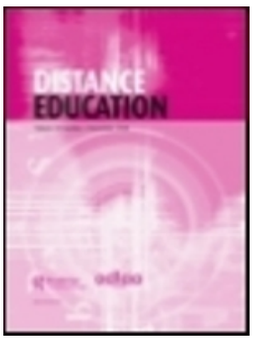

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The digital portfolio as an assessment strategy for learning in higher education

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ABSTRACT

This study was developed in the context of a course in higher education and in a blended learning environment—online, distance, and face-to-face (b-learning). The aim was to identify and characterize the meanings and effects that students and teachers attribute to the use of digital portfolios as an assessment and learning strategy. The experience allowed the portfolio to be recognized as a mediating device in the development of assessment procedures that generate learning—an epicenter of efficient feedback and a means of enhancing the (re)construction of knowledge. The portfolio also helped develop students' reflective capacity on their work and their learning, autonomy, and collaboration action, and improved their learning.

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digital portfolio; assessment for learning; higher education; blended learning (b-learning)

Introduction

Digital transformation is present in the multiple dimensions and actions of contemporary life. Examples of this are social networks and their virtual omnipresence, which have been gradually modifying traditional forms of interpersonal relationships.

The educational context did not escape this virtual movement. In a globalized world, schools and universities have had to equip themselves with educational technologies, thus "opening windows" to the world so that their students can access, and dialogue with, other areas of knowledge. Digital platforms, due to the multiple possibilities of interconnection that they provide with the world outside school, offer students greater flexibility and independent organization of time, thus promoting their autonomous learning. In this scenario, teachers are challenged to employ new forms of pedagogical relationships, knowledge construction, and learning assessment. In a digital world, assessment becomes even more complex, requiring the use of more diversified strategies and more student participation.

Within this context, the need to build and develop assessment processes that go beyond the hegemonic order and logics of testing has been argued (Stobart, 2008), recognizing the importance of assessment processes as promoters of learning (Marinho et al., 2017; Wiliam, 2011). Within this framework, the digital portfolio has been justified as a pedagogical device that promotes more interactive and collaborative learning and

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assessment processes in which feedback is highly relevant (Cova, 2010; Klenowski, 2005; Martin & Rodriguez, 2012).

With these ideas as a reference, the study presented in this article was carried out with a focus on the construction of digital portfolios as an assessment and learning strategy. It was undertaken in the context of Education and Digital Technologies, a first-year course in an undergraduate program in pedagogy in a public university in Brazil in a blended learning environment: online, distance, and face-to-face (b-learning).

The research adopted a qualitative approach, based on an interpretative and holistic analysis of situations and contexts (Gerring, 2006), aiming to answer the following questions: What meanings do students and teacher attribute to the use of the portfolio as an assessment strategy for learning? What effects do they associate with the portfolio in the (re)construction of students' learning? More specifically, this research aimed to identify and characterize the meanings and effects that students and teachers attribute to the use of the portfolio in the development of teaching-learning processes.

Digital portfolios: assessing to learn

The advancement of technology and the evolution of teaching and learning theories, in a mutually influential relationship, have led to a reinforcement of technology in the educational field and, concomitantly, to the development of pedagogical technological tools that have enhanced the teaching and learning process. With this purpose, one of the tools that has assumed prominence is the digital portfolio (Bryant & Chithum, 2013). Also called an electronic portfolio (e-portfolio) or webfolio, this tool began to be used to assess students' performance in the late 1980s, mainly in North American universities (Barrett, 2005).

Digital portfolios emerge, therefore, as pedagogical technological tools that have been fostering academic and teacher discourse and have been welcomed with enthusiasm (Weller, 2018) at the higher education level, configuring b-learning environments. Indeed, it has been recognized that these blended environments have provided students with opportunities to experience interactive processes that induce new possibilities of communication, time, and teaching and learning experiences that go beyond the walls of the classroom and that have contributed to motivation and improvement of students' learning (Asarta & Schmidt, 2020; Garrison & Kanuka, 2004; Vaughan, 2007). In these b-learning environments, assessment practices also gain greater importance and meaning, requiring continuous feedback by the teacher in the development of teaching-learning processes and committed and active involvement by the students (Stein & Graham, 2014). In the context of this study, the digital portfolio was used as a tool that favors assessments focused on the teaching and learning process.

In the context of digital culture, the portfolio has been considered a device that provides strong participation in and commitment to the learning process itself, which integrates not only the acquisition of content but also the development of soft skills (Beckers et al., 2016; Cambridge, 2008). However, the development of such skills is dependent upon how the portfolio is mobilized and implemented (Chen & Penny Light, 2010; Martins & Pimentel, 2018). In this context, the inclusion of digital technologies in the educational process requires, among other dimensions, teacher actions that go beyond being a technician and a mere user of artifacts. The digital portfolio should include diversified activities, such as the production of texts and videos, and reflections on the

work developed; and take advantage of the interfaces promoted by online interaction between peers, favoring the building of concrete learning and creating a collective intelligence (Lévy, 2005). As Irons (2008) reinforced, the great benefit of digital tools lies in the "provision of effective and efficient feedback that can be individualized" (p. 92) and in student interaction.

Studies have reported that digital portfolios promote increased student engagement in extending and integrating knowledge, motivation, self-reflection and, consequently, in improving learning outcomes. On the other hand, it is a tool that encourages teachers to direct their activity toward guiding students in the construction of their own knowledge (Barrett, 2007; Bolliger & Shepherd, 2010; Brandes & Boskic, 2008; Doig et al., 2006; Dreisiebner & Slepcevic-Zach, 2019; Hartnell-Young, 2006; Heinrich et al., 2007; Jenson, 2011; O'Brien, 2006; Slepcevic-Zach & Stock, 2018; Zubizarreta, 2008, 2009).

Based on these ideas, we recognize that the digital portfolio in higher education contexts and, in this specific case, in a course offered in b-learning modality, offers possibilities for students "to achieve committed learning and self-training modes supported by dialogue and mentoring processes, understood as a means to enhance a dialogic monitoring" (Leite & Fernandes, 2011, p. 514). Also, within this framework, Zubizarreta (2008) argued that learning is more deeply consolidated when the portfolio assumes three core components: reflection, documentation, and collaboration. The author states that a portfolio, of which the focus is learning, should involve a reflection process, evidence selectivity, and use the teacher as mentor who can assume a collaborative role in supporting its reconstruction and management. The teacher-as-mentor assumes a crucial role "not so much for the knowledge he/she might be able to provide, but mainly for all the knowing he/she might be able to encourage" (Keegan & Costa, 2009, p. 133) through collaborative processes between teacher and students, and among peers, in sharing and discussing learning experiences while promoting a collaborative online learning (Cova, 2010; Luchoomun et al., 2010).

Further, Conrad and Openo (2018) argued that the "shift to online learning in higher education creates a fertile environment for potential synergies between authenticity and assessment, and no better way exists to exercise authenticity in assessment than by portfolio" (p. 73). Authentic assessment aims to engage students in carrying out tasks that include problematic situations that are close to real-world problems. With the exploration of these tasks, it aims to enhance the development of knowledge and skills, in particular, favor the development of students' higher order thinking skills, such as communication, initiative, autonomy, problem-solving, and critical thinking (Conrad & Openo, 2018; Moon et al., 2005).

The use of digital portfolios has expanded from an assessment device that is closed in itself, that is, focused on the final product—a demonstration of knowledge mastery—to a device that interactively feeds back into continuous assessment processes that promote learning—an assessment device for learning (Deneen et al., 2018; Earl & Katz, 2006; Webber, 2012; Wiliam, 2011). The portfolio thus emerges as an alternative assessment device to the tradition of testing, encouraging students to develop skills of critical reflection on the work done and to develop self-assessment and autonomy in the reconstruction and production of knowledge (Habib & Wittek, 2007; Lam, 2018); and thus establishing itself as a device for an integrated assessment approach (Cambridge, 2010; Clarke & Boud, 2018; Conrad & Openo, 2018), enabling a constructive alignment

between learning, teaching, and assessment (Yang et al., 2015). In other words, a portfolio uses a constructivist approach (Buzzetto-More, 2010), the main goal of which is to promote learning, allowing students to initiate learning processes at different starting points and evidencing students' skills and abilities in constructing new knowledge and, concomitantly, new learning. The digital portfolio enables teachers and students to develop a differentiated conception of assessment that sees assessment as an integrating axis of learning and as a mediator of relationships and knowledge among students, content, and teacher (Kuh et al., 2018; Martin & Rodriguez, 2012).

In the context of learning and assessment, therefore, the portfolio plays an emancipatory role, since students are authors and readers of their assessment process, which is continuous and systematic. Throughout the process, the teacher, as mentor, guides students towards further extension, clarification, and strategies that enhance learning through feedback processes (Marinho et al., 2017).

The digital portfolio allows for greater flexibility and fluidity than in its traditional paper form, as it enhances greater interactivity and reflection on the practices and knowledge produced for students. In this way, it allows students to develop knowledge-building activities through "rhizomatic networks" (Marinho & Delgado, 2019, p. 258), in a dialogical way. At the same time, the achieved learning is being demonstrated; and the portfolio is also creating conditions for teacher-student dialogue, leading to a connection between what is taught, what is learned, and what is assessed. In this context, Yancey (2009) reinforced that the digital portfolio, based on this interactive process, promotes and supports a contextualized reflection for enhanced student performance. Buzzetto-More (2010) corroborated these data when they pointed out that the use of digital portfolios helps students to better understand learning objectives, to think about what they learn, and to reflect on the knowledge and skills they develop. Buzzetto-More also pointed out that digital portfolios are tools that allow students to assume an active and autonomous role in building their knowledge, selecting and organizing information, showing their learning progress, exchanging ideas with others, and learning from others' comments.

In summary, the digital portfolio may constitute a device that enhances significant experiences of teaching, learning, and assessment.

The case under study

As previously mentioned, the study presented in this article aimed to understand the meanings and effects attributed by students and teachers to digital portfolios as useful devices in b-learning.

This qualitative research study used a case study to seek a more thorough understanding of the phenomenon (Flick, 2014; Gerring, 2006). The research was carried out with a group of 31 students enrolled in Education and Digital Technologies, a first-year course in an undergraduate program in pedagogy, in 2019–2020, at a federal university in the northeast region of Brazil. This four-year program offers teacher qualifications. The 31 students aged 18 to 30 agreed to create portfolios during their course.

Data were collected through three focus groups (two with 10 students and one with 11 students) held at the end of the term, focusing on the pedagogical experiences that they attributed to the portfolio; and a logbook (Bassey, 2002) that explored students' daily

narratives about the use of this pedagogical device, prepared by the teacher throughout the course.

The research was approved by the university's ethics committee, ensuring that all ethical issues, namely informed consent, anonymity, and data confidentiality, were properly applied. For a better understanding of the procedure followed in the development of the digital portfolios, see Figure 1.

As shown in Figure 1, the portfolio development process was based on five phases developed in the face-to-face classroom and online, monitored by the teacher. The formative journey was accompanied by continuous feedback between teacher and students, and among students, and by moments of self- and peer assessment, in which there was space for students to write synthesizing records while enhancing their reflective thinking and learning.

At the end of the course, students responded to questions about their learning experiences in three focus groups that explored the portfolio as a learning and assessment tool. As mentioned above, the logbook records made by the teacher were also considered in the analysis of these data. It should be noted that the students and teacher comments have been translated from Portuguese. The comments were analyzed using the content analysis technique based on a categorical system (Krippendorf, 2003). The

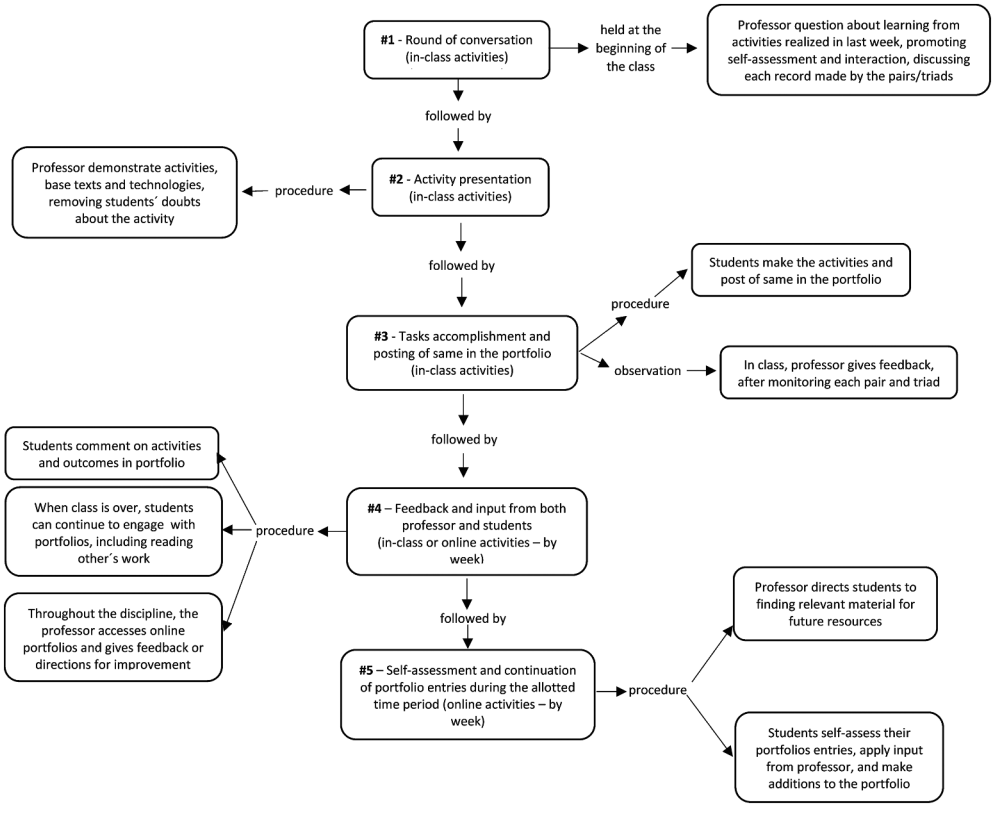

Figure 1. Procedure followed in the creation of digital portfolios.

Table 1. Dimensions and categories of analysis.

Dimension of analysis	Categories
Meaning attributed to the use of the digital portfolio in the students' learning and assessment	The digital portfolio as an enabling device for learning and assessment
Effects of the use of the portfolio on the (re)construction of students' learning	Deepening of knowledge and reflection on what is learned and how it is learned Articulation of theory and practice

students' discussions were catalogued as FG1 (focus group 1); FG2 (focus group 2), and FG3 (focus group 3), and the teacher's logbook as P. The analysis was guided by the objectives and research questions, thus identifying two main dimensions and three categories of analysis, which are presented in Table 1.

Data presentation and discussion

The presentation and discussion of data followed the rationale explained in Table 1. Wherever deemed relevant, relationships were noted between students and teachers' discourses.

Meanings attributed to the use of the digital portfolio in the students' learning and assessment

Within this dimension, the students' comments point to a vision of the portfolio as a learning and assessment enhancing device, assigning great importance to the feedback provided by both teacher and peers. This, and other findings, are explained in the following subpoints.

The digital portfolio as an enabling device for learning and assessment

In this category, all students assigned importance to the portfolio as regards their learning and assessment. Among these data, the reference to regular and constructive feedback from the teacher emerges as a central issue; it is presented as a pedagogical practice that allowed students to better understand and redirect their learning, as the following statements illustrate:

> Through the teacher's comments I had guidance to know how I was doing regarding the activities and simultaneously the opportunity to improve. (FG1)

> Whenever necessary, the teacher gave constructive criticism and praise and this stimulated us a lot to advance in learning. (FG1)

> The monitoring of the teacher and his positive feedback on the work we were developing helped us to understand if we were really following in the proposal of the course. (FG2)

> The information given about what was being done was essential, helping to better understand and learn. (FG3)

Likewise, the constructive feedback is recognized as a stimulus for self-learning and self-reflection. This reflective dimension that runs through the teaching-learning process is reinforced by the use of digital portfolios. Students feel that this pedagogical resource provides them with opportunities to be autonomous and to assume the role as regulators of their own learning. The discursive excerpts reinforce these inferences:

> The teacher always encouraged us to work autonomously, seeking strategies that would help us advance in understanding the contents. (FG1)

> The constant feedback we received from the teacher or colleagues was very important for us to know in which point we had greatest difficulty and thus dedicate more time to this task in order to improve. (FG2)

Indeed, a vision of a high level of student appreciation of the portfolio and the teacher's role in monitoring the activities carried out in both a classroom or virtual environment emerges from the data; students were pushed to ask new questions and tackle challenges that promote higher-level learning, as is clear through these testimonies:

> The comments made by the teacher in the online records were relevant so that I did not have a distorted view of the use of technologies in the classroom. It made me grow even more and helped me to formulate my opinions on certain courses. (FG2)

> With the teacher's observations I understood where I could improve. The written comments by the teacher were of fundamental importance because I could correct my mistakes and know even more about the contents. (FG3)

The students' perceptions echo in the teacher's logbook narrative, when referring to feedback:

> The feedback was performed in the classroom, when I followed the activities that students were performing and discussed the concepts with them, redefined strategies and indicated the need to read some situation or theme again. A second moment of feedback was carried out online during the week, analyzing the students' records on the activities they were developing, making comments when something needed revision, or when the students presented doubts or some record beyond what had been requested. (P)

> All the comments and records made online were extremely important; students started to research more and more and record more things that had to do with both technology and education, and with each record and each research they learned more and more. (P)

This last statement points to the great potential that the comments and written reflections, made in the portfolios, have contributed to students' learning, as their testimonies report:

> The weekly written records were essential for my awareness of the process I was building. The information recorded helped immensely at the time of research and extending what we had accomplished and what we should improve. (FG1)

> All the notes I took were useful to clarify the doubts that always appeared during the undertaking of the activities. I relied a lot on these notes to advance in the work. (FG2)

> The records we made were extremely important to summarize the work or even to unblock one or another aspect that at some point was not clear and that led us to a blockage, to not being able to move forward. (FG3)

The data illustrate clearly that the students' weekly entries in their portfolios constitute moments of higher-level synthesis of the class material. As Bloom and Krathwohl (1956) pointed out in their taxonomy of learning, higher-level learning integrates the ability to articulate isolated parts in a whole and establish relationships between them.

As regards assessment more specifically, we observed that the procedure followed in the construction of the portfolios was perceived by students as enhancing the assessment (self- and peer assessment) of their learning. Specifically, they mentioned:

> The teacher's clarifications and continuous feedback on our work allowed us to understand that assessment is continuous and not to be afraid of the final grade. The constant feedback from the teacher both online and in the classroom was essential. Also doing the assessment of my colleagues was a very enriching experience, especially because it forced us to think and say serious and important things to help them improve. (FG1)

> By having the observations made by the teacher in my written records of the portfolio I could redo or correct to have a good result in the activities. A process that moves us to another rationale of assessment, not only of our assessment, but also of our peers . . . a demanding but very serious process, which forced me to be critical, to reflect. (FG2)

> The assessment technique through the analysis of the records placed in the digital portfolio was something innovative, because the use of the digital as an assessment form that helps us to learn more and more. (FG3)

Students valued the feedback associated with assessment, recognizing that this practice favors their learning. In other words, these testimonies are illustrative of the importance of this experience in constructing their vision of the importance of formative assessment (Earl & Katz, 2006; Webber, 2012; Wiliam, 2011), based on individualized and efficient feedback processes (Irons, 2008).

Establishing a parallel between the students' statements and the teacher's narrative, we also identified a convergence regarding the meaning of feedback in learning assessment:

> One week after the activity, in a face-to-face context, I would start the class with a conversation circle, allowing the students to self-evaluate, evaluate the other students and their records in the portfolio. At this time I would also record their impressions of the learning achieved during the week, the developments and the improvements they had made. (P)

The teacher's account, in convergence with the students' views, shows that the assessment practices followed are embedded with a strong formative intentionality (Wiliam, 2011) with room for both self- and peer assessment. This assessment practice integrates well into the learning cycle (Cambridge, 2010; Conrad & Openo, 2018; Yang et al., 2015), enabling a constructive alignment between learning, teaching, and assessment; and always oriented toward learning.

In summary, the analysis of this category's data highlights the convergent meanings of students and teachers' comments regarding the recognition of the digital portfolio in improving students' learning and the adoption of formative assessment practices, expressed through recognition of regular and positive feedback provided by the teacher; and the availability of resources that allowed students to "open windows" to new ways of learning through continuous and contextualized interactive and collaborative assessment (Cova, 2010; Klenowski, 2005; Martin & Rodriguez, 2012).

Effects of the use of the portfolio on the (re)construction of students' learning

The analysis of this dimension allowed the identification of two types of effects: the deepening of knowledge and reflecting on what is learned and how it is learned; and articulation of theory and practice.

Deepening of knowledge and reflection on what is learned and how it is learned

The students' comments show a clear understanding of the use of the portfolio as a mobilizing device for their ability to deepen knowledge and to reflect on what they learn and how they learn. Below are some of these excerpts from students' discourse data that highlight this understanding:

> Through the contents, and the activities carried out in the classroom I had the opportunity to reflect on what was learned and extend it through research, examples, individual and collective activities, thus reinforcing my learning. (FG1)

> The way the teacher organized the activities and encouraged us to participate in reflective written activities, both individual and group, was an opportunity to help us review and rethink the activities and contents and reconstruct our learning. I always wrote drafts in the notebook, which I perfected to then put my records in the portfolio. (FG2)

> Our involvement in the activities helped us to better understand what we had to learn … sharing with our colleagues and discussing with them was a new experience. Both in the classroom and in the activities we had to do online. (FG2)

> The reflection activities, and our written records helped us to broaden our knowledge and also the sharing of what others were building and discussing allowed us to keep up well with the content that the teacher was teaching. (FG3)

Additionally, students recognized the way in which material is organized in b-learning, with online and face-to-face occasions. In general, the students admitted that the organization of the course in this modality allowed them to extend the learning time beyond the classroom, providing them greater time flexibility and supporting the improvement of learning outcomes. That is, b-learning offers flexible time frames that can be personalized to each person, offering them the ability to learn at their own pace (Vaughan, 2007). In this process, they recognize that the use of the portfolio was an important factor for them to establish a relationship of greater depth and articulation with knowledge through the production of texts and materials, reflections on the work developed, and discussions between peers, as indicated by the following comments:

> The organization of the course with online moments, through the portfolio, allowed coordination between the subjects addressed in the classroom with greater depth and with more time. (FG2)

> The time outside the classroom meant that we had another learning time, our time, which allowed us to put our imagination and creativity into practice, both in the construction of the texts and support materials proposed by the course and included in the portfolios, and in the research of other materials to help consolidate knowledge of and understand the contents to be worked on in the classroom. (FG3)

> It was very useful to have time to review the issues worked on in class, and then make the records in the portfolio … at the same time, it facilitated learning with peers, debating between all the contents enhancing the reconstruction of knowledge in a network. (FG1)

They also pointed out the added value of working in a hybrid modality (b-learning), through the digital portfolio, recognizing that it is an experience that enhances the development of their cognitive skills, such as critical thinking and creativity (Koraneekij & Khlaisang, 2019).

The importance of the blended teaching-learning process and the potential of the portfolio in promoting new learning and deeper reflections on what students learn and how they learn was also present in the teacher's narrative, as evidenced by the set of excerpts quoted here from his logbook:

> In the classroom context, in the conversation circle, students orally presented what they had studied during the week and recorded in their portfolios. Some of them are starting to realize that they can use the same strategies and technologies to study other courses of the program. They are starting to mobilize knowledge from other disciplinary areas, something that promotes a more substantial and interconnected learning. (P)

> With the use of portfolios, students have the possibility to extend and reconfigure senses and meanings about concepts that they are learning, becoming aware that the way they engage is reflected in the improvement of their learning. (P)

> The portfolios, being open access to all students in the class, allow a networked construction of knowledge and self and peer regulation online, i.e., they allow everyone to learn from others. The combined pedagogical strategy (b-learning) allows active participation of all students, both in classroom and online contexts. (P)

In summary, the analysis of these data allows the conclusion that the course under analysis, in a b-learning environment, constituted an enriched learning strategy for students. The discourses analyzed also show that the use of the digital portfolio reflected a collaborative perspective among students and their peers and teachers which permits a rhizomatic networked reconstruction and production of knowledge (Marinho & Delgado, 2019), and enhances the creation of a collective intelligence (Buzzetto-More, 2010; Lévy, 2005) among learners.

Articulation of theory and practice

We referred earlier to the notion that the portfolio contributed to students' increased awareness of what they learned and how they learned it; this relates to their recognition of the fact that they felt that the portfolio enabled them to achieve a greater level of understanding of praxis, the combination of theory and practice. Their comments demonstrate this:

> The portfolio made us improve in practice what was learned in class … for example, through the construction and reflection on teaching materials using digital technologies. (FG1)

> We experienced what was taught in reflective practice. On the other hand, the records made in the portfolio allowed me to check aspects that I did not remember, and to remember the structure of the lesson plan … in my future teaching practice I will have to organize many lesson plans. This articulation that portfolio provided me with the practice and organization of a lesson plan was very useful. (FG1)

> The portfolio was a tool that helped me to reflect on the practice and thus seek further reading to improve this practice that I will implement when I am in the work context. (FG2)

> It made the students evaluate what was said in class to put it into the portfolio in an informative way, showing us the various ways of putting the content into practice. (FG3)

The students through the portfolio had the opportunity to articulate the theory to their future teacher praxis, providing the development of their professional skills. The portfolio enabled a critical reflection on praxis, that is, it enabled students (future teachers) to problematize praxis and, consequently, to perceive it in the context of action (Arnold & Mundy, 2020). These ideas are further reinforced by the following comments:

> The portfolio, as it was built in this course, is a very interesting and different proposal from the traditional one. I learned a lot … and I will possibly use this methodology in my future teaching practice, with works related to writing, reading, textual production, a mural of ideas, among other forms of use. (FG1)

> It was wonderful, this process … I understood how it is possible to organize a course and have creative lessons, namely in this period of isolation. In the school where I work, we started to use the portfolio as a teaching and learning tool for our online classes. (FG2)

> I found that the course followed a very valid plan and methodology, in which I felt very comfortable and learned a lot … Therefore, when we start teaching, I believe that the portfolio will be an important tool to work with my students in my course. And that I will certainly take these learning methods for life, for my practice. (FG3)

The teacher's narrative also indicates this intentionality of linking theory and practice:

> Today we also presented what a lesson plan is (model) and indicated how each pair should develop a lesson plan in which the inclusion of a technology, the portfolio, is evident in the lesson methodology. (P)

> Today's class was about a content of the elementary school. The portfolio was the basis for the exploration of this content, in the sense of being mobilized for the practice of future pedagogues/teachers, their own professional practice. (P)

In summary, students recognized that using the digital portfolio was an innovative methodology that helped them to see the articulation of theory and practice in their learning. As future teachers, these students recognized that the experience of creating the portfolio allowed them to understand how to develop curriculum; it gave rise to positive expectations for the use of this instrument in future contexts.

Conclusions

This study used the construction of digital portfolios as an assessment and learning strategy within a course in a b-learning environment in higher education. It intended to identify and characterize the learning experience of students and teachers who used a portfolio strategy.

Within this scope, students and teacher involved in the development of portfolios found that the digital portfolio served as an enabling device for assessment that generates learning (Wiliam, 2011), where an efficient feedback process involving both teacher and students was the driving epicenter of reflection and action in students' construction

of knowledge. The portfolios thus enabled the development of an assessment practice that assumes the promotion of student learning as its central objective and purpose (Conrad & Openo, 2018; Webber, 2012). This assessment is integrated into the learning cycle (Cambridge, 2010; Yang et al., 2015) and is seen as an alternative to the older tradition of assessment that focused primarily on testing processes (Habib & Wittek 2007; Lam 2018) as an end product and measure of learning.

This study shows that the use of the digital portfolio promotes new learning and reflection on what students learn and how they learn. It enables systematic collaborative actions between students and teacher and among peers, enhancing the (re) construction and production of knowledge in interactive and rhizomatic networks that materialize from a variety of observations and conceptualizations, without a hierarchical subordination of knowledge between teacher and student (Marinho & Delgado, 2019). Thus, the digital portfolio serves as a pedagogical resource generating a collective intelligence (Lévy, 2005); it enables students to play an active role in constructing their own knowledge (Buzzetto-More, 2010). In other words, the use of the portfolio assumes a constructivist approach, where knowledge is built among students from their individual perspectives and previous learning experiences (Conrad & Openo, 2018).

This study also shows that the digital portfolio, used as a pedagogical resource, allows the teacher to assume the role of co-pilot – facilitator and mediator of learning (Marinho et al., 2017); and promotes the development of students' reflective capacity about their work and their learning. It promotes autonomy, cooperative and collaborative action among peers, which contribute to the deepening of the learning experience (Bolliger & Shepherd, 2010; Dreisiebner & Slepcevic-Zach, 2019; Jenson, 2011; Slepcevic-Zach & Stock, 2018; Yancey, 2009; Zubizarreta, 2008, 2009).

It is also worth highlighting that the portfolio and the b-learning modality contributed to mediate time in the rhythms and learning styles of each one, in virtual space and at a distance, allowing an extension of the learning time beyond the classroom (Koraneekij & Khlaisang, 2019; Vaughan, 2007). It also allows students to see its value in connecting theory and practice and a catalyst for the development of new curricular and assessment practices. Finally, the digital portfolio provides students with a personal space to assess and reflect on their own learning in authentic and meaningful ways (Conrad & Openo, 2018; Farrell & Seery, 2019).

Disclosure statement

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