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The Pedagogical Affordances of E-Portfolio in Learning How to Teach: A Systematic Review

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Abstract

The advances in technology have paved the way for student centred learning environment which allows for higher students' engagement, active participation, deep meaningful learning, and critical thinking. One of the technology applications which have gained popularity at the beginning of the 1990s is the use of e-portfolio. Studies in many professional fields have shown exceptional findings on the adoption of e-portfolio. Nonetheless, the development of e-portfolio affordances over a period of time has yet to be explored to ascertain its usefulness particularly in the area of teacher education. This article presents the process of systematic literature on the e-portfolio pedagogical affordances in teacher education programs and issues to be addressed for successful implementation. Using the content analysis method, 28 articles which focused on e-portfolio, teacher education, English as a second language, scientific research, and secondary school were reviewed. The findings of the review have mainly shed positive lights on its use in documenting student teachers' learning experiences particularly on assisting and assessing student teachers learning how to teach. This article implicates the relevance of having a holistic view and understanding of the e-portfolio pedagogical affordances and the need to recognize issues to be addressed prior to its implementation in a teacher education program. With this understanding, the university and teacher education institutions can have

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a well-defined policy on the adoption of e-portfolio into their teacher education programs.

Keywords: E-portfolio, teacher education, systematic review.

1. INTRODUCTION

Teacher education in the 21st century has been increasingly demanding due to the realities of life and schooling as well as the educational goals that the programs and learners set to achieve (Darling-Hammond, 2012). Teaching at present is no longer just about imparting knowledge to learners but more importantly knowing what knowledge can do to the learners who are diverse in their backgrounds and abilities. Such situations have heightened the complexities of preparing new teachers. In general, there are three main problems which Darling-Hammond (2006a) has posited in learning to teach. First, student teachers need to acknowledge the fact that teaching is not the same as what they have experienced as learners. Second, student teachers need to be thinking and acting like a teacher while they are learning how to teach, and third, they need to understand the multifaceted nature of a classroom which is non-routinized and constantly changing. Therefore, teacher education institutions and programs need to prepare teachers who are able to teach and function in complex classroom situations with a deep understanding of learning, social and cultural contexts (Darling-Hammond, 2006b). Retrospectively, Hammerness et al. (2005) have suggested a framework for teacher learning which emphasises new teachers learning to teach in a community that allows them to develop a vision for their practice. This includes a set of understanding about teaching, learning, and learners, knowledge dispositions, practices to act their intentions and beliefs, and tools which can support their efforts (p. 385). In support of the implementation of the framework, performance task should be structured comprehensively in a teacher education program to enable student teachers to exhibit their understanding of learning how to teach such as developing lesson units, teaching a set of lessons within the unit, and completing a range of performances related to instruction.

To assess all the documents in the aforementioned performance task, teaching portfolios, as a form of formative assessment, has been typically used in teacher education since the 1980s'. It is seen as a more authentic form of assessment as it enables student teachers to demonstrate what they are able to do in relation to what they have been taught. Langeling (1996), Mullin (1998), and Wolf and Dietz (1998) define a portfolio as documentation which describes teachers' practice, strengths, and philosophies. According to Moore (1994), the portfolio allows the student teachers to do more self-directed learning and self-correction, and provide more opportunities and time frames. Besides that, it also promotes student teachers' self-reflection and reflective thinking. However, the use of conventional teaching portfolios has several limitations, for instance, selecting and choosing data and work samples can be time consumed and laborious for student teachers. Not only that, the portfolio tends to be bulky and difficult to manage with all the samples and documents provided. In addition, there is no easy access to retrieve the portfolios submitted for evaluation for future reference by other student teachers or even after they graduated and become practicing teachers. Such learning experiences tend to become an individual endeavour

with less extension of ideas to be shared and collaborated with other peers as a community of practice (Wenger, 1998).

With the advancement of technology and Web 2.0, the conventional teaching portfolios have shifted to the use of digital technology or known as e-portfolio. The Web 2.0 tools provide a wide range of opportunities for teachers and teacher educators to embark on 21st-century learning taking into consideration the connectedness among individuals, community, and society at large (Lim & Newby, 2020). In addition, these tools allow for users' interactions with contents, and dissemination of this knowledge and content can be done through social networks (Baker-Doyle & Yoon, 2020). Users are able to collaborate by sharing and revising existing content. Thus, the use of the internet is seen to function as an intermediary for interaction (Al-Hassan, 2017). The aforementioned features can also be found in many e-portfolio applications. Barrett (2007) points out that an electronic portfolio uses technologies as the container which allows students and teachers to collect and organize portfolios artefacts in various media types such as audio, video, graphics, and texts. Due to the growing interest in using e-portfolio for teacher education, there is a significant need to understand the essence of e-portfolio pedagogical affordances and the kinds of issues to be addressed for successful implementation. This is because one of the overriding issues in the implementation of e-portfolio is the amount of time spent developing the content of the e-portfolio (Oh et al., 2020). Therefore, there is a need to carefully design the integration of e-portfolio so that it will not be an impractical effort for both teacher educators and student teachers.

2. METHOD

The review process was conducted taking into consideration the phases proposed by Boland et al. (2017). This involves a ten-step process of planning the review, performing the scoping search, identifying the research questions and protocol writing, literature search, screening titles, and abstracts, obtaining papers, selecting full-text papers, data extraction, quality assessment, analysis and synthesis, and writing up editing and disseminating. For the purpose of presenting this method, the systematic review has been refined into six steps which include formulating the review aims, defining inclusion and exclusion criteria, developing and documenting the search strategy, selecting studies and extracting data, and analysing and synthesising quality data.

2.1 Formulating the Review Aims

The systematic review in this study is designed to locate, appraise, and synthesize available resources and to provide evidence-based answers which can inform future practice in the implementation of e-portfolios in teacher education programs. The review aims to answer the following questions:

1. What are the pedagogical affordances derived from reviewed articles on the use of e-portfolio in teacher education programs?
2. What issues need to be addressed in the process of implementing e-portfolio in teacher education programs?

2.2 Defining Inclusion and Exclusion Criteria

The first inclusion criterion has got to be research articles pertaining to e-portfolio. Three-time frames were used to search articles: 1980s', 1990s' and the 21st century (2000-2019). All the articles searched have to be in English. They have to be peer-reviewed and the full article can be accessed. The search includes both qualitative and quantitative methods. The articles should also focus on the use of English as a second language/foreign. On the other hand, articles were excluded if they were in the form of notes, books, or book chapters. Articles on the use of e-portfolio in other fields, for instance, medical fields or human resources were also excluded from the search.

2.3 Developing and Documenting Search Strategy

The search was carried out within the EBSCOhost (Education Research Complete). This database was chosen as it has a significant number of articles particularly related to education and provides a relevant focus for the review. The search with the focus on e-portfolio did not yield any results from 1980-1989. However, there were 1,112 articles from 1990-1999. The number of articles searched was further increased within the year 2000-2019 as there were 1,487 articles.

From the above numbers, a refine search was carried out to focus on articles on teacher education. The search indicated that from 1990-1999, there was no article focusing on e-portfolio in teacher education. In extension, the search within the year 2000-2019 has shown that there were 1,220 articles.

2.4 Selecting Studies and Extracting Data

The above articles were further filtered based on the exclusion and inclusion criteria. The articles were excluded if they did not focus on English as a second language or a foreign language. From 1,220 articles, there were 507 articles which included e-portfolio, teacher education, and English as a second language. The 507 article abstracts were further excluded if they did not focus on teacher education programs for secondary teaching and scientific research encompassing qualitative and quantitative studies. From the search, there were 86 articles within the year 2000-2019 to be abstracted for their eligibility.

The 86 article full papers were reviewed for inclusion purposes. The review of abstracts excluded articles which focused on the use of e-portfolio with learners and teachers in schools and higher education, for teacher education programs accreditation, for teacher education programs auditing, e-portfolio for graduate employability purposes, and e-portfolios as emerging technologies or online education in general. The final review has shown that there were 28 articles to be included in analysing the quality of the study to answer the research questions in focus. Figure 1 illustrates all the processes involved in the review method.

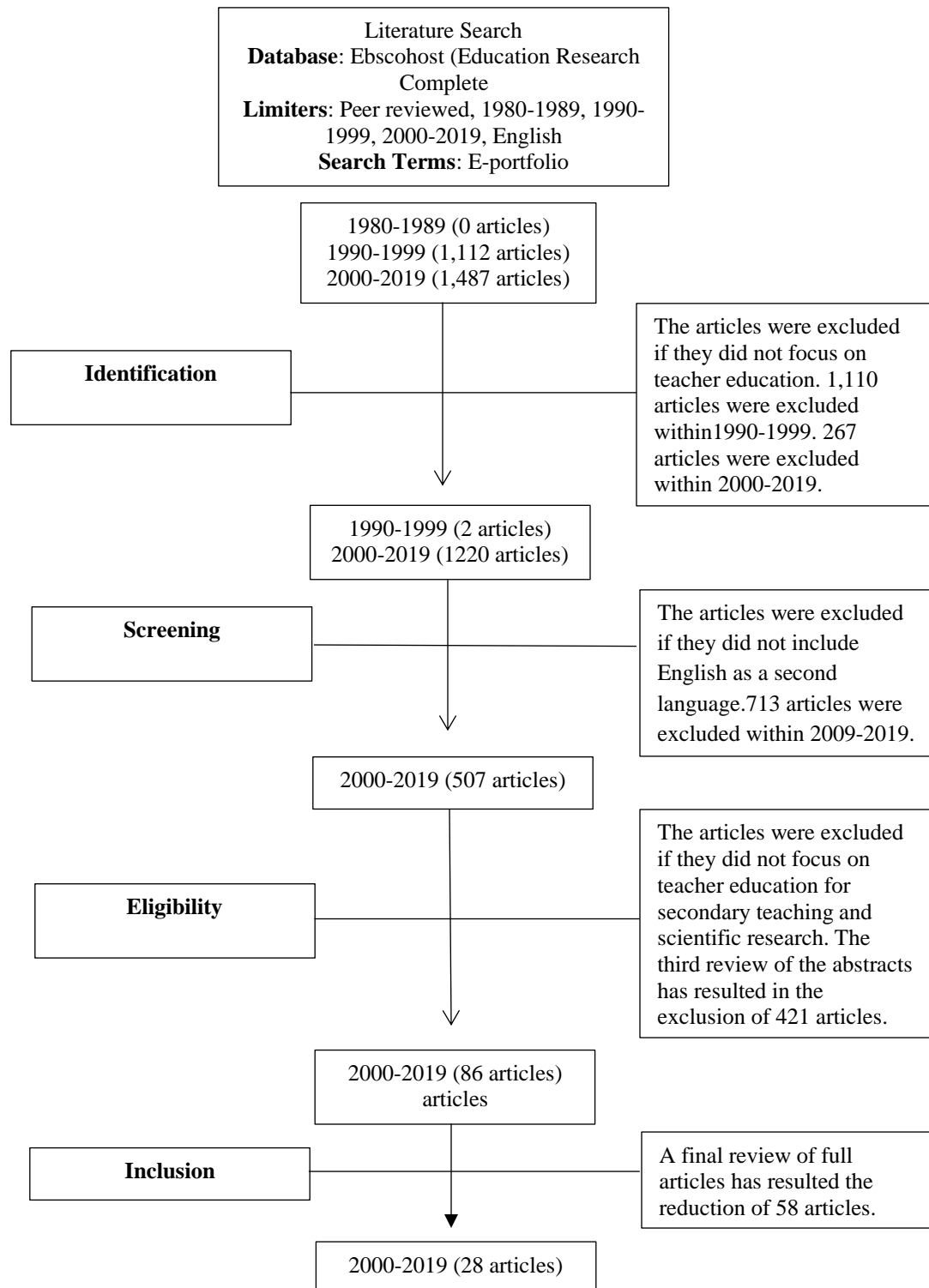


Figure1. Review method.

2.5 Analysing Quality of Study

The content analysis method was used for all the 28 articles as it can represent the actual words and internal features of the articles. The articles were read in-depth and the articles' content was analysed using a form designed by the researchers to

extract the categories and themes that emerged from the articles. The categories of analysis for the literature review were guided by the two research questions as mentioned earlier. The categories were analysed across all the articles and were refined to ensure there were no overlapping categories and redundancy. In addition, the data were analysed further to come up with emerging themes within the categories.

The member check procedure is used to ensure the emerged themes and categories are appropriate to the articles' content. This is to avoid misinterpretation which can pose ethical issues in reviewing the articles. The categories and themes for pedagogical affordances of e-portfolio and the issues raised in the implementation are illustrated in Table 1.

Table 1. The categories based on the research questions.

Research questions	Categories and themes
What are the pedagogical affordances derived from reviewed articles on the use of e-portfolio in teacher education programs?	<p>Category 1: Affordances of e-portfolio in assisting student teachers in learning how to teach</p> <p>Themes: Feedback for Student Teachers; Philosophy of Teaching/ Professional Development/Identity; Reflective Practice, Development of Technological Tools; Collaboration; Student Centred Learning; Process of Learning; and Metacognition.</p>
What issues need to be addressed in the process of implementing e-portfolio in teacher education programs?	<p>Category 2: Affordances of e-portfolio is assessing student teachers learning how to teach</p> <p>Themes: Self-assessment; Peer- assessment; Formative Assessment; and benchmarking standards</p> <p>Category: Issues in the implementation of e-portfolio</p> <p>Themes: Reflection; Instruction; Roles and function; Time; Social Pressure; and ICT Skills</p>

The analysis was done by reading and synthesizing the findings in the articles into relevant categories and themes. A qualitative process of content analysis was carried out and the texts were extracted and compared between recurring themes taking into account the differing contexts of the teacher education programs.

3. FINDINGS AND DISCUSSION

Findings from studies implementing e-portfolio in teacher education programs can be categorised into two main affordances: assisting student teachers in the process of learning how to teach and assessing student teachers learning how to teach.

3.1 Assisting Student Teachers in Learning How to Teach

This category is discussed based on the eight emerging themes. The theme which has the most recurring affordances emerging from the findings of the 28 articles was how e-portfolio can assist student teachers in the process of learning to teach. Beck et al. (2005) have found that the use of e-portfolio has a significant effect on the student teachers' understanding in learning how to teach and there is no significant difference

between males and females in doing the e-portfolio. The use of RSS in the e-portfolios such as in weblog has enabled the teacher educators to scaffold student teachers understanding through resolving ambiguities by giving immediate response (Chuang, 2008). Studies, such as Christen and Hoffman (2008), Harun and Jhee (2012), Denton and Wicks (2013), Sardegna and Dugartsyrenova (2014), Fahey and Cronen (2016), Gencel (2017), Cimermanova (2018), and Romero et al. (2019), have shown that many student teachers are positive and gained benefits with the use of e-portfolios in the process of learning how to teach. This is due to the fact that student teachers are able to retrieve information posted via the e-portfolio in the form of PowerPoint presentations, notes, assignment tasks, points of group discussion, reflection notes, and peer assessment evaluation. It was convenient for the student teachers to organise and document information, and show their progress over time. Furthermore, e-portfolio provides a platform for sharing experiences of teaching practices in various contexts. The assistance given through the use of e-portfolio has given more opportunities for student teachers to relate between theory and practice. The socialisation process that was involved in the online teaching portfolio has given the opportunity for student teachers to be engaged in transformative learning in which enriched ideas and experiences. This, according to Kabilan (2016), has facilitated the reconstruction, reconfiguration, and refining of knowledge that was personal and meaningful to each individual member of the online community.

Rade (2014) has emphasised that the use of e-portfolio is in support of the process model rather than the product model of learning how to teach. In extension, Swan (2009) has found that teacher educators have also found the benefits in using e-portfolio due to its ability to store a huge number of artefacts including data from classroom observations and learners' participation. In addition, Mostafa (2011) has carried out the assessment driven instruction (ADI) via the use of e-portfolio and found that the training program was successful in improving student teachers' knowledge of electronic ADI and improving their skills in designing ADI. Chye et al. (2013) have found that positive perceptions on the use of e-portfolio can be affected by student teachers' intrinsic motivation. Surprisingly, school requirements, social pressure, time, previous experience, impact on family members, and personality are the primary factors that can influence e-Portfolio adoption (Zhong & Hartsell, 2015).

The student teachers' professional development and identity is the second e-portfolio affordance found in 16 studies. E-portfolio can provide useful techniques in enhancing student teachers' development (Beck et al., 2005; Cimermanova, 2018; Gencel, 2017; Kabilan, 2016; Rade, 2014; Tang, 2013; Toom et al., 2015; Zhong & Hartsell, 2015), and professional communities from the various background (Rade, 2014; Sardegna, & Dugartsyrenova, 2014). This is supported by the use of metacognitive strategies, engagement of diverse approaches, and evaluation of their own learning (Wyk, 2017). The multimedia format in the e-portfolio enables student teachers to use e-portfolio as self-expressions of their identity as prospective teachers (Chuang, 2008; Rowley & Dunbar-Hall, 2012). Teachers' motivational profiles need to be explored to see how engagement in the e-portfolio can affect student teachers' identity and professional development (Chye et al., 2013). In addition, e-portfolio can introduce expectations which can change the dynamics of a professional community (Swan, 2009). E-portfolio has the potential of becoming a future resource for employers to assess the learning experiences that student teachers have gone through in the preparatory programs (De Jager 2019; Denton & Wicks, 2013; Rade, 2014).

The third affordance, which has been found in 14 articles reviewed, is the reflective practice in the implementation of e-portfolios in teacher education programs. Beck et al. (2005), Harun and Jhee (2012), and Rade (2014) have found that the reflective based inquiry in the e-portfolio can assist student teachers in their professional development as they were involved in a higher level of thinking. This can help bridge the gap between theory and practice which has been an issue commonly found in many teacher education programs. The student teachers were able to explain, justify, and argue their pedagogical considerations (Toom et al., 2015). The student teachers' reflective entries were found to be in the form of multiple representations, due to the features in the e-portfolio, which enhance their criticality and creativity of their own practices (Chuang, 2008). Their performance in learning how to teach is also reflected in their entries (Chung & Kim, 2010). In addition, Tang's (2013) analysis of her student teachers' reflective entries via e-portfolio has shown that they have the tendency to highly reflect on their pedagogical content knowledge (PCK) concerns, and these apprehensions can shape student teachers' teaching beliefs, identity, and practices. Chuang (2010) has found that group collaboration in writing reflective entries has formed a group identity and reduced the diversity among student teachers in understanding each other's practices. In contrast to all the above findings, Kecik et al. (2012) have found that the e-portfolio platform was not able to assist student teachers' concerns about their teaching practices in schools particularly from the perspectives of the university lecturers especially on reflecting their lessons. However, the platforms were successful in generating discussions at the planning and lesson development stage.

The findings from the studies also showed that one of the e-portfolio affordances can be in the form of collaboration with at least three parties which are between teacher educators and student teachers, student teachers with their peers, and student teachers with mentor teachers in schools (Kabilan, 2016; Tang, 2013; Wyk, 2017). It can extend a wider readership among the members of the e-portfolio which allowed for the sharing of many topics such as teaching plans, teaching videos, reflections, and issues and challenges of managing learning in various classroom contexts (De Jager, 2019). The presence of the expert others as members of the e-portfolio can provide support in solving problems faced by student teachers. Thus, the cognitive apprenticeship can be enhanced through such collaboration. Besides that, the in-class communication has increased due to the socialisation process that occurred in the e-portfolio (Gencel, 2017). Beck et al. (2005), Kabilan (2016), and Wyk (2017) have found that the benefit of teacher peer collaboration as one of the distinctive components for professional portfolio development. In extension, Wang (2009) and Sardegna and Dugartsyrenova (2014) have used group collaboration in constructing e-portfolio and it was found to be effective in solving problems and providing meaningful experiences among the student teachers.

The affordances of e-portfolio can also be discerned in the form of improving student teachers' technological skills through the assimilation process of ICT applications (Chuang, 2008; Chuang, 2010; De Jager, 2019; Rowley & Dunbar-Hall, 2012; Sardegna & Dugartsyrenova, 2014). They are able to select presentation strategies and web-based tools to carry out social discourse and gain benefit from presenting themselves in the e-learning environment (Fahey & Cronen, 2016). Such activities indirectly enhance student teachers' confidence in doing technology-related tasks in the classroom (Wang, 2009). Sardegna and Dugartsyrenova (2014) have also

found that technology-enhanced instruction can bring about changes in pre-service teachers' thinking and reflection processes. Moreover, their attitudes toward learning and teaching in a technology-supported classroom have changed. These changes through technology-mediated activities have enabled the student teachers to understand the way in which such technologies might be used in their own classes (Sardegna & Dugartsyrenova, 2014).

The use of e-portfolios in teacher education programs has enabled teacher educators to cater to student teachers' active learning in learning how to teach (Harun & Jhee, 2012; Kecik et al., 2012; Rowley & Dunbar-Hall, 2012). Chuang (2008) has shown that once student teachers provided focus on the learning goals in their portfolios, they also have the tendency to focus on their progress and achievement in learning how to teach. Activities, such as discussion forums, have enabled different perspectives on a topic to emerge which can be an enriching dialogic interaction and inter-thinking among student teachers (Sardegna & Dugartsyrenova, 2014; Wyk, 2017). In addition, student teachers have become more aware of their learning styles and creativity (Fahey & Cronen, 2016; Wyk, 2017).

Another affordance of the e-portfolio is the feedback both from the teacher educators and the student teachers' peers (Chuang, 2008; De Jager, 2019). Kecik et al. (2012) have found that getting immediate feedback on student teachers' works was of paramount importance to them. This allows them to revisit and revise the content based on the feedback they have gathered (Fahey & Cronen, 2016; Sardegna & Dugartsyrenova, 2014). This feedback can also provide exemplars of the teacher education program quality (Cimermanova, 2018). The last affordance of e-portfolio from the analysis of all the 28 articles is enabling student teachers to develop metacognition skills. Fahey and Cronen (2016) was the only study which extrapolated the student teachers' responses while working on their e-portfolios and the evidence of metacognition was demonstrated through specific examples.

3.2 Assessing Student Teachers Learning How to Teach

The affordance of e-portfolio in assessing student teachers learning how to teach was not that prominent although there are studies which have found e-portfolio useful for student teachers to carry out self and peer assessment, formative type of assessment, and benchmarking competencies with teacher standards. Only one article has emphasised on understanding the assessment roles.

Four studies have found that the use of e-portfolio can assist student teachers to benchmark their performance to the learning standards (De Jager, 2019; Elliott et al., 2008; Gencel, 2017; Rowley & Dunbar-Hall, 2012). In elaboration, Elliott et al. (2008), and Rowley and Dunbar-Hall (2012) have proposed that e-portfolio should be a fundamental aspect of teacher education program as it can synthesize all the learning experiences and demonstrate professional attitudes, knowledge, and skills of a student teacher. It can be used as a means for future reference. Gencel (2017) further suggests that the grading tools to evaluate e-portfolio should include more than one evaluator's opinions.

The use of e-portfolio was found to be useful for student teachers' evaluation purposes. Rade (2014) has highlighted the importance of self-assessment in the e-portfolio assignment so that it can provide student teachers with rich and complex learning situations which are central to professional practice. Oakley et al. (2014) have

emphasised that through self-evaluation and assessment student teachers can learn to improve the way how they see their practice. The self-evaluation can help student teachers to view what they have achieved over time (De Jager, 2019). Harun and Jhee (2012) have found that peer assessment can be integrated into the e-portfolio to enhance student teachers' awareness of their own progress and others. In support of this, Oakley et al. (2014) agreed that there is a need to develop peer assessment skills among the student teachers. Rowley and Dunbar-Hall (2012) have espoused the idea that e-portfolio should be used as a formative assessment for the longitudinal purpose from the first year until the fourth year for continuous development. In addition, Beck et al. (2005) indicated that the e-portfolio can assist student teachers in understanding the roles of assessment.

3.3 Issues Need to be Addressed in the Implementation of the E-Portfolio

The second research question intends to address the issues in the implementation of e-portfolio in teacher education programs. Nine of the studies have found that instructions play an important role to ensure the success of e-portfolio implementation. Chung and Kim (2010), and Oakley et al. (2014) have found that the student teachers in their studies were uncertain of the significance of e-portfolio and how it could improve their practices. Sufficient input is needed for student teachers to understand the need for such implementation. More importantly, is the support which they have received and this does not only mean in terms of technological assistance but also how they can be assisted to interpret teaching standards in developing the artefacts (Denton & Wicks, 2013; Kabilan, 2006). In addition, Chuang (2010), Kecik et al. (2012), and Kabilan (2016) have also emphasized the need for teacher educators to help in scaffolding the development of the artefacts to meet the target learning goals. In addition, the studies have found that student teachers found it difficult to present themselves among their peers, teacher educators, and a wider audience. Swan (2009) cautions that in the instruction process there is a need to ensure that the e-portfolio has a transformative nature and does not function merely as a robust filing cabinet. The implementation of e-portfolio is also highly dependent on the teacher educators' competence and creativity in shaping the learning experiences (Sardegna & Dugartsyrenova, 2014). They further exemplify that the engagement and commitment of teacher educators are perceived as essential to ensure that student teachers' place value on e-portfolio development. Zhong and Hartsell (2015), and Kabilan (2006) implicate the need to provide a thorough explanation and examples of online content. They suggested that understanding learners' background can assist teacher educators to provide the necessary support. Kabilan (2006) stresses the importance of making student teachers aware that this effort leads towards professionalism.

Reflective practice is another important issue which has been highlighted in the analysis of studies implementing e-portfolio in teacher education programs. Studies like Kecik et al. (2012), Denton and Wicks (2013), Tang (2013), Oakley et al. (2014), and Rade (2014) have found that student teachers need more guidance and practice in writing reflection. This is to avoid the written reflection to be at the descriptive level without any deeper analysis.

Another issue which has been discerned from the studies analysed was the lack of support given to the student teachers in the process of developing the e-portfolio. The use of e-portfolio necessitates the student teachers to have some background

knowledge on the use of technology in designing the e-portfolio. Oakley et al. (2014) and Zhong and Hartsell (2015) have found that a lack of technological skill can hamper the development of e-portfolio and has an effect on students being demotivated and not showing interest. Not only that, De Jager (2019) has realised from his study that some of his student teachers did not have access to the internet, particularly in the outskirts. In addition, student teachers have also expressed that they got a lack of support and structural assistance for interpreting standards and developing artefacts (Chung & Kim, 2010; Denton & Wicks, 2013). Elliott et al. (2008) have found that the writing for the portfolio should start early in the teacher education program so that student teachers are regulated in writing about teaching and learning for themselves and different audiences such as for teacher educators, peers, and community. Student teachers from Sardegna and Dugartsyrenova (2014) study have indicated that some of the instructors' values which were highly appreciated by them were like integrating online activities with other course activities, giving clear guidelines on task fulfilment, and showed presence, appreciation, and interest in students' online posts through comments in class.

Chuang (2008) and Swan (2009) have indicated that student teachers need to understand the roles and functions of e-portfolio integrated into the process of learning how to teach. Chuang (2008) has found that her students were having difficulties in switching their personal weblog to a professional weblog. On the other hand, student teachers in Chung and Kim (2010) were positive and knew how to exercise their functions and roles in the e-portfolio for professional development. They were able to develop a teaching philosophy, design and execute lessons, analyse a video of their own teaching, reflect on teaching, and observe classrooms, and analyse lessons. Findings from Harun and Jhee (2012) have implied the need for student teachers to be taught formal discourses which can enable them to function effectively in the online community such as when giving comments and feedback to their peers. In support of this, Kecik et al. (2012) have also found that student teachers need to learn how to give feedback to other student teachers.

Time can also be an issue which needs to be considered as the development of e-portfolio can be time-consuming and laborious for student teachers (De Jager, 2019; Swan, 2009; Zhong & Hartsell, 2015). Another interesting issue which emerged from some studies was social pressure (Zhong & Hartsell, 2015) and privacy issues (Sardegna & Dugartsyrenova, 2014) when designing an e-portfolio. Measures need to be taken so that student teachers did not create unnecessary anxiety relating to competition among peers and bridging of privacy. By establishing the community of practice via the e-portfolio can reduce such debilitating anxiety.

4. CONCLUSION

The systematic literature review of 28 articles on the implementation of e-portfolios in teacher education programs has shed light on many positive benefits in the process of learning to teach. Such pedagogical affordances enabled student teachers to focus more on the process of learning how to teach; transformative learning which is student centred; development of reflective thinking, and metacognitive and technological skills. The e-portfolio affordances can enhance collaboration among student teachers and teacher educators and serve as a platform for providing feedback.

The e-portfolio affordance can also enhance student teachers' professional development and growth and mould their professional identity and teaching philosophy. The e-portfolio affordance in relation to assessing student teachers learning how to teach can be further explored by other researchers as many of the studies did not deal with these affordances in depth. Some emerging themes found were connected to self and peer assessment, formative assessment, learning standards benchmark, and assessment roles. The systematic review has also highlighted pertinent issues in the implementation of e-portfolios in teacher education programs. These issues include instructions when using e-portfolio, technological skills, and support, time, reflective practice, roles, and functions as well as social pressure and privacy issues. These issues have provided information for teacher educators to consider when integrating e-portfolio into a teacher education program. One future recommendation for further study is to explore the technological tools and applications which can support the development of e-portfolio among student teachers.

This study implicates the need for all parties to have a holistic view and understanding of the pedagogical affordances which an e-portfolio can offer to better design the curriculum, teaching and learning, assessments, and student teachers' professional development in a teacher education program. The university and teacher education institutions can have a well-defined policy on the adoption of e-portfolio into their teacher education programs. Teacher educators and student teachers can be better prepared for the implementation of e-portfolio through recognition of its affordances, issues which need to be addressed, the outcome of such learning experiences, and the impact on student teachers' professional development.

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