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Focusing on Learning rather than Assessment through Digital Portfolios in Higher Education

Centrándonos en el aprendizaje más que en la evaluación mediante portafolios digitales en Educación Superior

Cristina Galván-Fernández

Universitat de Barcelona

Abstract

The study analyzes how students relate to their own learning process in situations mediated by digital portfolios in the university context. The framework of the study is the implementation of the portfolio under pedagogical criteria and the use of a platform, Digital Folder, according to them. The research use pretest-postest technique using a questionnaire before and after the didactic treatment mediated by digital portfolios. The questionnaire, called R-SPQ-2F, allows us to know the learning approaches of the students (Biggs, Kember & Leung, 2001). This means that we can assess to what extent students are involved with their learning process. The authors differentiate between a deep approach and a superficial approach in two dimensions: motivation and strategies, although in higher education it is recommended to measure the intensity in which the students are located. The participants are 148 students from the Universitat de Barcelona and Universidad Católica de Temuco, who improve their intensity in deep approaches to learning, modifying strategies more than motivation.

Keywords: e-portfolios, higher education, learning approaches, learning motivation, learning strategies

Post to:

Cristina Galván-Fernández
Pg. Vall d'Hebrón, 171; Edificio Levante
Campus Mundet; Universitat de Barcelona
08035 Barcelona
cgalvan@ub.edu

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Resumen

Se analiza de qué manera los estudiantes se relacionan con su propio proceso de aprendizaje en situaciones mediadas por portafolios digitales en el contexto universitario. El marco del estudio es la implementación de portafolios bajo unos criterios pedagógicos y el uso de una plataforma, Carpeta Digital, acorde a ellos. La investigación es de carácter experimental pretest-postest utilizando un cuestionario antes y después del tratamiento didáctico mediado por portafolios digitales. El cuestionario, denominado R-SPQ-2F, permite conocer los enfoques de aprendizaje de los estudiantes (Biggs, Kember y Leung, 2001). Esto significa que podemos valorar en qué medida los estudiantes están implicados con su proceso de aprendizaje. Los autores diferencian entre un enfoque profundo y un enfoque superficial a partir de la motivación y las estrategias utilizadas, si bien en educación superior se recomienda medir la intensidad en la que se sitúan los estudiantes. Los participantes son 148 estudiantes de la Universitat de Barcelona y la Universidad Católica de Temuco, los cuales mejoran su intensidad en enfoques de carácter profundo hacia el aprendizaje, modificando más las estrategias que la motivación.

Palabras clave: educación superior, enfoques de aprendizaje, estrategias de aprendizaje, motivación hacia el aprendizaje, portafolios digitales

Higher Education and Digital Portfolios

In the context of the information society and knowledge, higher education has prompted various changes in the teaching and learning processes. The main objective is for students to develop transversal skills, within the paradigm of learning to learn and seamless learning. Methods of monitoring and evaluation of learning are used, centered on the student, based on continuous and formative assessment.

One such method is the use of digital portfolios, which allow the student to show their learning and skills by means of academic tasks and other personal documents (Barberà & Martín, 2009; Becta, 2007; Buzzeto-More, 2010; Cambridge, 2010). The key element of the portfolios is continuous reflection on learning made in relation to previous knowledge, previous experience, and the experiences provided during the teaching of courses, as well as personal and professional interests (Barrett, 2011; Cambridge, 2010; Grant, 2010). At present, the portfolios are digital in nature, so they are known as "digital portfolios" or, as they were called a few years ago, "e-portfolios" or "electronic portfolios"; another synonyms is "learning folders". Digital portfolios, created on online platforms and presented in this way, allow some of the main characteristics of a portfolio to be highlighted to demonstrate learning. The main feature is the ease of including any document or link to the portfolio website, so the student can display any learning work that they may have on their computer or online. At the same time, this allows the document to be multimedial, hyperactive, and/or interactive, and the student's learning evidence can include videos, audio, images, and interactions, among other things, that facilitate reading and comprehension of the evidence (Barberà & Martín, 2009; Bass, 2012).

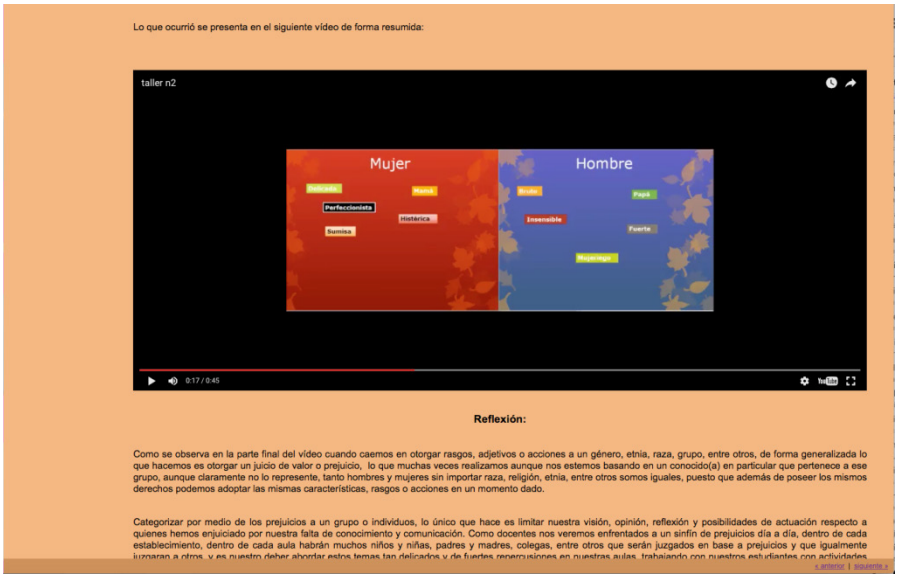

Figure 1. Evidence of learning with video inserted into digital portfolio

From the perspective of student-centered learning, it has been established that the process of creating portfolios favors the development of metacognitive skills (Clark & Eynon, 2009; Miller & Morgaine, 2009) and the assumption of responsibility for the learning process (Barberà & Martín, 2009; Bowman, Lowe, Sabourin & Sweet, 2016; Driessen, Van Tartwijk, Overeem, Vermunt, & Van der Vleuten, 2005; Galván, 2015; Herrera Torres, 2011; Rodríguez-Illera, Galván & Martínez, 2013). This assertion is only partially addressed in the research literature on the topic due to its complexity. Nevertheless, when students do this for the first time, there are various aspects that influence the process: time, learning to use the tool, learning about the significance of the portfolios, adapting to other means of assessment, and making it sustainable, among other things. The results of the first portfolios are not always as expected (Galván, 2015). Therefore, with this research we consider how students approach their learning experience through digital portfolios and under the concept of approaches to learning (Biggs, Kember, & Leung, 2001; Marton & Säljö, 1976).

Conceptual Framework

Approaches to learning

The term approach to learning was promoted by Marton and Säljö (1976), centering on the study strategies used by students to conduct academic activities. Later on, various studies were done that coined the term with the variables that contributed to the concept. Biggs, Kember, and Leung (2001) developed the Theory of Student Approaches to Learning (SAL).

The concept *approach to learning* refers to the student's perception of learning (Biggs, 1985, 1988, 1998; Marton & Säljö, 1976). Depending on how the student perceives learning, they will conduct academic tasks with motivation to learn and using strategies aimed at doing that. The focus comes from the interaction between the general orientations of the activities and those for a specific task, mediated by meta-learning. That is, the perception of a task describes a relationship between the situated context and the student's previous experience.

Both approaches describe a relationship between the perceptions of the student and learning (Laurillard, 1984), which suggests that the approach depends on the context and the student. In contrast, Marton and Säljö (1976) argue that the learning approach is not a characteristic of the student, but rather a relationship with learning.

In order to define what type of approach the student has, the dichotomy *deep* and *surface* is used. Both types have a *referential* and a *relational* component (Marton, 1988). The referential component is defined as the intention of the student in learning, while the relational component refers to the manipulation of the process. In this regard, the main educational question is how to encourage certain relational and referential components of learning so that students have an approach to the deep style of learning.

In a more recent review of the Theory of Student Approaches to Learning (Biggs et al., 2001), the same researchers developed the *Reviewed-Study Process Questionnaire-Two factor* (R-SPQ-2F). With this instrument, the two dimensions that establish the approach of a student can be determined: the motivation and the strategy. Motivation is the component that allows the student to continue and improve their learning process with greater personal interest, while the strategy is the component that enables the student to decide how and under what conditions they will perform a learning activity to achieve a certain result. The questionnaire was still being used recently in numerous international studies (Baeten, Dochy, Struyven, Parmentier, & Vanderbruggen, 2016; Kember, 2016; Kyndt, Donche, Trigwell, & Lindblom-Ylänne, 2017; Law & Stock, 2017; Nunes Janeiro, Duarte, Araújo, & Inocencio Gomes, 2017; Smyth, Mavor, & Platow, 2017; Soler-Contreras, Cárdenas-Salgado, Hernández-Pina & Monroy-Hernández, 2017; Vermunt & Donche, 2017).

Motivation in the learning process. The concept of *motivation* is an old term, with various meanings. We focus on motivation as one the dimensions of approaches to learning.

Marton and Säljö (1976) define motivation as an element that guides the learning process of students. Although the purpose of motivation is to learn, it can also be aimed at superficial learning, that is, to meet minimum requirements. Marton and Säljö (1976) propose three types of motivation: that with a deep approach, a surface approach, and focused on achievement, which Biggs (1985) reduced to a dichotomy of the former two in his Student Approaches to Learning theory.

Motivation with a deep approach.

There is an intrinsic interest in what is being learned, in the subject, and other topics or related areas. There is a clear intention to understand, an intention to examine and establish a basis for the logic of the arguments. The student sees assignments as interesting and is personally involved.

Motivation with a surface approach.

The student satisfies the minimum requirements for the task, is afraid of failure, does not work more than is necessary, is focused on extrinsic motivation, is pragmatic and utilitarian, and obtains the minimum qualifications to pass. Assignments are always approached as an external imposition. Absence of reflection on purposes or strategies.

Kember, Ng, Tse, Wong, and Pomfret (1996) argue that motivation influences the efforts of the student (along with the type of assessment) and, at the same time, the motivation depends on the

quality of the experience. Other factors on which motivation depends are obtaining good academic achievements, producing work of the student's own authorship (Pintrich, 1996), feeling responsibility, or even perceiving the figure of the teacher positively (Bennett, Dunne, & Carré, 2000). Motivation is positively influenced if students are inspired, organized, set goals, and learning is made easy. If students feel that they have responsibility for their learning process, the experience may be positive to them and they see the benefits of learning, even though they may not feel satisfied with the outcome or even if they felt under pressure during the course (Bennett, Dunne & Carré, 2000). There is a series of resources that maintain motivation during learning activities (Zimmerman & Cleary, 2009), such as: conducting self-assessment of the student's own self-regulation of learning; attributing causes to controllable aspects, such as the process, effort, and strategies; and feeling satisfaction when recalling one's own performance.

During the reflection that takes place in learning, there is a balance between "the new" and "the old", between "the distant" and "the local" (Dewey, 1989). The motivation is located in the distant, which provides stimulus as it is unknown. The most local thing would be the traditional methodologies and resources known to the student. Dewey (1989) suggests that in order for there to be stimulation and motivation, there has to be a certain aspect that is unusual, which is different from the easy and familiar. This can thus provoke thought and the student seeks solutions different from those that they know, but which are understandable to achieve learning.

When a situation occurs and the combination of circumstances produces something new and uncertain, there is no standard response to resolve it. By thinking of other solutions, the situation will become familiar and, at the same time, will be a resource to expand new knowledge and resolve new situations.

Putting ourselves in the position of university students, the new situation could be using new digital platforms to track learning or assessing oneself with alternative methods. The same idea of learning from elements other than those students are accustomed to is mentioned in the variation theory (Marton & Booth, 1997).

Learning strategies

Between the 1980s and 1990s the bases were defined to improve any process of teaching-learning using learning strategies. In order to do this, the various authors defined the concept of *learning strategy* and classified different aspects of the concept into several dimensions related to the cognitive and metacognitive process. This research took place in a framework of formal and classroom-based teaching, so it is necessary to conduct new research centered on virtual learning environments.

Learning strategies are defined as tactical sequences or procedural techniques aimed at achieving learning objectives (Schmeck, 1988, Schunk, 1991). Genovard and Gotzens (1990, p.266) argue that they "are the behaviors that the student deploys during their learning process and which, supposedly, influence their process of coding the information they must learn." Monereo (1994) agrees with this definition and underlines that decision-making is conscious and intentional and that it depends on the characteristics of the educational situation in which the action takes place.

Weinstein and Mayer (1986) set out three types of strategies: cognitive, affective or resource management, and metacognitive. The latter refer to the planning, control, and assessment of cognitive strategies in order to achieve learning objectives (González & Tourón, 1992; Kurtz, 1990). They are

formed by self-regulatory procedures that allow access to conscious knowledge of cognitive abilities (Monereo & Clariana, 1993). In addition to metacognitive knowledge, they require knowledge of the variables of the task and the strategy (Flavell, 1987).

When a student has learning objectives that imply improvements in knowledge and skills, they have to activate learning strategies that promote meaningful learning involving their motivations, interests, plans, and decisions, such as achieving understanding, reflection, and internalization of learning (D'Erizans & Bibbo, 2015; Garner, 1990; Genovard & Gotzens, 1990; Qvortrup & Keiding, 2015).

Assimilating digital portfolios in the learning process

The renowned Dewey (1989) argued that social conditions and circumstances establish the motivations of adults. In the university context, students take their profile as a social condition and prescribe certain characteristics of their role to guide and justify the actions they take. Therefore, if one seeks a change of role in the figure of the student, modification of certain elements can have an impact on their circumstances. However, the changes require a period of assimilation, adaptation, and acceptance. On the other hand, the absence of motivational elements and personal interests favors the abandonment of activities (Zimmerman & Cleary, 2009). Biggs et al. (2001) and Biggs and Tang (2011) suggest that the most effective way to promote motivation for learning is for teachers to take responsibility from the evaluation process and other contextual elements. By way of illustration, they designed the 3P model of teaching and learning (see Figure 2) associated with the R-SPQ-2F questionnaire.

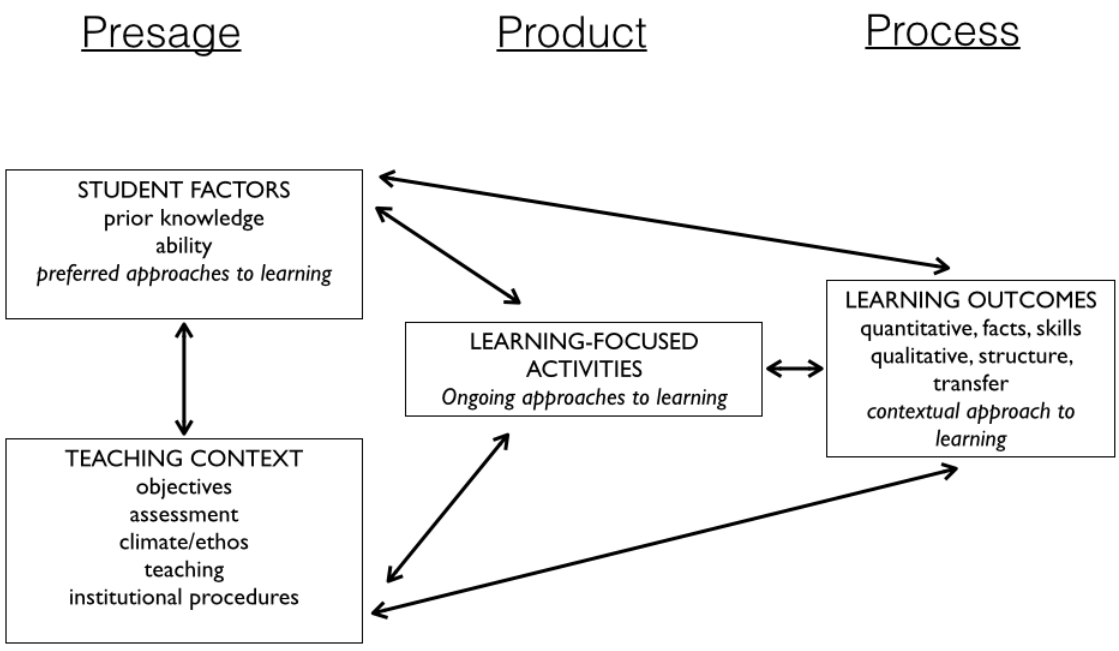

Figure 2. 3P Model Presage-Product-Process of teaching and learning (Biggs, Kember, & Leung, 2001)

These theoretical bases enable comprehension of the educational concept based on which the study is conducted and stemming from which the following question is posed: can the students' approach to learning be improved using digital portfolios as a method for monitoring and assessment of alternative and situated learning?

Research Methodology

This exploratory study is intended to analyze whether there is an improvement in approaches to learning, considering the subscales of motivation and strategies for learning, within a teaching-learning process mediated by digital portfolios in a university context in which these are used by first time and are used longitudinally. The aim is not to establish a comparison between the traditional method and the use of portfolios, but to observe how the use of digital portfolios with a certain educational approach influences the components of approaches to learning. A pretest/posttest is conducted with university students who use a digital portfolio for the first time on a course. The questionnaire used is the *Revised Two Factor Study Process Questionnaire* (2-RPQ-2F), devised by Biggs, Kember, and Leung (2001), the objective of which is to analyze the approaches to learning based on motivation and strategies for learning in the academic activities of university students. The questionnaire was given to the students during the first week of the course, examining their methods of studying before the traditional assessment; the posttest was done in the last week, once the students had finished the course. The questionnaire was presented by a research assistant not involved in the course assessment.

The study participants were 148 students on various courses at the Universitat de Barcelona (Spain) (N UB= 103), specifically on the degree courses of Audiovisual Communication (20), Education (63), and Social Education (20); and the Master's degree course on Teaching and Learning in Digital Environments (15); as well as students at the Universidad Católica de Temuco (Chile), specifically on the degree course of Basic Education with Specialization (N UCT=45).

The sample corresponds to all of the students who took the course and were in class, although responding to the questionnaire was voluntary. These students had not previously created digital portfolios, so we incorporated the variable of "the new" into the experience. To observe what happens once they have some experience in digital portfolios, the approaches to learning are analyzed in 15 students of Basic Education with Specialization at the Universidad Católica de Temuco de Temuco, who created portfolios for two consecutive years.

The participating teachers form part of a research team in digital portfolios, so they have some knowledge, although for some it was the first year that they had worked with digital portfolios.

Procedure of the teaching intervention

The process involving digital portfolios has a specific educational approach, explained in greater detail by Rubio, Galván, and Rodríguez-Illera (2013), which has been maintained over time, undergoing certain improvements. The main characteristics of this approach are related to the 3P model (presage-product-process) associated with the questionnaire and are as follows:

Awareness of the student's role as the main agent of their education process. The digital portfolio requires the student to recognize what evidence of learning is necessary to achieve and demonstrate their learning; At the same time, the student seeks to find links between academic learning and their personal and professional interests, as well as looking for the necessary strategies to achieve them (such as consulting the teacher on their own initiative, using the modes of expression that the evidence requires, or, as they do better, seeking new supports to underpin their learning, etc.). All of this implies that the student is the creator of his or her own personal and professional development plan, with the student being the main agent of their learning and responsible for their process.

Training on the concept of "digital portfolios", the digital platform, and the reflective process. Sessions are established to explain and record these three elements. In first place, the questions of what is a digital portfolio for monitoring and evaluation learning, what opportunities does it offer, and what requirements can it enhance, as well as the key elements of developing a digital portfolio, are all explained. Secondly, a workshop is held on the Digital Folder (Carpeta Digital ©) platform, so that the students know how to prepare their portfolios under the demonstrated concept of digital portfolios, making them the main agent of their learning. Thirdly, the students are taught on what the reflective process is in the experience of the digital portfolio (see section "Emphasis on reflection...").

Continuous and formative assessment, with feedback both in person and through the platform. As students deliver their digital portfolios (at various times during the course), the teacher provides feedback on the situation of each of them through the platform, as well as in the class group, taking advantage of times in the classroom. It is at these times that the teacher can identify new requirements and weaknesses among the students, as well as listen to opportunities and detect strengths.

Planning of learning in accordance with students' interests and needs. In the initial sessions, it is stressed that the portfolio is not solely an assessment tool for the teacher, but also an alternative assessment instrument and is situated based on the student's own interests. While we understand that even now this is a change of perspective for the student, we help them to plan their achievements in the short, medium and long term using feedback. One of the activities with the biggest role in this planning process is that of reflection on the learning process (see next section).

Emphasis on reflection on the learning acquired in the activities on content, the process, and considering professional performance. Various guidelines are established to work on reflection, since it is often found that this is one of the students' weaknesses. These guidelines are accompanied by the continuous insistence by the teachers of the relevance of this aspect. The guidelines are related to the structure of the reflection and questions to answer using a technique. This structure has to do with the narrative and the plot of the portfolio itself as something continuous. The questions are related to learning strategies and motivation, highlighting aspects of learning aids (time management, collaboration, and resources used, among others).

The implementation of the experience is carried out with the Carpeta Digital © platform, which is developed for the creation of digital portfolios in the current context of higher education from the perspective of continuous education and between contexts, that is, by integrating formal and non-formal learning. For practical purposes this means that students can incorporate the required evidence from the subject itself and from other environments (work done on other courses, professional projects, curriculum vitae, etc.). A full description of the platform can be found in Rodríguez-Illera, Aguado, Galván, and Rubio (2009); Rodríguez-Illera, Galván, Martínez-Olmo (2013); and Rodríguez-Illera, Rubio, Galván, and Barberà (2014).

Figure 3. Digital portfolio of a student. Example of an activity

Data analysis procedure

The results of the questionnaire *The Revised Two Factor Study Process Questionnaire* designed by Biggs, Kember, and Leung (2001) are analyzed with the program SPSS, v.21 for Macintosh.

The questionnaire is a Likert scale in which each rating is from 1 to 5 points, ranging from "Strongly disagree" to "Strongly agree". To obtain the approaches to learning and their factors (also known as a dimension or subscale), the sum of the scores of the items corresponding to each type of approach and factor is calculated and it is determined whether they are deep or surface, depending on which obtain the highest scores (Annex 1). When the value of the sum of the surface and deep approaches is the same, it is determined that the student has an undefined approach or subscale.

As higher education students tend to have a deep approach to learning, Recio & Cabero (2005) suggest analysis of the intensity of the approaches and subscales on three levels: low, medium, and high intensity. The intensity is classed according to the difference of the averages between the scores obtained by the student in the deep and surface items, with the intensity considered to be low when the difference is 1.33 points; medium if it is between 1.34 and 2.66, and high if the difference is greater than 2.67 points.

This allows us to assess the improvement of approaches to learning, even within the surface or deep approach itself. For example, within a deep approach we can see whether the students have a higher or lower intensity at the end of the approach than at the beginning.

In order to determine the internal reliability of the questionnaire, Cronbach's alpha was calculated and compared with the coefficient obtained in the original questionnaire by Biggs, Kember, and Leung (2001), and that obtained in Segers, Gijbels, and Thurlings (2008) in its adaptation for the use of digital portfolios. The results achieved on each scale are superior to the original ones in most cases. In the deep approach dimensions the figures were 0.680 (PRE), 0.735 (POST) and 0.665 (POST2), while for the surface approach they were 0.840 (PRE), 0.812 (POST), and 0.807 (POST2), with the alphas of the original questionnaires being between 0.64 and 0.75.

The results obtained in each dimension are reliable, except for the Deep strategy dimension, where a lower coefficient was obtained all three times, especially in the group that carried out the second posttest.

Normality tests were calculated for all of the items and some of them did not follow the normality curve, so the contrast tests were performed with nonparametric tests for related samples (using Wilcoxon).

The approaches and their dimensions are analyzed in all of the participants, obtaining the percentages of students that are within each range of the Likert scale at the different times of data collection by course and in the total sample, both before beginning the experience with digital portfolios (PRE) and at the end (POST). The UCT students who have created two consecutive portfolios have another final time for data collection (POST2). We also obtain averages, standard deviations and the significance value to assess significant changes between the indicators for each dimension.

The results associated with the influence of using digital portfolios in learning approaches are shown below. First, the data is displayed for the total sample and, at the end, for the 15 UCT students who have developed two consecutive portfolios.

Results

Students' learning approaches

Most students begin using the portfolios with a deep approach to learning. At the end of the course, the number of students with a deep approach increases to 93.2% (4.5% more) and the number of students with a surface approach decreases to the remaining 6.8%. However, 3.4%, which corresponds to 5 people out of 133, go from having a deep approach to a surface approach, and 3.4% continue to have a surface approach.

While it is positive to see that the perception of students towards learning increases in terms of the number of students, we must bear in mind that the deep-surface dichotomy comprises a wide

range of scores. To see the improvement of the students in more detail, the resulting approach has been analyzed according to the scale of intensities proposed by Recio and Cabero (2005).

As shown in Figure 4, the intensity of the deep approach grew after using the digital portfolios. As regards those who maintained their approach or changed to a surface approach, they are mostly at a low intensity, which means that they are moving toward a deep approach.

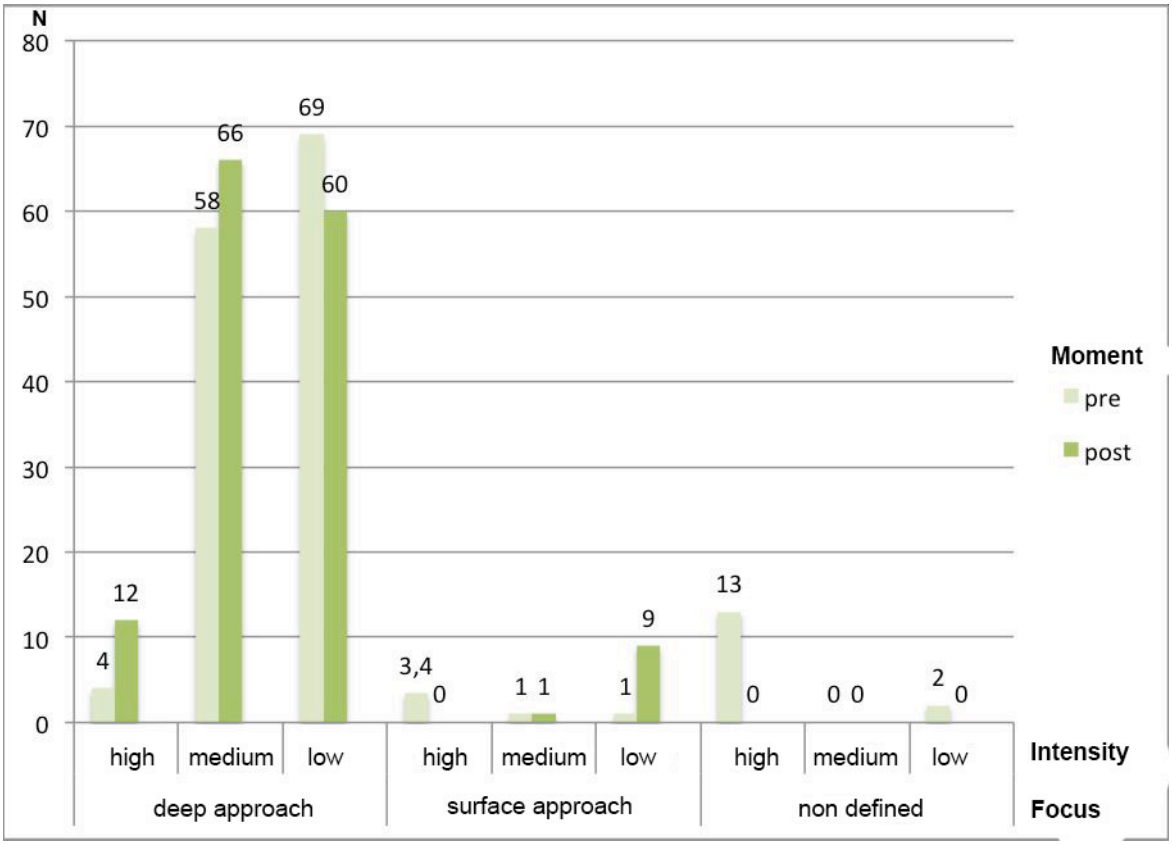

Figure 4. Intensity of approaches before (first graph) and after (second graph) using the Digital Folder

The results of the learning approaches can be better understood if we analyze their two dimensions: motivation for learning and learning strategies. The results obtained in the items can be seen in Annex 2.

Motivation for learning and learning strategies of students.

Comparing the two dimensions that comprise approaches to learning —motivation for learning and learning strategies— we can observe that before and after using digital portfolios there are more students with deep motivation (*pre:* 95.3%- *pos*t: 96.6%) than with learning strategies associated with a deep approach (*pre:* 72.3%- *pos*t: 85.8%), although the marginal impact is greater in learning strategies.

Deep motivation

Initially, the average score of deep motivation was 16.79 (*dt*=2.77), while by the end it had risen by almost a point (17.18; *dt*=2.80).

The use of digital portfolios led to satisfaction (p = 0.011) and personal interest (p = 0.016) in the study. Specifically, for 64.9% it produces great personal satisfaction initially and then to 73%. Meanwhile, 86.6% acknowledge that working on the topics leads to greater interest for them (previously that figure was 56.8%). Some 66.7% are as satisfied as by a movie or novel (initially it was 43.2% of the students). However, no actions have been generated, such as resolving questions of personal interest in class.

Deep strategy

As regards learning strategies, there are no significant differences between the time before using the portfolios with the Digital Folder and after the experience. However, some interesting facts were reported about student practices:

Some 32.5% of the students dedicate extra time to finding more information (initially it was 25%), 23.7% say that they use a lot of time and 63.5% need to work for a time to draw their conclusions and feel satisfied. Some 61.5% put effort into the reading recommended in class.

The creation of digital portfolios with the Carpeta Digital platform improved the frequency with which students seek complementary information to provide evidence of learning, in spite of the fact that they pay more attention to the lectures provided by the teacher. It should be noted that on the courses the students are given the possibility of presenting supplementary activities and using other sources of information, and they were valued in the assessment.

Surface motivation

There are no significant changes in the presence of surface motivation. In addition, few students showed surface motivation, both initially and after using the digital folder (initial average and dt=9.37(3.35); final average and dt=9.16(3.13)).

Of all the students, 3.4% said they wanted to pass the course with the least possible effort and 4.7% did not consider the subject interesting, while 39.2% thought it was very interesting and 45.3% found it interesting. Some 74.4% acknowledge that they obtain better results understanding the main aspects rather than memorizing them and 85.8% believe that studying in depth is not a waste of time, besides considering that they only need a minimum effort to pass (4.8% do believe this). Some 76.3% value the learning material offered by teachers, even if it is not assessed.

These results complement those for deep motivation and the students conclude that the courses have been interesting to them and they value the material provided by the teacher to understand the subject better, even though it is not assessed.

Surface strategy

With the digital portfolio as a system of assessment the students do not have to memorize concepts that they do not understand, but instead work with them. As mentioned below, the students perceive that the portfolio promotes synthesis and understanding of the material. Some 21% say they only use the class material and 44.6% (the percentage is consistent in items 4 and 12) claim that they use more materials. This percentage is somewhat higher than in similar statements that have appeared previously. Finally, 56.8% think that the teachers expect them to study supplementary material. Indeed, in the motivation dimension it is stated that 76.3% appreciate that the teachers provide more material than will be assessed. These results are therefore in line with the fact that, using the digital portfolios, the majority of the students establish practices that are not considered to be superficial.

The results of the R-SPQ-2F can be summarized thus: there was an improvement in the practices associated with the learning process after the experience of using the digital portfolios under our educational approach. The students appreciate and need the extra material to understand the content; some students search for extra information even though the percentage could still be higher and, therefore, this tells us that with more work by teachers and students we can improve it. Students show that they have more motivation for learning than acquired learning strategies, so there is a greater motivational effect than from strategies and, although the results are positive, over time they can be improved. The courses that participated were interesting to the students and they appreciated that the portfolio facilitated their understanding of the content and that they obtained better results than with memorization

As regards the courses, we established that those with students who maintained a surface approach or who declined from a deep to a surface approach were those being applied for the first year (2010-2011) and among students in their first year (2011-2012). However, on one of the courses that used portfolios in 2011-2012 for the second consecutive year, 100% of the students had a deep approach at the end of the course.

Transversal case: Students who have used the platform twice consecutively: Perception of the portfolio as a learning tool

The Basic Education students underwent significant changes in the use of learning strategies the first time they used the portfolios with Carpeta Digital. However, there was no change in motivation and, therefore, there was also no change in entire approach since they already showed high results initially. For this reason we will look again at the intensities.

When using the digital portfolio for a second time, the students improved the intensity of their approach and its dimensions. Although the first experience showed favorable results in motivation and the strategies applied, on the second course there were two students with results less aimed at learning. Therefore, it may be construed that the approach of the student to the subject has an effect on the process of preparing the digital portfolio. The main differences that occurred in the 15 students after creating two portfolios are described below.

There is a significant change between the first and second time the students use the portfolios, as is also the case between the second and third times in terms of satisfaction among the studies, despite the fact that this does not imply an improvement. The percentages of the scale indicate that after the first use of the portfolio there is an increase in students that "strongly agree" and a considerable decrease the second time they use it.

There is also a significant change in interest in the course between the second posttest (p=0.034) and the first time the questionnaire was applied and the first posttest (p=0.043). Initially, 60% strongly disagree and 33.3% disagree that the course will not interest them and they will do the least possible work. After the first use, there are more students who merely disagree, so it seems that the course has interested the students or they were more interested in working on it. The same did not occur with the next course, given that some students confirmed that they did work the least amount possible because they were not interested. These data can explain the fact that there are significant differences at all times and we can construe that the satisfaction in studying decreases because the course creates less interest among the group.

Another significant change that occurs with the first experience using the portfolio is that students spent more time obtaining supplementary information (p=0.034). However, there is no significant difference between the second time they use it and before using it for the first time, even though the results improve over time. Specifically, before the experience 26.7% of the students seek more information, while after using the portfolio that figure increases to 46.7%, and after using the digital portfolio three times it rises to 66.7%. Initially, the students felt that teachers should not expect students to spend time on material that will not be assessed, but eventually they realize that they are using it and that it may be assessed.

Lastly, we can observe a change in perception after the students use the second portfolio in terms of the strategy used to pass the course. Although initially some 80% of the students strongly disagree or disagree that the best way of passing was to try and memorize the answers to the exam, after using the portfolios for learning in which they did not have to memorize information, 86.7% strongly disagreed (p Post2_pre=0.009; p Post_pre=0.047).

Interpretation of the data and discussion of results

In order to interpret the results in accordance with the objective of the research, four key questions were established: What has improved? In what were the worst results obtained? What elements have influenced the improvement? And what elements must be improved? These questions will facilitate the later proposal of improvements in the educational approach using the digital portfolio.

If we focus on the intensities obtained from the dimensions, the results of both motivation and learning strategies improve with the use of the portfolio. It should be noted that there are initially more students with deep motivation than with deep strategies, which is consistent with studies by Bernard (1995) and others. Therefore, the digital portfolio had positive effects in the development of learning strategies and managed to maintain motivation among a high majority of students. The only courses with students that declined from deep to surface motivation or from indefinite to surface were

Education and they were in the first year of implementation for the teaching staff. The courses that had students that went from having deep to surface strategies were also in the first year of implementation for the teaching staff. Therefore, the experience of the teaching staff is another variable that positively affects the results. This aspect will be re-examined along with others that are connected to the 3P (presage-process-product) model of Biggs (1987).

Improvement in strategies for learning

Improvement in strategies is implied as soon as the students put effort into the lectures provided by the teacher, used extra material, and favor synthesis and the comprehension of the material, as well as dedicating time to drawing conclusions, which makes them feel satisfied.

The factors that favored improvements in strategies are indicators that the student has appropriated the learning process itself to try to understand the subject and feel satisfied. If the interest in creating a digital portfolio has had any implication, it is probably the use of a strategy to process the course information (Valle, Cabanach, Rodríguez, & Núñez, 2006). The course teachers insisted on final reflections and conclusions for both the activities and the whole of the digital portfolio, which allowed the students to self-assess and reflect on their own learning, which are practices that are required for using strategies (Paris, 1988). In addition, the fact that they want to feel satisfied can be a general personal goal among the students that becomes a factor to implement learning strategies related to meaningful learning in relation to their motivations, interests, plans and decisions (Genovard & Gotzens, 1990).

Although no specific factors have been found that reduce the focus of the strategies, some factors have been identified that can be improved, such as the search for information, the enhancement of complementary activities, and encouraging the use of new sources of information in assessment instruments.

The creation of portfolios favored certain aspects of the strategies to improve learning, but it can also be improved by providing more key elements in the education that students receive, such as teaching them how to find information to complement their learning activities, as well as encouraging them to present complementary learning activities. Kurtz (1990) and Valle et al. (2006) propose presenting the strategies they can use. To do this, we have to focus on them and model the ability to choose them sequentially by presenting examples and providing detailed explanations. These proposals can be taken into account for future interventions.

Thus, learning to choose strategies favors the development and self-regulation of metacognition. It should not be forgotten that reflection on the use of the strategies will help students acquire them (Valle et al., 2006, Dewey, 2010). It is possible that teachers who have improved their students' approaches year after year have emphasized these aspects in the second and third year of implementation. In addition to the training needed to optimize the search for new information and to encourage complementary activities to provide evidence of learning, we have to check whether students do not apply such strategies for any of the reasons proposed by Garner (1990).

Improvement in motivation for learning

Most students started their courses with a deep learning approach, which means that they have an intrinsic interest in learning and this is an advantage in developing self-regulated learning (Zimmerman, 2000).

Zimmerman and Cleary (2009) stress that monitoring learning outcomes can reveal the positive results achieved. When students create the portfolio, they see the achievements, reflecting on the learning acquired in each activity and at the end of the portfolio. They also achieve this when they expand the portfolio with evidence of learning at different times during the courses. In addition, the fact that the portfolio is digital and the structure of the portfolio offered by Carpeta Digital encourages browsing of the evidence. This helps to visualize the achievements presented and to recognize both strong and weak aspects. When the student identifies that they can improve or expand any part of the portfolio, they can re-edit it until they are satisfied.

Students are motivated by learning, with the tasks they perform, and with the digital portfolio as a whole, but they still do not ask questions that lead them to broaden their concerns. One proposal to improve this situation is to share the process of preparing the portfolio with the group or class and generate questions and interests in order to encourage looking at certain issues in greater depth. In this manner, the group itself generates a motivational effect as a community and develops active participation and personal responsibility (Slavin, 1994; Salomon & Perkins, 1998).

Greater dedication has been noted in the portfolios than in other traditional forms of assessment, such as examinations. Innis (1996) previously stated that more time and effort is dedicated to the alternative assessment. The educational approach agreed by the participating teachers takes into account the three roles described by Mason (1991), so we are very familiar with what to do, how and when; to encourage and share doubts and achievements, as well as to promote improvement of the evidence provided. However, it is possible that the organizational role was provided more at the beginning, the social role during the whole course, and that the motivation feedback messages may have supplanted the intellectual role in the initial interventions.

Conclusions

The aim of this study is to confirm that digital portfolios, as a method of monitoring learning and in which the student is the main agent of the learning process, make it easier for students to focus on their learning. The final outcome is that there are more students with a deep approach and greater intensity, fewer students with a surface approach, and none have an undefined approach. Of the students who have a surface approach to learning after using the portfolio, some already had that approach initially and others have changed due to the portfolio. That is, for a small number of students the portfolio has not led to greater motivation or using learning strategies, although the intensity of their surface approach has declined.

These results can be interpreted taking into consideration three factors: 1) an educational approach that allows the use of learning strategies and certain interrelated factors that encourage personal

motivation; 2) an alternative assessment that is different to the customary method (traditional, exams); and 3) the use of a new platform and that allows new ways of working, of displaying the evidence of learning, and of interacting with teaching staff.

The feedback received and the way students have used it to benefit their learning also makes the latter collaborative (Hiltz & Turoff, 1993). Therefore, it is proposed to enhance the intellectual role in subsequent interventions with digital portfolios in order to ensure that students use more feedback to benefit previous and future activities. One of the positive aspects of promoting learning strategies is that they are one of the keys to increase motivation and academic learning (Zimmerman, 2000), as well as to improve performance (Rosario, Núñez, & González-Pineda, 2006).

Recognition of the digital folder platform Carpeta Digital as a variable in the improvement of these results cannot be discerned based on the adapted questionnaire. However, an effect can be observed with the platform and in improving learning, taking into account the dichotomy of Salomon, Perkins, and Globerson (1992), to learn *about/with* technology. This implies that with the Digital Folder platform to create the digital portfolios, students felt motivated and had room to develop certain strategies, such as taking into account the messages of the teacher or seeing the improvement of their learning throughout the course. The effect of the platform on students was to improve learning, maintain and increase motivation, and favor the search and development of new learning strategies adapted to the new situation.

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Appendix

Annex 1
Calculation and assignation of deep and surface approaches
Deep learning approach = Sum of the items (1,2,5,6,9,10,13,14,17,18).
Surface learning approach = Sum of the items (3,4,7,8,11,12,15,16,19,20).
The subscales motivation and learning strategies are calculated by adding the score for responses in the range corresponding to each item (deep or surface).
Deep motivation = Sum of the items (1,5,9,13,17).
Surface motivation = Sum of the items (3,7,11,15,19).
Deep strategy = Sum of the items (2,6,10,14,18).
Surface strategy = Sum of the items (4,8,12,16,20).

Annex 2 (Table 1)
Table 1.
Descriptive statistics of motivation and strategies in the complete sample (PRE-POST)

Deep motivation	Time	N	Average		Sign. (bilat)
Studying gives me great personal satisfaction.	PRE	148	3,77	,87	,011
	POST	148	3,95	,86	
I feel that practically any topic can be very interesting once I work on it.	PRE	148	3,49	1,0	,451
	POST	148	3,41	1,03	
I think that studying academic subjects can sometimes be as interesting as a good novel or movie.	PRE	148	3,26	1,09	,016
	POST	148	3,53	,99	
I work a lot on my studies because I consider the material to be interesting.	PRE	148	3,49	,71	,877
	POST	148	3,51	,84	
I come to most classes with questions in mind that I want to answer.	PRE	148	2,78	,89	,937
	POST	148	2,78	,87	

	Time	N	Average	Standard dev.	Sign. (bilat)
My objective is to pass the course making the least effort possible.	PRE	148	1.80	.93	.252
	POST	148	1.71	.86	
I do not consider my course very interesting, so I work the minimum.	PRE	148	1.83	.85	.749
	POST	148	1.81	.81	
I think I can obtain better results by memorizing the key aspects rather than trying to understand them.	PRE	148	2.10	1.20	.658
	POST	148	2.03	1.07	
Studying the topics in depth represents a waste of time when you only need minimal knowledge to be able to pass.	PRE	148	1.74	.85	
	POST	148	1.70	.85	
I think the learning material is not useful if it is not going to be assessed.	PRE	148	1.90	.97	.935
	POST	148	1.90	.95	

Deep strategy	Time	N	Average		Sign. (bilat)
I have to work a lot on a topic to draw my own conclusions and feel satisfied.	PRE	148	3.65	.910	.974
	POST	148	3.63	.978	
I consider most new topics to be interesting and I often spend extra time to find more information about them.	PRE	148	2.89	.842	.015
	POST	148	3.09	.876	
I test myself on the important topics until I fully understand them.	PRE	148	3.36	1.025	.002
	POST	148	3.64	.948	
I spend a lot of time searching for more information on interesting topics that have been discussed in class.	PRE	148	2.76	.899	.597
	POST	148	2.80	.987	
I put effort into most of the reading recommended in class.	PRE	148	3.55	.898	.170
	POST	148	3.42	.976	

Surface strategy	Time	N	Average		Sign. (bilat)
I only seriously study what is in the class notes or the study programs.	PRE	148	2.76	1.05	2.45
	POST	148	2.64	.99	
I learn the content by memory and repeat them until I know them, even though I don't understand them.	PRE	148	1.90	.92	0.015
	POST	148	1.70	.77	
I generally limit my study to what is strictly established	PRE	148	2.74	.99	.268
	POST	148	2.62	.86	
I think that the teachers should not expect the students to spend much time studying material that will not be assessed.	PRE	148	2.60	1.08	0.004
	POST	148	2.35	1.07	
I think the best way of passing the exams is to try and remember the answers to the possible questions.	PRE	148	2.21	1.04	.600
	POST	148	2.27	1.14	