Constructing an e-portfolio of competences with higher education students of postsecondary age group.
Technological issues and outcomes.

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Abstract

This paper presents some outcomes and results of a 3-year empirical research in which we propose an adult workers-oriented tool – the portfolio of competences – to higher education students of the postsecondary age group, using an e-portfolio system (Mahara), with the aim of making them able to reflect about their learning experiences, to demonstrate their competences and to mobilize them in a real working context, relying on the substantial working experience they have during their studying period, albeit often occasional and scarcely related to their degree programme.

We especially focus here on technological issues, mainly addressing the portfolio structure and communication between the teacher/tutor and the students, analyzing data coming from the internal database of the e-portfolio system and comparing the solutions adopted both at technological and didactical level, from one year to another.

Keywords: e-Portfolio, Higher Education, Postsecondary Students, Portfolio of competences, Demonstration logic

Introduction

Higher Education has been undergoing major transformations in the last two decades, in several respects. Both the Bologna Process (with the so-called Dublin descriptors (EHEA, 2005)) and EU policies (with the European Qualification Framework (European Parliament and Council, 2008)) enforce its certifications to be described by competence-based learning outcomes (Zaggia, 2008), implying two main effects: the "uncoupling" of education and certification (Feutrie, 2004) that allows validation of prior learning; and the competence orientation that strengthens the link between education and working contexts. While an increasing number of adults are addressing higher education, looking more for qualification than for further education, many European countries have activated some recognition and validation devices (for example, VAE in France or APEL in the UK). Italy has only recently started updating its legislation (L. 92/2012; Dlgs. 13/2013), although some important researches with adult students have been carried forward (Di Rienzo, 2010; Alberici & Di Rienzo, 2011; Galliani et al., 2011).

But these transformations involve Higher Education including "traditional" students also, those belonging to the post-secondary age group. Firstly, ever since the *Memorandum on lifelong learning* (European Commission, 2000) and then the well-known Recommendation of the Parliament and the Council (2006), European lifelong learning policies have attributed initial education institutions with the task of developing the "learning to learn" key competence. Within

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[1] Francesco C. Ugolini is the author of the introduction and of paragraphs "The structure of the e-portfolio of competences", "The construction process and communication issues" and "Conclusions".

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a high-level professional perspective, this also means making students learn to engage in future validation processes. In a former empirical research (Ugolini, 2009), we saw that, even in France, people addressing Universities in order to validate their experience were not fully aware of what it actually meant to be engaged in such a procedure, in reflecting on what they learned in their working experience and in proving their acquisitions to the jury[3]. We then focused on three "logics" we wanted to strengthen in students: the "reflection logic" (the ability to recognize learning when it has happened or, even better, while it is happening), the "demonstration logic" (the ability to find appropriate "proof" of one's own competences), the "competence logic" (the ability to mobilize one's own resources in order to solve problems in real contexts (Le Boterf, 1994, 2008)).

To achieve this, we propose that all students – even those belonging to the traditional post-secondary age group – construct a "portfolio of competences", a specific form of portfolio that normally addresses adult workers (Aubret, 2001, 2002), and has already been brought to the Italian university context for adult students (Galliani et al., 2011). In doing so, we take advantage of the fact that the great majority of Italian students (over 80% in some Humanities disciplinary group courses (Almalaurea, 2014)) are actually "working students". Even without considering the part of adult "studying workers"[4], over 60% of Italian University students have some kind of working experience during their studying period, albeit often occasional and scarcely related to their degree programme (*Ibidem*).

We therefore set a 3-year experience within a university course in a II year of a first cycle Degree Programme[5]. The construction of the portfolio of competences was part of the final exam. As we aimed at enhancing the three logics we presented above, we mainly focused on the portfolio construction process rather than on the portfolio itself. Consistently students were evaluated according to some specific indicators related to those logics independently of the specific portfolio content[6]. Moreover, at least one communication with the teacher was provided, in order that most students achieve the learning outcomes, on a formative evaluation basis.

According to Rossi (2006, p. 24), this is within the concept of a formative portfolio, rather than a certification portfolio; the portfolio is more a tool to become aware of one's own learning path than a documentation of one's working or learning credits. According to Aubret (2010, p. 27) the "portfolio of competences" demarche is a reflective demarche of analysis and synthesis of the education received and of personal, social and professional experiences, in order to make visible the knowledge and competences that these experiences generated, to 'codify' such knowledge and competences in a language that makes it possible to memorize their content, for oneself or for others, to find and capitalize in a personal dossier the pieces of 'proof' that can attest their effectiveness within social negotiation, for employment, validation or certification of competences.

In this paper we will especially address some technological issues related to the use of an e-portfolio system (Mahara) we adopted in order to reach our goals. In particular, we will focus on two main issues: the structural and multimedia features of the e-portfolio system and the communication with the teacher during the construction process. We will especially highlight some differences occurring from year to year, as we adopted the e-portfolio solution only from the second one. Namely: in aa. 2011-2012, students used common office automation tools (such as MS Powerpoint) to construct their portfolios and e-mail to interact with the teacher; in aa. 2012-2013, we adopted an e-portfolio system for both construction and interaction with teacher; in aa. 2013-2014, we changed the didactical design of the course in order to better integrate the construction process of the e-portfolio with the ordinary learning activities within a competence-based approach (Castoldi, 2011).

1. The structure of the e-portfolio of competences

The structure of the e-portfolio we proposed to our students was based on the model proposed by Ajello and Belardi (2007). In their research, they asked those who were constructing their portfolio first to divide their learning experiences into formal, non formal and informal and then, with the support of a tutorship, they promoted a reflective process that led to the presentation of documents of various kinds (written notes, diplomas, pictures, movies …) as proof of a competence.

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[3] For further information on how the French VAE device works, see Ugolini, 2009, Zaggia, 2009, Daniele, 2010.

[4] According to Almalaurea research operational definitions, "studying workers" (lavoratori studenti) have full-time working experiences for more than half of their study course, while "working students" (studenti lavoratori) have any other kind of working experiences during their study course.

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[6] By indicators, we mean here five dimensions we adopted in order to attribute marks to the students'portfolios (See Ugolini, 2013) and, therefore, to guide the construction process on their basis. A more detailed operational definition of the three logics, permitting a more precise measurement in order to test more refined hypothesis on an experimental basis, must be done yet and will be the subject of further research.

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We moved forward from this approach, also asking our students to describe a situation-problem in which they had mobilized an appropriate combination of their resources in order to make them develop a competence logic. Within this framework, the issues we pointed out in order to evaluate the portfolios – which were explicit to the students, and therefore guided them in the construction process – were the following:

The partition into formal, non formal or informal, depending on the context[7] in which the experiences considered to be relevant for learning purposes took place;

The reflection on experiences (especially the ones gained, often unawares, in an informal context) in order to make explicit what had been acquired;

The demonstration of learning through proof that, in an e-portfolio, takes the form of multimedia documents (text, images, movies, audio files …);

The description of a situation-problem showing the mobilization of their own resources (Le Boterf 1994, 2008) in a new situation, within a logic of competence.

From a technological point of view, in 2007 Ajello and Belardi used a web developing environment. Due to the large number of students (more than 100), during academic year (a.y.) 2011-2012 we asked them to use the most common office automation tools (namely MS PowerPoint or similar presentation authoring systems), in order to avoid technological problems overcoming the methodological issues. However, it is important that a portfolio of competence takes a reticular, hypertext shape. According to Rossi (2006), there is actually a strong link between the concept of a resource network as described by the theory of competences (Le Boterf, 1994) and the concept of a document network as shown in a portfolio. On the contrary, a presentation structure is mainly sequential (although some hyperlinks could be created, from slide to slide), and, moreover, the space of each slide is bound in frames of the same dimensions.

Mahara, while allowing the construction of hypertext-structured e-portfolios, is also quite easy to use, as it appears to be similar to the Web 2.0 social software (Giannandrea & Sansoni, 2011) that students of this age group are used to frequenting on a daily basis.

A typical example of an e-portfolio has therefore three "collections", one for each kind of context; each collection contains one or more pages, one for each specific learning context[8].

On each page, the student gives a textual description in the first person of the context, the experience and what he has learned, activating reflective processes in doing so. To this end he can use the page description directly, or insert one (or more) textboxes on the page body. On the same page, he can place one or more media elements constituting some proof of learning. Each item must be accompanied by an appropriate caption that explains the competence the document is expected to prove.

It is this point that we found posed the greatest difficulty for students. They often inserted purely illustrative pictures, typically without captions, or proving the experience instead of the competence. On the other hand, the maturation of the "demonstration logic" was one of the main targets of the course and of the process of portfolio construction.

Finally, students were asked to describe a situation-problem in which they mobilized a combination of resources, preferably coming from different learning contexts. We did not specify a unique location to this description: if it was linked to one of the narrated experiences, it could be placed within the corresponding page in a specific textbox, while most often it was inserted in a specific page, inserted conventionally in the collection concerning informal learning (according to Galliani (2012), informal learning acts as a frame for all others).

From a technical point of view, the access to the system did not pose problems for attending students. As we said above, those students are used to social software. Moreover, we prepared a simple guide (a pdf document, provided with snapshot pictures) in order to support them in performing the operations we asked for (creating collections and pages, associating the latter to the former, setting the access rules[9]). Attending students often help each other to overcome the technical difficulties, but they rarely use the communication tools internal to the platform[10].

As mobile technologies were progressively spreading, and namely during the a.y. 2013-2014 while we enhanced integration of the portfolio construction process with the lessons, we noticed that several students accessed the platform during the lesson itself using their own smartphones. In addition to facilitating the construction process (any problem

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[7] We actually agree with Galliani (2012) that what should be characterized to be formal, non formal or informal are the learning contexts rather than learning, learning experiences or competences.

[8] The minimum task we asked of our students in order to pass the final exam was to present one of each (learning experiences in non formal contexts may not occur; in that case we asked for another informal context to be described).

[9] This is a very important issue. As they upload many personal materials (e.g. their secondary school diploma), the students must keep complete control of their sharing policies. Of course the teacher must be granted the reading rights, and should be able to write a feedback in the student pages. But each student should feel free to share his portfolio with every other student, with his "friends" or only with the teacher.

[10] We gathered this from the platform database (see next paragraphs of this paper), from a small survey (30 answers) we did at the end of a.y. 2012-2013, and from the fact that almost no attending students asked for help of a technological kind.

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either at technological or content level could be immediately solved), this aspect emphasized the feature of this task as being an authentic task); this was obviously consistent with the competence-oriented didactical design we adopted.

2. The construction process and communication issues

In the previous paragraph we focused on the portfolio structure and how an e-portfolio system like Mahara was suited to it. But, as we said above, for the aim of our intervention, the construction process was more important than the portfolio itself. For this reason, we wanted this operation to be more than a simple task to be accomplished autonomously between the end of the lesson cycle and the final exam[11]. It is actually not an end in itself, rather a means to make students develop the three logics we presented above. Therefore the construction process such as the one we are proposing should be accompanied by the teacher (or by a tutor[12]) as well as integrated within the theoretical aims of the course. We need a technology that easily supports communication between the teacher and the students, and also a specific didactical design. That is why we evolved from an e-mail-based communication framework in the a.y. 2011-2012 to an e-portfolio system in the a.y. 2012-2013, and we then adopted a competence based design in the a.y. 2013-2014. By this latter we mean that we presented the portfolio construction right from the very first lesson as an authentic task, updating it during the lesson cycle while the theoretical issues were being progressively exposed.

Unfortunately, for privacy reasons, we could not institutionally design moments of group work, which would have been desirable from a didactical point of view according to a socio-constructivist paradigm[13]. Therefore the only interactions prescribed at institutional level were those occurring with the teacher, who was no more than a particular user and whose profile page acted as a "notice board" for official information and communications. We also asked the students to use the internal messaging system to report to the teacher the "deliveries" of their portfolio (due to the high number of students, we set precise deadlines for passing the final exam and for receiving feedbacks during the construction process). To this end, the students had to assign the reading rights to the teacher user, with the authorization to place a feedback.

This feedback was inserted, using the appropriate feature of Mahara, into the very page in which the teacher found the point that needed to be finalized. The communication between the teacher (who then acted as a facilitator) and the learner was one of the elements in which the advantage of using a system such as Mahara was more appreciable. Previously, portfolios were contained in files often of no small size, and were sent via e-mail, which entailed many reliability problems; feedbacks were provided through the same means, and were necessarily synthetic concerning the portfolio as a whole rather than specific parts of it.

We focused here on two specific technological issues[14]; in the second part, we will present some data coming from the Mahara database to show the results of our research.

3. Data analysis

In this data analysis we will refer to the two aa.yy. 2012-2013 and 2013-2014, when we used Mahara e-portfolio. The total number of students in the account system exceeded 500 units, but it must be said that an account was created automatically at the beginning of the cycle of lessons for all those who were attending, and it was not always used immediately, also because we permitted the delivery of the portfolio using office automation tools (even though it was discouraged).

For greater uniformity in data, we will consider here only students who actually built their portfolios with Mahara[15] and who sat for the final examination in the first session after the cycle of lessons (three subsessions – "appelli") as we

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[11] Giannandrea and Sansoni (2012), noted «a general lack of autonomy among students, who were not able to manage an open task individually» (p. 247), though their research addressed secondary school students and this problem should be less important in a higher education context.

[12] A portfolio construction process should always be accompanied by a tutor, who may be a teacher in educational contexts or a specific professional in validation contexts (see, for example, Ajello and Belardi (2007)).

[13] Mahara has, however, a fairly easy rights management system to use; interactions between students were therefore encouraged on a voluntary basis, thus promoting a more informal type of learning within the framework of a formal context.

[14] In previous papers, we addressed the theoretical framework (Ugolini, 2014) and we proposed a qualitative analysis of a sample of 50 portfolios (Ugolini, 2013).

[15] "lastlogin" field not null, quota used greater than 0.

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encourage a regular completion of the course by a written task, timed so that the study of the theory accompanied the process of construction of the portfolio.

Given these conditions, we considered 291 portfolios, namely 146 for the a.y. 2012-2013 and 145 for the a.y. 2013-2014.

Here we present some quantitative data from the Mahara database, in order to give an overall idea of the consistency of these portfolios:

More than 4 users out of 5 have 3 collections, as had been indicated; some others made 4 or 5 collections including the problem situation in a separate one; however, not surprisingly, the average number of collections per user is 3.09.

Users created 1877 pages, of which 1733 were contained in collections (sometimes the problematic situation was described in a separate page and therefore it was not included in any collection);

Users created 681 pages in formal learning collections (2.4 pages per user), 472 pages in non formal learning collections (1.72 pages per user), 535 pages in informal learning collections (1.91 per user). We can explain the prevalence of the former by the fact that they required less work in terms of reflection and were more easily associated to experience in a Curriculum Vitae (usually secondary school diploma or university exam registration, but also first aid certificates, sporting certifications…), while the non-formal skills are generally fewer in number than the informal ones because they may not occur[16]; the number of informal learning pages may also have been inflated by the problem situation, sometimes included in this collection.

The richness of the pages varies widely from user to user. If we look at the overall data, we find that the students considered made 3513 blocks, the vast majority of the "image" type (2461, 1.31 per page, 8.46 per user); the quantity of text is more difficult to estimate as we can see it variously in the textbox type blocks (949, one every two pages), in the "page description" of the pages themselves (1195 those that exceed 100 characters) or in the "image description", for what concerns the picture captions (2149 out of 2461 pictures with captions, some however not being relevant, as an image description can be created and not shown); some, albeit a minority, also benefited from other forms of media such as videos (4), photo galleries (24) or files (62).

The other fundamental fact that we believe should be addressed here regards communications, mainly those with the teacher. We recall that the teacher placed a feedback in student pages to facilitate the achievement of the objectives at specific deadlines. The total number of feedbacks was 563 for 270 users (2.09 on average).

We found information about feedbacks particularly interesting because the presence of only one feedback is often a sign of an achievement of the objectives without help from the teacher (while it is not always true that a large number of feedbacks corresponds to more deliveries, as one feedback can be structured into multiple messages in different parts of the portfolio). The percentage of students who received only one feedback is 40% but evolves significantly from the a.y. 2012-2013 (25.2%) to the a.y. 2013-2014 (55.7%). As we did not find an equally significant loss of quality in the portfolios, we believe this finding particularly relevant. During the a.y. 2013-2014, as we described above, the construction of the portfolios was more integrated with face-to-face lessons within a competence-based didactical design; moreover, the construction of a large part of the portfolio was a precondition for the written exam, set very close to the end of the cycle of lessons; this may have promoted communication with the teacher during lessons and work in groups, beyond the use of ICT tools.

A final consideration concerning the communication between students should be made; as we have said, privacy issues prevented the institutionalization of group work within the system and the period of use was too short to foster informal communication in significant amounts. However, we found some encouraging signs of a more integrated use within entire degree programmes: for example, we found 220 "friends" (involving 189 users); we also had 102 messages on internal messaging, mainly informal in nature, or about the formalities for examination. Taking into account that more focused exchanges were not encouraged, we could not expect more substantial numbers, but the data still allow further developments in this regard.

4. Using a virtual machine in an educational context

From a technological point of view, another interesting feature of our intervention was the use in an educational context of a virtualization system (Smith & Nair, 2005; Craig, 2006; Hammersley, 2008; Parrino, 2012).

Virtualization is the latest technical innovations designed to increase the level of system abstraction and enable users to harness ever-increasing levels of computer performance. At its simplest level, virtualization allows users to have two or more computers, running completely different environments, on one piece of hardware without the need of having a double partition of the hard disk (systems running together). In slightly more technical terms, virtualization essentially

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[16] In this case, we asked students to propose two informal learning experiences rather than a non-formal learning one and an informal learning one.

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divides users and applications from the specific hardware characteristics of the systems they use to perform computational tasks. This technology ushers a new dimension of hardware and software innovation.

Virtualization systems are able to improve the efficiency and availability of hardware and software resources within the different organizations. With these systems we can go beyond the "one server/one application" restriction. Virtualization divides the resources of a system by simulating the existence of many independent processes within a physical hardware. Through the virtual machine users work as if they were provided with a dedicated system able to meet the diverse computing needs.

The feature characterizing virtualization software is the potential to manage physical resources of a real system, so as to allow several virtual systems to run as real systems, from the users perspective. Users work with a virtual machine, a sort of imaginary computer, the components of which are simulated by the hardware virtualization software; different virtual machines can be configured within the same virtualization environment with different operating systems (Windows, Unix, Mac OS), adapting the virtual configurations to different needs. In this way the user interfaces a virtual system without perceiving the difference from a real system.

From the point of view of finance and administration, the use of virtual servers offers many advantages, including a reduction of capital costs regarding hardware components, a reduction of power and cooling capability requirements and a more flexible allocation of process load. In addition, a system configured in this way helps to maintain continuity of service due to specific features of data recovery in case of malfunction.

However, being able to deploy not simple applications or individual contents but complete systems as a whole, opens up many perspectives also from a strictly educational point of view. In fact, though many people enhance the issue of content reusability between heterogeneous systems, it is also true that the most common standards are often limited to encoding information about the educational processes leaving out the contents, distributed separately, and above all the activities, such as forum discussions or chatrooms, or as cooperative and collaborative activities, which are central in quality deliveries. In this context, the distribution of a course on a virtual machine allows its content and educational activities to be completely prepared, as recommended by the main educational models.

Conclusions

The use of Mahara facilitated the management of the portfolio construction process. In addition to expanding the range of multimedia possibilities in the selection of products, it greatly facilitated communication with the teacher and made it more accurate, even with a very large number of students per teacher. The system provides communication tools that students are willing to use, but which, in strong contextual privacy conditions, could not be promoted institutionally; in less short paths, perhaps related to the entire degree programme, it may be valued better, on a spontaneous basis.

While comparing the improvements we made from one year to another, we can certainly affirm that an e-portfolio system is able to integrate communication with the teacher within the portfolio construction process making it more accurate and focused, stressing its formative function. However, using an ICT tool within an educational context must be suitable for pedagogical aims, and for the subsequent didactical design; in this, an e-portfolio system appears to fit the purpose, in several aspects both technological and didactical, namely: the task is an authentic reality task, as it encompasses actual personal experience and will be maintained even after the end of the course; the evaluation process is strongly formative-oriented, as the embedded communication system allows the teacher to assist the construction process while highlighting the theoretical issues that should be acquired; these issues are thus presented within a concrete and practical situation and are therefore contextualized, and can be helpful in the future professional life of students.

In the case of the intervention described above, we can therefore certainly conclude that the educational approach of choice is that of competences. However, its natural extent should unquestionably be the whole duration of the study course, better with suitable accompaniment taking into account its specific learning outcomes[17]. We can in any case underline the importance of an instrument such as the e-portfolio system that has in any case allowed us to carry out our intervention in spite of strict limitations in terms of time and the number of support figures.

In general, however, this research has attempted to contribute to overall reflection on the high level of professional preparation of the University; in this sense, "learning to make a competence portfolio" appears as a specific feature of "learning to learn", where it empowers not only reflective logic but also demonstration and competence logics, which

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[17] We can refer to the "tirocinio" in the "Scienze della Formazione Primaria" courses (Falcinelli, 2011; Laneve & Pascolini, 2014). A more consistent guidance can namely help in better enhancing the reflection logic, while we could focus here in a more specific way on demonstration and competence logics, that are usually less pointed out in "tirocinio" documentation.

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we believe to be crucial in tomorrow's world of work. These are aspects we intend to investigate in greater depth in our future work.

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References

Ajello A.M., & Belardi C. (2007). Valutare le competenze informali. Il portfolio digitale. Roma: Carocci Faber.

Alberici, A., & Di Rienzo, P. (Eds.) (2011). I saperi dell'esperienza. Politiche e metodologie per il riconoscimento e la convalida degli apprendimenti non formali e informali nell'università. Secondo rapporto di ricerca PRIN. Roma: Anicia.

Almalaurea (2014). Profilo dei Laureati 2013 – XVI Indagine (2014). Bologna: Author.

Aubret, J. (2001). Le portefeuille de compétences. Le portefeuille des acquis de formation et d'expérience. Paris: EAP.

Aubret, J. (2002). Le portefeuille de compétences. Orientations, 20.

Aubret, J. (2010). Les compétences entre le monde de la formation et le monde du travail. In E. Felisatti & C. Mazzucco, Le competenze verso il mondo del lavoro. Formazione e valutazione (pp. 17-30). Lecce-Brescia: Pensa MultiMedia.

Ugolini, F.C. (2009). VAE: aspetti problematici e rapporto con le ICT. Giornale italiano della ricerca educativa, 2/3, 77-91.

Ugolini, F.C. (2013). Riflettere sulle competenze informali all'Università in una logica di dimostrazione. Una proposta di portfolio. In Ugolini F. C. (Ed.), Apprendimento informale. Aspetti multidisciplinari e prospettive di ricerca (pp. 37-96). Lecce-Brescia: Pensa MultiMedia.

Ugolini, F.C. (2014). Logica di dimostrazione e di competenza per le nuove (e diverse) generazioni di studenti universitari. Un'ipotesi di portfolio. In M. Corsi (Ed.), La ricerca pedagogica in Italia. Tra innovazione e internazionalizzazione (pp. 751-758). Lecce-Brescia: Pensa MultiMedia.

Castoldi, M. (2011). Progettare per competenze. Percorsi e strumenti. Roma: Carocci.

Craig, I.D. (2006). Virtual Machines. London: Springer.

Daniele, L. (2010). Apprendimento permanente e università. Il riconoscimento e la convalida degli apprendimenti pregressi in Francia e in Italia. Roma: La Nuova Cultura.

Di Rienzo, P. (Ed.) (2010). Il riconoscimento e la validazione degli apprendimenti non formali e informali nell'Università. Primo rapporto di ricerca: politiche e modelli in Europa. Roma: Anicia.

EHEA (2005). A framework for Qualifications of the European Higher Education Area. Bergen: Author.

European Commission (2000). A Memorandum on lifelong learning. Brussels: Author.

Falcinelli, F. (2011). Ricostruire la pratica: approccio integrato alla formazione dei futuri docenti. L'esperienza di Tirocinio nel Corso di Laurea in Scienze della Formazione Primaria di Perugia. Perugia: Morlacchi.

Feutrie, M. (2004). Une autre évaluation, une autre validation pour l'expérience. Education Permanente, 158, 99-114.

Galliani, L., Zaggia, C., & Serbati, A. (2011). Adulti all'università. Bilancio, portfolio e certificazione delle competenze. Lecce-Brescia: Pensa MultiMedia.

Giannandrea, L., & Sansoni, M. (2012). Mahara in secondaryschool. The introduction of an ePortfolio to foster oral skills and socialization. In S. Ravet (Ed.), Proceedings of ePIC 2012, the 10th International ePortfolio and Identity Conference (pp. 245-251). Poitiers: ADPIOS.

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Hammersley, E. (2008). VMware server. Indianapolis: Wiley Publiching.

Laneve C., & Pascolini F. (Eds.) (2014). Nella Terra di Mezzo. Una ricerca sui Supervisori del Tirocinio. Brescia: La scuola.

Le Boterf, G. (1994). De la competence. Essai sur un attracteur étrange. Paris: Les Éditions d'Organisation.

Le Boterf, G. (2008). Repenser la compétence. Pour dépasser les idées reçues: 15 propositions. Paris: Eyrolles - Les Éditions d'Organisation.

European Parliament and Council (2006). Recommendation of the European Parliament and of the council of 18 December 2006 on key competences for lifelong learning. Brussels: Author.

Parrino, M. (2012). Virtualizzazione di desktop e server. Con VMare Player, Oracle Virtualbox, Citrix XenServer. Milano: Apogeo.

Rossi, P.G., & Giannandrea L. (2006). Che cos'è l'e-portfolio. Roma: Carocci.

Smith, J.E.. & Nair R. (2005). Virtual Machine. Versatile platforms for system and process. San Francisco: Morgan Kaufman.

Zaggia, C. (2008). L'università delle competenze. Progettazione e valutazione dei corsi di laurea nel processo di Bologna. Milano: FrancoAngeli.

Zaggia, C. (2009). La validazione degli acquis dell'esperienza. Elementi peculiari, comuni e distintivi rispetto al bilancio di competenze. Professionalità, 106, 71-74.