of interactive and social skills. It is a purposeful framework and a learning method in which the concepts are elaborated and designed to reflect on their users' achievements (Bouzeghaia, 2020). It creates a more active, flexible, and digital learning environment that largely affects the demonstration of different reflective instructional practices. Figure 1 illustrates the process e-portfolio framework that has been developed from this research study.

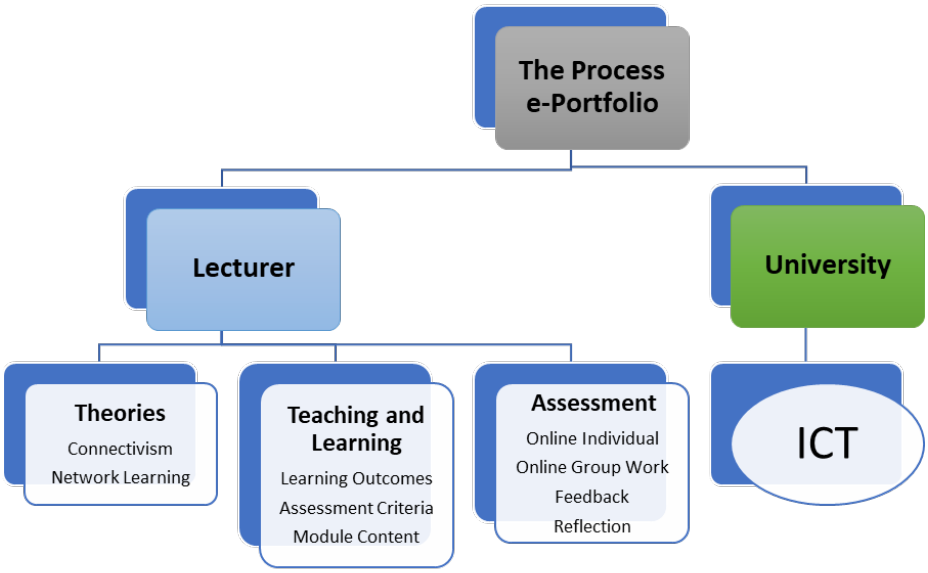

Figure 1. The Process E-Portfolio Framework

According to this process e-portfolio framework, the lecturer has many activities and is expected to undertake and understand many things, such as the guiding learning theories. This includes uploading information, media, links, and open educational resources (OER) that will assist the students in understanding the content before attempting to answer the questions developed for the assignment activities. The University's Policy on the Provision of e-devices for e-learning was approved by the Council in 2018 and influenced by the character of the institution that requires the provision of meaningful support to students in their learning process to succeed in an increasingly technologically enhanced learning environment. The institution's ITC department is tasked with synchronizing the e-portfolio. This process will help lecturers set up the process e-portfolio, identify and synchronise participants, and update the LMS. The LMS helps institutions effectively develop courses, deliver instruction, facilitate communication, foster collaboration, and assess students (Ayouni et al., 2021). However, it needs to be accessible, and its capacity must be updated to accommodate many students as well as being updated with the latest technology. The LMS requires logistics infrastructure and software upgrades, which are necessary for the efficacy of the online tool. The e-portfolio involves connecting students to a university's LMS to access content and assessment activities that facilitate learning through online activities.

Conclusion

The use of the process e-portfolio framework developed as a result of this research study enhances teaching and learning in ODeL because it enables online delivery of the content and the administration of assessments. This tool assists students in learning the module content through engagement, interaction, and activities. It is mainly used by students to display the work accumulated over a period. This study concludes that e-portfolios are considered a productivity pedagogical tool that enables users to work logically on activities while developing understanding and building knowledge as well as technological skills. This online learning tool affords students the learning of the module content through completing formative assessment activities. Achieving learning through the e-portfolio requires continuous assessment activities set for the students for both grading and non-grading. This included individual and group activities with each activity linked to a learning outcome and assessment standard for the module. For this study, students were required to complete a small chunk of activities aligned to each learning outcome. Therefore, e-portfolios became the online classroom assessment tool for open-distance electronic learning. The lecturer must be flexible because students might require extra activities to improve their learning and achievement. The small chunks of activities that students do via the e-portfolio improve efficacy in the ODeL context in several ways.

Through co-teaching and co-learning students become knowledge creators and active users of the e-portfolio. The presence of the lecturer during online discussions is key to feedback and student support. Even though online learning is characterised by individualism with the help of the LMS, students get the chance to interact with their lecturers and other students, supporting each other during formative assessment activities. This study further suggests that further research could focus on the use of social media to facilitate learning through the e-portfolio, the value of peer review and feedback with e-portfolio use, and students' experiences of e-portfolio use as a learning tool. The views and perceptions of the students are very important in educational research.

Recommendations

The lecturer and assessment tool must be flexible to ensure students get enough and much-needed support. This study recommends that lecturers and students must be provided with formal training in administering e-portfolios and the university must make a serious decision about the use of the e-portfolio. For better use and learning, students must be grouped into smaller groups to enhance student support. Lecturers could be offered formal training with formal certificates on e-portfolios. The university could design a formal module focusing on digital skills for all the students. Lecturers must teach students how to reflect on their formative assessment activities and how to use the feedback provided so they can use it in their future jobs. For the e-portfolio to be used as an effective tool in the teaching and learning process, the university needs to ensure updated infrastructure and continued technology support for both lecturers and students. The ICT department should be available to support both students and lecturers because not all students have access to technology and possess the required basic technological skills.

Limitations

It seems that fewer lecturers use e-portfolios for assessment due to a lack of support from the university. Thus, limited data were collected for the study. In teaching practice modules, students misunderstood the concept and nature of e-portfolios and decided to download and print the workbook they were supposed to do online.

Ethics Statement

The findings of this study are based on the research conducted at the University of South Africa from the three colleges and involved lecturers and fourth-year students who use e-portfolios for formative assessment to enhance efficacy in ODeL (Ethics Ref: 2021/10/13/59040165/16/AM). The researcher is grateful to the participants who took the time to participate in the project and the institution's editing team for their expertise in editing this article.

Data availability

The data supporting this study's findings are available within the article and its supplementary material. Raw data supporting this study's findings can be shared as a link upon request.

Disclosure and Conflicts of Interest

There is no conflict of interest, and the article presents the findings of the larger study conducted by the researcher for the Ph.D. study. No financial interest influenced the interpretation of the findings.

Generative AI Statement

No AI tools have been used.

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Appendices

Appendix A: e-Portfolio Checklist

Number	Content	Person responsible	Yes	Scale 0-5	No	Comment
	Administrative Activities Connectivity Content coverage Formative assessment activities Discussion Collaboration Student learning Self-regulated learning ZPD Feedback (peer and lecturer). How does it accommodate students with disabilities					

Appendix B: Semi-structured interview schedule with an example of a transcribed interview

BIOGRAPHICAL/GENERAL INFORMATION	
Department	**Curriculum and Instructional Studies**
Module	**ISC3701**

1. Were you trained in administering and setting up e-portfolios for your module? Please share your experience.

Interviewer: Did you get any training on how to set up e-portfolios for students?
Participant: I attended a programme where we were introduced to e-portfolios and created our own portfolio. I was able to figure out things and help students.
Interviewer: Were you not trained by your employer?
Participant: You must train yourself how to use the system because when I took over the module, it was using Mahara and students were on Mahara. I had to learn how to use Mahara and teach students with Mahara. The lecturer from whom I took over the module did not do a proper handover.
Interviewer: Were you self-taught?
Participant: Yes, I had to learn. I believe in a core teaching strategy. When you see a student who understands and grasps the concepts and can use the technology tools, you use them to help others – it is a form of peer learning as some students learn better than their peers.

2. Please explain how you formatively assess students in your module.

Interviewer: How do you formatively assess the students in this module?
Participant: We did the non-venue-based examination where they submitted an e-portfolio that they had to compile throughout the year. With every assignment they do, they go back to the e-portfolios and add their reflections (how they felt and their understanding of the content).
Interviewer: What informed your assessment activities?
Participant: Everything we did came from the learning objectives, the assessment plan and the content of the module. Activities are based on the learning objectives and discussions on the topics of the module. Some of the tasks required technical skills of technology, for example, the assignments. One was an orientation to Mahara and e-portfolios where the students would go to Mahara and start familiarising themselves with the platform and sharing things like their biographies, CVs and personal information. What I like about Mahara is that it allows the students to share. It works like Facebook and you can invite specific people to view your profile.
Interviewer: What formative assessment activities can be done for the e-portfolio?
Participant: For example, one of the assignments was a blog. Students were required to do a blog post on myUnisa. We have a blog function on myUnisa where students can write about the topic that you have given them from the module's learning objective and content.

3. Outline formative assessment activities students must do via the e-portfolio.

Interviewer: Name formative assessment activities done via the e-portfolio for this module.
Participant: Online discussion
Designing Wikis
Assignments
Essay writing
Group work
Mind map of the content
Designing a lesson plan
Reflective journal

4. How do they help students learn the content?

Interviewer: How did they help students learn the content?
Participant: Essay writing encourages students to apply their minds and not copy from the text provided. They need to differentiate between concepts and look at the similarities, depending on what is expected from them. There is an assignment that requires them to let me quickly go to that assignment to see if they understand the concepts.

5. How do they help identify the gap in learning?

Interviewer: How did they help identify the gap in learning?
Participant: If you as a teacher or lecturer want to follow up or when students complain, you go into the group to find out what is happening. Why are people not participating? What is the quality of a question's answer? Based on essay-type assignments you can see if the student understand the concept, the content or the question.

6. Which formative assessment activities do you give students for discussion (peer or group)?

Interviewer: Which formative assessment activities were designed for discussion?
Participant: Blog assignments
Forum discussions

7. How do they conduct or engage in discussions via the e-portfolio?

Interviewer: ***How was the discussion conducted?***
Participant: They meet online using online meeting tools and discuss topics.

8. How did this activity generate knowledge for the module?

Interviewer: How did this activity generate knowledge for the module?
Participant: Through knowledge sharing and creating more ideas about a topic.

9. How do you provide feedback for e-portfolio formative assessment activities?

Interviewer: Describe the process of feedback in your module.
Participant: Markers provided written and constructive feedback, which depends on the platform the assignments or tasks require the student to be on. Written assignments are submitted via myUnisa and we have markers who mark them on JRouter where they can comment on the assignment.
Interviewer: How did you provide feedback as a lecturer?
Participant: Every week I had to be online to observe students' online discussions. I need to check that everybody participates, that they do not copy and paste from somebody else's work, do not use abbreviations, and so forth. This guides me in terms of marking and assessing. I am further guided by rubrics.

10. How does this process improve feedback?

Interviewer: How does this process improve feedback if any improvement is identified?
Participant: Students are also commenting on the discussion about the feedback provided. We suggest that engagement is taking place and students reflect on the activity and feedback provided.

11. How do you foster reflection via the e-portfolio? Why?

Interviewer: How do you foster reflection on your module?
Participant: Students take a screen shot of every activity they do and go back to the portfolio they are building. They go back to Mahara and attach it to the assessment task. This is evidence that they participate and give their reflection. How was the discussion with other students? What did they learn that they did not know before? What and how did they contribute?
Interviewer: Why do you ask for this process?
Participant: The portfolio has an element of reflection or reflective practice to reflect after every activity.

12. Do you think using e-portfolios for formative assessment enhances efficacy in ODeL? Elaborate.

Interviewer: Are the students learning through the e-portfolio and formative assessment?
Participant: Students learn skills like collaboration. Students work in groups where they will discuss, apply, debate and agree to disagree. There is a lot of learning and students must take ownership of their learning. They had to because, at the due date, they must present to me a mind map without copying and pasting somebody else's work. You need to do it because that is learning by doing.
Interviewer: Elaborate on how the use of e-portfolios enhances efficacy in ODeL.
Participant: The thing about its portfolio is that it is an integrated workflow where the students are not detached from the learning process and their portfolios. Sometimes, in a module where the assignment due date is March, they do that assignment and close their books because the next due date is in June and the rest of the time they are not actively interacting with the learning materials.

13. What other strategies can be employed to attune academics and students to how e-portfolios can be used as a formative assessment strategy to enhance efficacy in the ODeL environment?

Interviewer: How would you describe the use of e-portfolios for formative assessment?
Participant: Integrated workflow
Online classrooms
Sequential activities

14. How do they enhance efficacy in ODeL?

Interviewer: Do you think the formative assessment activities of the e-portfolio enhance efficacy in ODeL?
Participant: Yes
With the e-portfolio, the student is continuously thinking about improving their portfolio because it is a presentation of themselves and they want to make it better. It is a lifelong learning activity and product they went through and want to showcase. You are continuously engaged in the e-portfolio, unlike an assignment activity.
Interviewer: How?
Participant: The e-portfolio is like an online classroom because they can do it online with other students or offline by themselves. They are continuously working, and it will depend on the learning activities that you design for the module.

15. What challenges do you experience with e-portfolios and formative assessments?

Interviewer: What challenges did you experience with e-portfolios? Please explain.
Participant: This should be group work, but some are not pulling their weight. Students had to develop a wiki online. Unfortunately, our wiki on myUnisa did not work well and Mahara did not have a proper functional system for that. So, I used Google. I went onto the Google educational suite and used their wiki to create a wiki for students. It was wonderful.

16. Please add any areas for improvement.

Interviewer: ***What needs to be improved to ensure better use of e-portfolios?***
Participant: Mahara is still using the 2019 version. The institution needs to take e-portfolios seriously and provide support to students.

Interviewer: This concludes our interview. Thank you for availing yourself to be part of this undertaking. I appreciate that you took time from your busy schedule to be part of this research study. Thank you very much.