

Mutual feedback in e-portfolio assessment: an approach to the netfolio system

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Abstract

This paper presents an alternative application of e-portfolio in a university student assessment context. A concept based on student collaboration (called netfolio) is developed, that differs from the classical e-portfolio concept. The use of a netfolio, a network of student e-portfolios, in a virtual classroom is explained through an exploratory study. A netfolio is more than a group of e-portfolios because it offers students a better understanding of learning objectives and promotes self-revision through participation in assessment of other students' learning, as indicated through their portfolios. Class student e-portfolios are interconnected in a unique netfolio such that each student assesses their peers' work and at the same time is being assessed. This process creates a chain of co-evaluators, facilitating a mutual and progressive improvement process. Results about teachers' and students' mutual feedback are presented and the benefits of the process in terms of academic achievements are analysed.

The netfolio concept

The classic concept of e-portfolio in online education offers great potential for learning, summed up in the extensive and rich snapshot that it provides of the abilities developed by a student in relation to a learning process. In this context, we should stress the reflective aspect of the e-portfolio as one of its undeniable contributions, incorporating in-depth learning that is rich in critical and creative thought (Zubizarreta, 2004). In the cognitive effort of reflecting on the work carried out, the students learn to discuss decisions and relate contents, high-level skills that could otherwise be left in the shade. Another value of the e-portfolio is the continuous improvement that it can offer a student. A student does not see the work as definitive but can steadily improve it over the

learning period. Several authors (eg, Cole, Ryan & Kirk, 1995; Hunt & Pellegrino, 2002; Svinicki, 2001) have argued that every learning action should focus on the collaborative construction of knowledge between students and teacher and between the students themselves. In this constructive process, educational help is given to students to acquire a meaningful knowledge (Cambridge, 2001; Riedinger, 2006). One of the leading mechanisms in the educational process is the assessment procedure of learning focused on regular qualitative feedback. Rovai, Ponton, Derrick and Davis (2006) have argued that sometimes the feedback process in online education needs to be more explicit than in face-to-face education to have similar educational effects. The netfolio seems to be a useful tool in achieving this aim because of the inclusion of peer and co-assessment processes and their consequences (Dochy, Segers & Sluijsmans, 1999; Olin & Sullivan, 2004).

The concepts of peer assessment and co-assessment may have various different applications in an educational context, and at the same time, as we know, they mean very different things. However, in the case of the netfolio these notions are reincorporated into the framework of profound learning of a collaborative nature. This study does not consider the results of these co-evaluation processes involving both teacher and student in a summative evaluation, as is often the case (Hall, 1995). Instead, they are understood as scaffolding methods at the heart of a formative evaluation directed at improving teaching and learning.

Formative evaluation that actively involves students in their development—as is the case with peer and co-assessment, as well as self-assessment—aims to facilitate the student to achieve autonomous and independent learning (Nicol, 2007). This autonomy is achieved through self-regulation processes that come from the application of the mechanisms included in formative evaluation in any of its different forms.

In recent years, the use of e-portfolios has played the key role in an effective form of carrying out a formative analysis. The four pillars of the e-portfolio (metacognition, authentic tasks, contextual feedback and student responsibility) seem to clear up some of the principal doubts raised as to the effectiveness of formative evaluation (Black & William, 1998). The focus of the e-portfolio also satisfies those educative models based on exploratory dialogue and guidance as a source of cognitive change (Whitelock, 2006) above all if one opts for an individual model of the learner.

Nevertheless, e-portfolios in their most common practice display a number of significant shortcomings. On the one hand, while there are some specific initiatives that consider the social aspect of the e-portfolio (Gordin, Grueneberg, Laff, Martinez & Lam, 2004), their format is most frequently based on the individual creation of work; insofar as the collective value that other students may bring to the work is not taken into account. On the other hand, it is not a complete work because it is not submitted as a single large text but as pieces of work that are very interesting but unconnected to each other. Each shortcoming, the individuality and the disconnection, are factors that the emerging netfolio concept aims to overcome. As the word reflects, the netfolio is con-

figured through a set of e-portfolios produced by different students who, at a given time and through online communication, provide the other students with new content and different perspectives. This collaborative approach in the form of a network offers students the ability to compare e-portfolios as another stage in the construction of their own personal e-portfolio.

In short, the netfolio overcomes the limitation of working alone and the restricted range of learning experiences that characterise 'classic' e-portfolios. For its part, a netfolio is basically a large mesh of different learning outcomes driven by two assumptions: (1) It offers different interpretations of each piece of students' work corresponding to a learning objective or a specific competence in terms of professional skills put forward by diverse students; and (2) it understands each student's portfolio as a multi-text that interweaves the different demonstrations of learning outcomes (called hereafter 'evidence' of learning as examples of student work that reveals the level of accomplishment of a competence) into a larger text with a global and interrelated meaning. The first assumption refers to the communication between students that validates or clarifies the demonstration of an agreed core of competence. The second assumption refers to the improved connections and interlinking resulting from the integration of a student's own demonstration of learning outcomes with those of other students.

Together, these two assumptions, external and internal, weave a solid network of evidences of learning and make an additional contribution based on the different inputs, both for the teacher and for the students themselves. As well as examples of progress, the teacher is presented with an alternative and supplement to their own teaching in the sense that it is the other students who show examples of their work and act as instructors by adding their own work to that of the others. The student is not only afforded this gallery of different works provided by other students for comparison, adjustment and improvement of their own productions, they are also forced into a complex (re)production of their own work.

The netfolio concept does not replace that of the e-portfolio or even extends its role, but rather draws attention to a more complete teaching and learning system. Very often, the instructional design of e-portfolios is limited by the chosen technology (Acker, 2005; Ehrmann, 2002). It is therefore a question, again and again in each case, of proposing the competences that are to be developed in the students and of attempting to reinvent and adapt the technology to carry out what is pedagogically required, through solid initial educational design (Ehrmann, 2006). On some occasions, the technology interferes with the educational intentions, taking them for granted; as a result, we find initial ideas that are good but prove incomplete when transferred to information technology (IT) systems. Nevertheless, IT systems in themselves do have the potential of adapting to almost any educational requirement.

Architecture of the netfolio

As an exploratory study, the netfolio concept has been applied to a PhD course on the Information and Knowledge Society at a virtual university that has been running all of

its courses completely online from scratch since 1995. The objectives of this course are to develop basic research competences within the framework of online education. The competences are organised in phases: defining the research question, making hypotheses, finding information and the presentation of results, integration of research results, comparison of hypotheses and drafting of conclusions. The netfolio has been integrated into the university's e-learning platform and has been designed technically and pedagogically to provide learning support to students online in such a way that they receive feedback at every phase for the improvement of their work.

In this case, the netfolio was structured in three sections visible to the students at all times. These were: 'presentation', 'competences' and 'monitoring'. A classic learning-type e-portfolio could have these three parts but, as we have seen, in the case of the netfolio the internal dimensions have been strengthened with regard to: (1) relations between evidences of learning (good student work examples) that show the achievement of a specific competence—students have the possibility to consult all the evidences of the others using the same IT platform through specific links marked by a special forum icon to this effect; and (2) relations between evidences of learning in the same e-portfolio—a single multi-text made up of a student's different evidences is created, through an explanatory forum that integrates all the phases completed in parts. Although this integration is located in a specific part of the introductory electronic page to make sense of the whole e-portfolio from the beginning (presentation section), it is only completed once the e-portfolio is finished.

In this way, in the netfolio, each student has and benefits from two different perspectives on the work of others: one is partial, centred on each of the skills and the other more global, in which the student reclaims the central role of a subject learning a discipline. At a technological level, both perspectives are shared by students through specific forums. The first is located in a forum site in each competence section, to which all students have access; the other emerges in the student's personal forum, which can be accessed by the other students. The final result of the contributions to the latter forum is what should be reflected in the introductory page (presentation section) of the netfolio as cognitive changes induced by equals.

The 'presentation', 'competences' and 'monitoring' sections are laid out in three horizontal tabs, which configure the main menu of the netfolio. In detail, 'presentation' includes in the foreground a *personal motto* and a *photo*, both of which are related to the student but necessarily also to the specific contents of the course—because they have their general biography in another part of the virtual campus. A global introduction of the whole portfolio that explains the integration of comments about the evidences of learning mentioned previously is also included in this section. Complementarily, the *best works* produced as professional and/or student and the approach are shown on the same page, and optionally the *professional milestones*.

The 'competences' section includes the drafting of the *competences* and the *evidence* required, and displays the part of the *rubric* corresponding to the competence selected.

Once a competence has been selected, an exclusive place (*dialogue page*) is provided to attach it, justify it, reflect on it and self-assess it. An important part of this space is that each evidence has a private discussion *forum*. This forum is aimed at the improvement of the evidence itself and the competence related to the evidence, which is always open to the comments of the teacher and, at the time of its presentation, also open to the opinions and assessments of other students on the course.

In the 'monitoring' section, the *complete rubric* of the course is displayed in which three types of qualitative assessments appear in an automatic box: (1) *Self-assessments* of the students themselves; (2) assessments of other students in the e-portfolio (*mutual assessments*); and (3) the teacher's assessments. The student has the possibility of writing *personal comments* answering the teacher's comments on his or her work in a specific discussion area within the same page. In this section the teacher views all of the portfolios and can make the different portfolios visible to other students according to the competences that he or she decides, when he or she thinks it necessary or at the request of the students themselves. In this section, each student has a summary box of their work displayed in such a way that they can link them and relate them in any way they see fit. They also have the synthesis of their assessments and an automatic alert system that informs them of the completion status of each of the evidences corresponding to each competence (not started, in progress, in revision, being modified and closed).

Although it is important to understand the netfolio structure, which is largely shared with the e-portfolio, it is more important to understand the nature of the interaction between students and with the teacher. This is where the main differences between the two types of portfolio lie—in the communication exchanges taking place in the different forums (referred to in previous discussion) that have been added to the netfolio (in the absence of more adequate technological solutions). These forums store the mutual feedback comments that solidify the students' social or learning network. These dialogues will later be subject to analysis, in order to verify the netfolio's real contributions to the methodological mechanism of progressive improvement in relation to cognitive change.

Contributions of the netfolio: empirical work

Hypothesis

The underlying hypothesis in relation to the type of contribution and reinforcement introduced by the netfolio—compared to a conventional e-portfolio—refers to the possibility of more mature learning decisions concerning scientific knowledge—in this case, research competences. This maturity is reflected in the increase in revision of students' own work and the expected improvement of the final result. This improvement is understood in terms of more in-depth reflection on the learning and argued explanation of decisions that lead to more significant and in-depth learning (Galley, 2000; Heath, 2002).

This hypothesis is based on the same concept of educational mediation that sustains the dialogue maintained between educational agents in formative evaluation. This must

give more reflective and effective learning results. Testing the hypothesis will also enable us to obtain the elements necessary for the progressive automation of these complex feedback processes in online environments (Whitelock, 2006). These include those elements taken from the dynamic that establishes formative evaluation in terms of the shared construction of high-level skills, not only at cognitive level but also at a meta-cognitive level, achieved by students through interactions with other, more capable students. Because of this, in this research we focus on the study of revision processes, both on an individual level (self-revision) that requires the capacity to incorporate the contributions of others in a meaningful way, and on a group level (mutual revision) that requires the capacity to offer relevant feedback on other's work.

Sample and context

The PhD course in basic research competences on the Information and Knowledge Society has 31 students online who, to pass, must complete a portfolio with the five competences listed previously by submitting a minimum of two pieces of evidence for each competence (as documentation of student competence accomplishment). Students can improve the evidences that show the achievement of these competences on at least two occasions: during the feedback periods set by the teacher and other students during the process, and at the end of the process of shaping the whole netfolio. The different versions of their work and evidences and the teacher's corrections are recorded in a section relating to the student's progress in the same space as the chosen evidence.

The students had the same teacher and were divided into two groups, distributed randomly (Group A and Group B with 15 and 16 students respectively). The structural difference between groups was that Group A had to show its achievements through a classical e-portfolio and Group B through the netfolio system. The differences between these groups primarily concern the new items incorporated into the netfolio compared to traditional portfolios. In other words, in this case, for Group B (for more details see Table 1): incorporation of an icon that allows the evidences of others to be viewed (whereas in Group A it must be at the student's request); display of revisions and version number of own and other evidences; participation in a shared forum area with other students for each of the evidences; requirement to issue comments on the work of other course mates; and requirement of integration of specific contributions of other students into their own netfolio. Both groups were being introduced to the e-portfolio and the netfolio for the first time. The general aim is to compare both groups in terms of assessment processes and products of learning.

As can be observed, the most relevant differences between both tools can be attributed not so much to the technological as to the instructional design. Naturally, both go hand in hand, but the educational premises underlying the design of the netfolio methodology are more powerful, on this occasion, than the technological changes that have been applied to the two platforms. In this sense it is relevant to observe that in both cases the technological resource used for interaction between participants is the forum, understood as a space for exchange of contributions between participants, but its use is substantively different from one case to the other.

Table 1: Similarities and differences between e-portfolio and netfolio systems

<i>Dimensions</i>	<i>e-portfolio</i>	<i>Netfolio</i>
General structure	Presentation, competences and monitoring	Presentation, competences and monitoring
Competence internal structure	Exposition of isolated evidences of learning clustered around a competence	Exposition of evidences of learning clustered around a competence with an introductory text integrating the whole sense of the work
Number and type of evidences	Two for each competence (total of 10). Unlimited versions	Two for each competence (total of 10). Unlimited versions
Feedback	From teacher	First from other students and then from the teacher
Location of the feedback	In public forums for each competence. By email to the individual mailbox.	In a specific personal forum area for each competence with a public side.
Product of the feedback	New personal version including teacher's comments	New public version including other students' comments and teacher's comments
Access of own evidences to others	On requirement in specific moments of the process	Free access any time
Comments of others work	Not required	Mandatory

Methodology

A dual methodology has been applied to the sample. On the one hand, a comparative quantitative methodology has been applied to detect the value of the dependent and independent variables. On the other hand, a more qualitative methodology based on case analysis (Stake, 1995; Weinberg, 2002) has been used to analyse the communicative exchanges that take place in the online classroom. A qualitative approach has also been applied to the class assignments, to detect a set of conditions that would precipitate a qualitative change in the behaviour of specific students. These findings will also contribute to further development of the netfolio itself through the preliminary comparison of the hypothesis proposed. To this end, the use of two different data collection instruments is proposed: (1) questionnaires—one questionnaire designed for the students and another for the teacher which assess their satisfaction with the monitoring and evaluation of the course together with the contributions made to the reflective processes prompted by the e-portfolio or netfolio used; and (2) analysis of documentation and interactions posted on the different portfolios—these include student dialogues and feedback from the teacher and classmates. The software used to analyse both questionnaires and interaction was the UCINET (2004) system.

Results and discussion

We divided the results obtained into two sections relating to the two types of data collection instruments.

With regard to the questionnaire, we have the most relevant results for the preliminary answer to the hypothesis (Table 2).

With regard to monitoring the products of students' evidences and teacher feedback and of the interaction between both agents, we present the results of the different dimensions of analysis (Table 3). All of the data has been obtained from content analysis of the exchanges of messages in the various virtual spaces of the classroom (teacher's notice board, specific forums and online debates) including assignment documents.

The results obtained initially confirm that both e-portfolio and netfolio are valid tools for learning assessment of university students, even though they are not used to being assessed with such tools. Both student and teacher satisfaction is high. This satisfaction is directly related to the monitoring and feedback of the class work, and if it is not total, it is because of the workload and amount that has to be handled to follow the course, both as teacher and as student.

The continuous work and monitoring of the students implied by the development of the two instruments used (e-portfolio and netfolio) also appears to foster in the students a continuous revision of their own work. At this stage, no significant difference is observed between the answers and the results of the students in Group A and Group B, so it is interpreted that the monitoring phase of the portfolio system of the competences for both e-portfolio and netfolio is responsible for this dynamic. Nevertheless, the students who used the netfolio seem to demonstrate a greater perception of improvements in their work (56%) than the students who used e-portfolio (40%). According to their own comments that could be the result of the explicit exchange of their own work with their peers. Many students corroborated that the interaction between equals led to greater awareness of their own capacities and the things that they do in the learning process than did individual work or work formed by the teacher-student dyad. There are two principal reasons for this. First, students are less used to receiving feedback from their equals because of the role of the student developed in a university context. This means that they display a more alert attitude, a basic requirement for learning (Conway, Kember, Siva & Wu, 1993; Falchikov, 1995). Second, this increased awareness is because of the process of verbalisation within the framework of explicit learning and skills of self-regulation (Anderson, 1983; Schraw, 2007). For all these reasons it is important to incorporate elements of collaborative learning into the new online learning evaluation processes.

As it is a required part of portfolio methodology, most students both groups revised their work (93.3% of the e-portfolio group and 100% of the netfolio group) but there are significant differences in the final results of these revisions. While in Group A not even half the students improve their results (46.6%), in Group B the number of students who improve their product reaches three quarters of the total (75%), although the e-portfolio results here are also fairly high.

Table 2: Results of student and teacher questionnaires

	Group A (N = 15) <i>e-portfolio</i>	Group B (N = 16) <i>Netfolio</i>	Significance
Students			
High or very high satisfaction of the student with the subject	80%	81.2%	$p = 0.6406$
High or very high satisfaction of the student with the e-portfolio/netfolio	73.3%	81.2%	$p = 0.4606$
High or very high satisfaction with class cohesion	66.7%	68.7%	$p = 0.6017$
High or very high satisfaction with class work as a group	60%	87.5%	$p = 0.0900$
Methodology facilitates improvement of work (e-portfolio or netfolio)	Yes 40% No 20% Neutral 40%	Yes 56.2% No 6.3% Neutral 37.5%	$p = 0.2933$
Obstacles to improve the work	<ul style="list-style-type: none"> • Lack of time 60% • Feedback 20% • Complementary resources 6.7% • Initial guidelines 13.3% • Technological issues 0% • Others 0% 	<ul style="list-style-type: none"> • Lack of time 62.5% • Feedback 6.2% • Complementary resources 12.5% • Initial guidelines 6.2% • Technological issues 6.2% • Others 6.2% 	NS
Students' comments	<ul style="list-style-type: none"> • Lack of time to change evidences • Difficulty to reassign • Stimulating methodology 	<ul style="list-style-type: none"> • Mates' comments stimulate good work. • Difficulty to listen to different comments • Netfolio difficulties at the beginning 	
Teacher^a			
Satisfaction of the teacher with the subject	High	High	
Satisfaction of the teacher with the e-portfolio/netfolio	High	High	
Satisfaction with class cohesion	High	Very high	
Satisfaction with class work as a group	High	Very high	
Obstacles providing feedback	Quality of assignments, number of students/ assignments.	Number of students/ assignments, divergence of students' comments.	
Teacher's comments	The subject has progressed normally. The students' contributions have been good without many variations.	The incorporation of the netfolio has meant more questions from the students regarding how to work with other students. Also more attention to the dynamic of the class and more complex grading on my part.	

^aScale: Very high, high, regular, poor, very poor.
NS, not significant.

Table 3: Results of the online interactions

	Group A e-portfolio	Group B Netfolio	Significance
Revision			
Number of students who have revised a competence	93.3%	100%	$p = 0.4838$
Number of students who have improved a competence	46.6%	75%	$p = 0.1055$
Mean of competences with revised competences/student	1.8667	3.6250	$p = 0.0422^*$
Average number of revisions for each evidence	$x = 0.6$	$x = 1.9$	$p < 0.001^*$
Display			
Students view the e-portfolios of the other students	26.7%	93.7%	$p < 0.001^*$
	A 13.3%	A 50%	
	B 40%	B 50%	
	C 40%	C 0%	$p = 0.0345^*$
Grades ^a	D 6.7%	D 0%	
Teacher-student grade match	73.3%	81.2%	$p = 0.4606$
Student-student grade match	60%	81.2%	$p = 0.1826$
	Total messages in the e-portfolio forums: 194	Total messages in the netfolio forums: 293	
Interaction			
Number of teacher feedback messages	17.0%	19.8%	$p = 0.2578$
Messages with improved versions or improvement comments from the students (total competence forums)	15.4%	34.8%	$p < 0.001^*$
Messages between students	5.7%	17.4%	$p < 0.001^*$
Student messages with high-level comments to the teacher (total competence forums)	10.3%	17.1%	$p = 0.0242^*$
Student messages with high-level teacher feedback (total competence forums)	2.6%	3.7%	$p = 0.3306$
Student messages with high-level comments to other students (total shared competence forums)	1.0%	6.8%	$p = 0.0013^*$

^aGrades (out of 100): A:100–85; B: 84–65; C: 64–50; D: –50.

* $p < 0.05$.

The most notable aspect observed in this section is the difference in number of revised competences and revisions made between Group A, which uses the conventional e-portfolio, and Group B, which uses the netfolio. In detail, over the five competences developed in the course, 26.7% of the students in Group A revised one competence as against 6.2% of Group B; 60% of Group A and 6.2% of Group B revised two competences; 13.3% of Group A and 31.2% of Group B revised three competences; 0% of Group A and 31.2% of Group B revised four competences; and 0% of Group A and 31% of Group B revised five competences.

These results show significant differences and they show an inverse relationship between the groups, so that the higher the number of competences revised by students in Group B, the lower the number of revisions in terms of competences carried out by students in Group A. This result is also supported by the greater number of revisions carried out in each of the 10 required evidences, as Group A reaches an average of 0.6%, while Group B reaches 1.9%.

The greater visibility of the revision processes and the requirement of mutual assessment in the netfolio and not in the e-portfolio appear to be amongst the reasons for this difference. However, this finding would not have had any relevance if the results of learning had been similar in both groups (Group B graded higher than Group A). In absolute terms, when it comes to the final qualifications, it can be said that both groups present good learning results. However, a significant difference is detected in favour of the group using the netfolio. Cent per cent of the netfolio students obtain an A or a B, while these grades make up 53.3% in the e-portfolio group. Thus while the qualifications of the netfolio group are concentrated in the highest possible grades (A and B), the results of the e-portfolio group are concentrated in the average grades (B and C). This higher achievement by netfolio users is reinforced by the fact that both groups were led by the same teacher and deal with the same learning content.

With regard to the matching of aims and grades, a more shared perspective is observed in the interpretation between the teacher and the students with reference to the students' work as there is a greater match in the grades and type of assessment made of the evidences. This is also seen between the students who use the netfolio in contrast to the ones who do not use it.

In terms of the results taken from the interaction data, it is interesting to observe that the number of teacher feedback messages in each group is similar, although one could presumably expect more in the second group. These are supplemented and complemented by the feedback messages that the students exchange between themselves as this datum is significantly different between the two groups. Consequently, with a similar number of messages from the teacher there are more revisions and modifications by the students, which also means greater activity in the online class.

The greatest differences between the groups can be detected in this section of interaction. Beyond the expected rise in the quantity of messages between students in the

netfolio group, it is observed that, in addition to the number of revisions and the grades obtained by the students that have already been mentioned, these messages contain a reasonably high measure of two aspects directly related to the hypothesis defined previously. These two aspects relate to the effective improvements that take place through the revisions and the inclusion of content that can be considered of a high cognitive and metacognitive level, (self-evaluation, reflection on ones own learning, requirements for change, etc) and both present significant differences.

By way of an example, we have transcribed part of an exchange between two students who mutually influence each other in the course of their online conversation:

Student 1: '... I think in your hypothesis you don't do what someone said about doctoring it to fit something specific with conditions. I don't really understand this doctoring, I think it is one step further, we'll have to ask the teacher, but what you do have to say in the first part is the "if ... then ..." and "therefore ..." in the second part, I think you are missing something'

Student 2: '... I use objectives rather than hypothesis, but it could also be necessary in my case ... how have you done it? Have you already got it right? ... in my work it could be good to have to specify to this extent because sometimes the projects stay in the ideas and go in directions you don't want them to, the results have to be directed towards the aims, in this case the hypotheses direct the results I want to obtain from the work'

Student 1: [Sends hypothesis and examples of others]

Student 2: '... reading the examples I realise, maybe if I put the factors that will influence it and not only that will influence it ... it would end up like that ... and it resembles the second one on the list'

Student 1: '... I would send it, and they can tell you as well, because thus topic is different from mine, but I also feel that I lack specifics'

Student 2: '... I think that I am finding it hard because I am not clear about the factors that influence it. I am going to look it up'

Student 2: '... I think I can send the hypothesis now ... I added your comments.'

In this example of exchange between peers, you can observe the double contribution resulting from the interaction between two students. Student 2 benefits from feedback from Student 1. At the same time, expressing her vision or problems facilitates her to make more conscious decisions that lead to the change in the final position and to a new learning, supporting the idea of the direct relationship established between interaction and cognitive change, this time between peers.

Conclusions

Using the netfolio leads to more revisions both by the students, of their own work, and amongst students, and this in turn leads to better final results. This is in line with the direct relationship commonly established between interaction processes and cognitive change, particularly when the electronic exchanges are geared towards

learning that is more profound. However, although the final results are important, we prefer to ask what is inside the so-called 'black box'. Following the work of Black and William (1998) who call attention to the dangers of understanding a class as a black box into which certain inputs are inserted and given outputs extracted, we aim to know more about what takes place inside the box. It is commonly recognised that formative evaluation is at the heart of high quality teaching and learning and that this evaluation must be, at the very least, consistent with the teaching methods. This, in the light of the emerging results, suggests that feedback between peers should not be an accidental practise, but an essential, integrated component of the evaluation system (in this case based on the e-portfolio methodology which is already, in itself, enough of a paradigm of formative evaluation). Within this framework, we observe that the role of the teacher alters and takes an unexpected direction. We already mentioned that netfolio increases the student's revisions, but, in relation to the teacher, another type of work is introduced. This teacher work is directed towards what could be called an 'observant assessment'. The teacher does not provide more feedback in the development of the netfolio than in the classical e-portfolio but must bring together a more complex network of interactions between the students and intervene when necessary. This does not necessarily translate into a number of messages; it is rather a vigilant and silent observation of what goes on in the online class. The teacher is in the mutual assessments but does not intervene directly, and this non-intervention becomes a positive assent, ie, he or she reaffirms with a silent but constant presence (message read register) the resolution of the evaluator student in the sense that the work is being developed and assessed correctly. This point suggests that a greater development of IT tools is needed to help teachers and students to make this positive presence more explicit and visible as an indicator to ensure the correct development of the learning assignments. This kind of teaching demands technological and pedagogic adaptations to online teaching and learning environments that combine distance with closeness, the invaluable help of the teacher with the inescapable responsibility of the student, that is to say, the promotion of a learning solution that is both shared and autonomous.

Technologically speaking, one of the ways of enhancing presence in online environments could be the work headed by Eisenstadt, Komzak and Cerri (2004) who propose some indicators that increase presence in e-learning scenario. Their proposal highlights the idea of 'enhanced presence' built upon a conversational model (Britain & Liber, 2004; Laurillard, 2000) and peripheral awareness of others understood as a mental state of the availability of the other, teacher or student. The system introduces interesting features (like an automatic roster construction and intelligent service discovery on the server.) It includes graphical visualisation of participants and their presence stated in an image, geographical or conceptual map and contextualises learners and includes student's current state of the mind (ie, goals, plans, intentions and understandings). Some of them can be included in the netfolio. For example, possible future ideas include automatic rosters as contact lists for making peers or revision groups linked by professional interest. That would make connections amongst students more relevant, through automatic recognition of shared areas of interest. Also trigger ser-

vices that alert students automatically about relevant properties and actions carried out by other students and by the teacher or simply marking the presence of who is required (matchmaking services) can be added to netfolio system. The trigger service could be an agent observing its environment and acting in specific situations facilitating and matching different styles of interaction.

Pedagogically speaking, another contribution, very close to the netfolio aims, is the structured and scaffolded feedback referred to by Whitelock (2006). This author proposes taking advantage of the technology, helping students to be more reflexive, thanks to the responsiveness and immediacy of feedback offered by the technology. This is one of the netfolio aims, although it is only partially achieved in this version, through the relationship expressed in the rubric regarding the level of competence reached by each student that is sent instantly and automatically as an initial feedback. In this context, the active cognitive process of mutual interpretation that students undergo amongst themselves at the heart of the netfolio (not only in terms of direct feedback) should also be captured by the technology in a more visible way to give more meaning to what is going on inside the black box, and therefore to the process of teaching and learning itself.

Besides this, the tangible difference between the type of content of the messages between teacher and students and between the students themselves that include greater reflection as a differential fact is reflected in the results obtained and student satisfaction with the group work. Conversely, the use of the netfolio generates more procedural messages about what to do and how to do it in relation to the co-revisions and the mutual assessment. No in-depth analysis has been made of the content of the messages in relation to the exact level of reflection and discussion. However, a distinction has been made between presence and absence, and low, medium and high levels according to the argumentative phrases, but it is necessary to look in greater depth into this direction in subsequent research to provide more definitive results.

To finish, we should point out that the netfolio is evaluated here in terms of the comparison of the evidences that it provides between students on the same course. However, from a research perspective, we expected greater satisfaction amongst the students who used the netfolio in comparison with the ones who used the more traditional e-portfolio. This greater satisfaction was expected as a result of the cohesion and internal relations within the group itself; however, the greater attention and load of electronic interactions is evidence that it did not occur as expected. On future occasions, this aspect needs to be taken into account—calling for an extension of it in this sense—together with the analysis of the more cognitive type gains implied by the use of one or other of the learning monitoring and assessment tools. In this sense, a study of the relationships of interdependence that denote contributions between students is proposed. One way to approach this is to return to the work already performed on social presence in online inquiry communities (Rourke, Anderson, Garrison & Archer, 2004) and on social networks (Wellman, 1999). From these and other works, analysis factors emerge, such as the social projection of the student within the group; the sense of mutual efficiency directed towards resolving the task; the level of intersubjectivity between peers and the

shared positioning of the students in relation to the task; and the co-construction of meanings. These factors combine to form a perspective based more on collaborative learning and its evaluation using tools based on the e-portfolio in a university context.

Given the scarcity of ideas, relative innovations in formative evaluation have often resorted to imaginative solutions and creative design to advance e-assessment (Mackenzie, 2005; Whitelock, Mackenzie, Whitehouse, Ruedel & Rae, 2005). Netfolio aspires to be a seed, mature enough to provide a greater bank of ideas and solutions to promote formative, reflexive e-evaluation.

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