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Training University Teachers on the Use of the ePortfolio in Teaching and Assessment

Emanuela M. Torre
University of Turin

Higher education is increasingly called upon to respond to the need for educational innovations promoting graduate employability and lifelong learning (European Higher Education Area, 2012, 2015). To achieve this, students must progressively become able to reflect both on their learning and their potential to improve and plan their own educational and professional development accordingly (D'Andrea & Gosling, 2005). The portfolio, now used in many university courses worldwide, is a tool that contributes to responding to these needs. A study of literature on this subject indicates that the portfolio's effectiveness during the teaching-learning and assessment processes is dependent on the ability of teachers to master this tool. It follows that, in order to facilitate the effective implementation and use of the portfolio in universities, teachers need to receive suitable training. This paper presents the characteristics and results of a training course on the use of the portfolio. The course was part of an extensive training project for university teachers in the University of Turin's IRIDI program that was aimed at promoting the improvement and innovation of university teaching. The results of the training course show a higher level of competency in creating a portfolio, and a higher level of willingness to introduce it into teaching.

Literature Review

As is already well known, the portfolio first appeared in the field of art, where it is used to put together a collection of a student's best works and to showcase the goals reached by professionals in their field. Using this concept as a starting point, in education, the term *portfolio* indicates the systematic collection (in paper or digital format) of documents that record a student's learning experience. This collection must be accompanied by an explanation of the connections between the chosen documents, and between the documents and the purposes for which the portfolio has been created, as well as reflections on the academic and/or professional development documented (Giovannini & Moretti, 2010).

In the context of university education, the portfolio makes it possible for us to observe a student's learning experiences as a whole rather than as fragmented pieces, as often occurs (Carson, Greenhill Hannum, & Dehen, 2018). The elements of reflection within the portfolio contributes to determining the added value that the use of this tool offers to the future graduate's learning process (McDonald, 2012). In this regard, the definition proposed by Alvarez and Moxley (2004) is particularly incisive: the portfolio is simultaneously "a process, a product and a tool" (p. 92). This indicates the educational value of the construction process (process), the effectiveness of highlighting outcomes achieved by those who construct it (product), and, at the same time, its ability to become a virtual or tangible place (tool) in which the process and product are visible, making it possible to compare with expected goals.

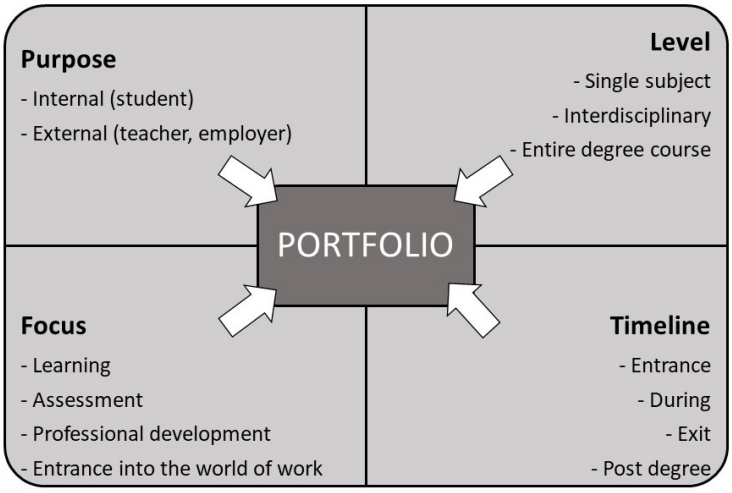
The portfolio's potential as a tool has increased with the transition from the paper portfolio to the ePortfolio. In the latter, the experiences included in the portfolio can be stratified more easily and can vary in format (e.g., written texts, images, videos, multimedia products). The ePortfolio can also be shared faster with other subjects (e.g., in a targeted manner, according to specific purposes, the situation and the recipients; Beckers, Dolmans, & van Merriënboer, 2016; O'Sullivan et al., 2012).

Types of Portfolios

The portfolio is therefore a flexible tool that performs different functions according to the purposes for which it is used. This makes it difficult to give it an unequivocal definition. Indeed, different nomenclatures are used to describe different types of portfolios in the various educational contexts, even if they are used for the same purposes, or, vice versa, the same nomenclature can refer to different objectives (Meeus, van Petegen, & van Looy, 2006).

For this reason, various classifications have been drawn up and disseminated worldwide. It is worthy to mention the classifications proposed by Smith and Tillema (2003), which are referred to in the most recent literature and described by Meeus et al. (2006) with specific reference to university education. These classifications have been employed to underpin the model proposed in relation to the specific context of Italian universities. Said model has been used as a theoretical basis for the training of university professors in the research path presented in this paper. The model identifies four main elements,

Figure 1
Classification of Portfolios and ePortfolios in Universities



which, when combined, determine the form, structure, and contents of the portfolio (Figure 1):

- the internal (the student) or external (teacher, tutor, potential employer) purpose;
- the focus with which the portfolio is created (learning, professional development, assessment, entry into the world of work);
- the level of complexity of the process that the portfolio describes: the development process of the expected goals in a single subject, or of the interdisciplinary goals in multiple subjects, or the synthesis of the experiences and skills gained during a degree course, possibly integrated with others acquired externally;
- the stage of the process under examination: initial orientation or recognition of incoming credits, the university process, leaving the course, starting a job.

Depending on the interaction and relative importance of these elements, the portfolio will require evaluation of different materials and highlight different aspects of the student's profile.

For example, a learning portfolio constructed for a single subject upon request of a teacher will contain completed assignments, supplemented with the student's reflections and any changes and improvements made based on the teacher's feedback, thus contributing to the process of building a specific set of skills. It can be used in summative assessment as evidence of the achievement of a set goal. A professional development portfolio, on the other hand, will document practical experiences and highlight the links between them and the theoretical aspects addressed in the courses. It will also contain the training professional's reflections on the strengths demonstrated, critical aspects encountered, and future development projects. It will be subject to subsequent updates to be presented to potential employers.

Research on Portfolio in Universities

The lines of research on the use of the portfolio in universities converge on three main questions: (a) the effects of the use of the portfolio on learning and the factors that support it, (b) assessment using the portfolio (process) and of the portfolio (result), and (c) critical aspects related to the use of this tool in teaching. As detailed next, all studies consider the role of the teacher as crucial to the educational effectiveness of the portfolio, its continued use, and its widespread use in universities (Eynon & Gambino, 2018; Yancey, 2019). This highlights the absolute need for effective continuing professional development training for teachers and tutors directed at favoring the correct implementation of the portfolio. We therefore briefly examine the three issues outlined previously in order to highlight the most important elements relating to teacher training.

Portfolio and meaningful learning. We recognize that it is not always possible to isolate the effects of the use of the portfolio on student learning, because this tool is often associated with other accompanying initiatives (e.g., freshman courses on study methods) or introduced in the context of a more general renewal of teaching (Bryant & Chittum, 2013). Nevertheless, the educational value of the portfolio is widely recognized.

The Association of American Colleges and Universities has recently indicated the portfolio as a high-impact practice for the effectiveness of university teaching (Watson, Kuh, Rhodes, Light, & Chen, 2016).

In general, research and empirical evidence on the portfolio show that, if properly used, it can help increase students' academic success and support the development of meaningful learning. Portfolio can also facilitate the development of soft skills and metacognitive skills. Students who use a portfolio tend to attain higher marks than their peers, as well as pass a higher number of exams with lower failure rates (Eynon, Gambino, & Török, 2014). There are many reasons for this positive effect. The development of a portfolio requires the student to make connections between the elements learned, including at an interdisciplinary and extracurricular level. It stimulates students to identify how and with which materials to document and present their achievements to others, and to explain the reasons for the choices they have made (Bryant & Chittum, 2013). Portfolio therefore promotes the active construction of knowledge and competence, the ability to organize and self-regulate learning and reflect on the results achieved, and self-assessment skills. These elements contribute to the development of deep learning, which has positive effects on academic results (Chittum, 2018; Eynon & Gambino, 2018; Hubert & Lewis, 2014; Qvortrup & Keiding, 2015).

It has been shown that this tool is also effective in promoting soft skills: students learn to communicate effectively, to collaborate, to participate in the community, and to use technologies (Yancey, 2019). Furthermore, the constant reflection required to create the portfolio has a bearing on the development of more specific metacognitive skills. Indeed, the structure of the contents of the portfolio not only requires students to learn a subject but also to consciously carry out and explain the processes necessary for this purpose while monitoring, evaluating, controlling, and changing said processes, and providing their rationale for the choices made (Janosik & Frank, 2013). Nevertheless, although said metacognitive skills also emerge spontaneously (Bokser et al., 2016), a student's ability to reflect needs to be suitably sustained (Landis, Scott, & Kahn, 2015).

Hence, the mere creation of a portfolio does not suffice for students to be able to benefit from the stimuli that the tool naturally offers to develop their metacognition. Rather, this potential must be made explicit and teachers need to guide development by proposing a structure to follow, by posing questions that students need to answer, and by providing targeted ongoing feedback (Bryant & Chittum, 2013; Buyarski & Landis, 2014).

Portfolio and assessment. The portfolio is recognized as a useful tool for the authentic assessment of students. In fact, by making the learning process and the goals achieved visible, complex aspects that are not always sufficiently appreciated with more traditional assessment tools can be evaluated (Buyarski & Landis, 2014).

The portfolio is also an effective educational assessment tool, not only for the student but also for the teacher and the institution itself. This is determined by the tool's unusual characteristics (e.g., a combination of assignments and reflections), which permit both the student and teacher to monitor progress, highlighting how expected outcomes are (or are not) obtained (Hubert & Lewis, 2014), while also promoting continuous improvement by the student, thanks also to feedback from teachers and peers. These elements are also an opportunity for organizational improvement; in fact, they provide indications for reflection on the aspects that need to be perfected in teaching a subject or in the curriculum (Buyarski & Landis, 2014).

However, the use of portfolios in assessment poses docimological problems related to the validity and reliability of the results obtained, especially when it is used for summative evaluation or certification purposes (Van der Schaaf & Stokking, 2008; Kelly-Riley, Elliot, & Rudniy, 2016). To respond to the critical issues raised, recent studies have recognized that the use of appropriately constructed and validated rubrics is a useful support to guarantee reliability, validity, and fairness in the assessment of students' products, especially when shared within the degree courses and with students (Buyarski & Landis, 2014; Kelly-Riley et al., 2016; Marshall, Mills Duffy, Powell & Bartlett, 2017). This again highlights the importance of targeted teacher training on the use of the tool and its implications.

Critical aspects in the use of ePortfolios and success factors. A few critical aspects of portfolio implementation are highlighted in literature, which can reduce the positive effects or limit the willingness of teachers and students to use the tool. They are mainly linked to (a) the ability of the subjects involved to use the tool and (b) the supports and technological skills necessary to manage digital portfolios.

With regard to the ability of the subjects involved to use the tool, research suggests that one of the main obstacles to introducing the portfolio is a lack of clarity on the tool's purposes and functions (e.g., Thibodeaux, Cummings, & Harapnuik, 2017). The negative attitude of students towards the portfolio is at times simply due to the teachers' own difficulty in understanding it; teachers may be unable to help students understand the methods of use and its potential, assist with its construction, or manage feedback. In fact, it is to be considered that, given the recent introduction of portfolios in university teaching, much of the research carried out on this subject has focused on experience where the teachers themselves were using this tool for the first time, and were therefore inexperienced

themselves both from an educational and technological point of view (Bryant & Chittum, 2013).

Among the main predictive factors for the successful introduction of portfolios in teaching, the following have been specifically identified:

- the teacher's experience in using the tool, the effective use of the portfolio in assessment, and the low number of students per course (Contreras-Higuera, Martínez-Olmo, Rubio-Hortado, & Vilà-Baños, 2016);
- transparency in the tool's purposes, the possibility of relying on formative and continuous feedback, and the degree to which students are autonomous in constructing the tool (Thibodeaux et al., 2017); and
- the convergence of teacher and student expectations (Scholz, Tse, & Lithgow, 2017).

In regard to technological issues, there are three types of factors:

- attitude towards technologies that affects the willingness to use the tool and the perception of its effectiveness (Deneen, Lumsden Brown, & Carles, 2018);
- the digital skills of teachers and students, and the availability of technical support (Clark & Eynon, 2009; Kelly-Riley et al., 2016); and
- the technical characteristics of ePortfolio management platforms, which are not always adequate for effective use nor constructed to adapt to the specific needs of the context or to permit students to organize their own documentation (Collins & O'Brien, 2018; Hains-Wesson, Wakeling, & Aldred, 2014; Janosik & Frank, 2013).

Implications for the professional development of teachers. A review of international literature on ePortfolios and the empirical research conducted suggest that the introduction of portfolios to university teaching would be valuable. As we have seen, the measures necessary to ensure that students benefit from the aforementioned advantages of using the portfolio involve changes in teaching. Precisely for this reason, we maintain that the introduction of this tool would promote the professional development of teachers and, consequently, require organizational change within universities towards more student-centered teaching (Eynon et al., 2014; Van Scoy, Fallucca, Harrison & Camp, 2018).

In fact, several have provided useful indications to potentially enable a more effective and efficient use of ePortfolios in the academic field authors (Beckers et al., 2016; Contreras-Higuera et al., 2016; Eynon & Gambino, 2018; Franco, dos Santos Franco, Pestana, Severo, & Ferreira, 2016; Yancey, 2019). Said indications are summarized next.

- With regard to curriculum:
  - inclusion of portfolios in routine teaching and
  - attribution of actual importance of portfolios in formative and summative evaluation.
- With regard to the tool:
  - accurate design of the portfolio structure, which avoids leaving out areas of competence and makes the work to be carried out clear (e.g., by providing examples or models) while maintaining a certain flexibility of use; and
  - presence of spaces or sections dedicated to reflections by the student.
- With regard to students:
  - formulation of clear objectives and clarification of how portfolios are constructed and evaluation criteria,
  - ongoing supervision and feedback from tutors or teachers and periodic review of progress by students,
  - scaffolding to increase motivation,
  - adequacy of the amount of work required, and
  - continuous technical support.
- With regard to teachers/tutors:
  - acquisition of skills regarding ePortfolio creation (consistent with the indications listed in the previous points) and of knowledge on the technical characteristics of digital implementation.

These brief considerations on the conditions that can promote a positive attitude towards the ePortfolio and willingness to use it—by both students and teachers—highlight a general and important aspect: the need for adequate training on the use of the tool from an educational-evaluative and technical point of view (Eynon & Gambino, 2016, 2018). Such training should be aimed at ensuring that teachers perceive the usefulness of portfolios, implement appropriate strategies to construct portfolios, assist students in the development process, and providing constant feedback (Beckers et al., 2016). An interesting experience in this regard is the one described in the research by Getman-Eraso and Culkin (2018).

Professional development activities to support teachers who intend to use the portfolio in their subject or throughout the degree course are therefore essential for the tool's implementation and integration**.** Using the panorama described previously as a starting point, we

present a training experience on the use of portfolios in university teaching and the results achieved.

Method

Context

This research falls within the broader framework of a research training program for university teachers that was started at the University of Turin during the academic year 2017-18. The IRIDI (Educational Research Incubator for the Innovation) program is aimed at promoting the improvement of university teaching and identifying effective interventions in the light of international research (IRIDI, n.d.). The scientific foundations, an analytical description of the course, and the overall results can be found in a recently published book (Coggi, 2019b).

The IRIDI training course was divided into 10 modules of three hours each with a final eight-hour workshop. The training modules were designed to promote certain fundamental skills for university teachers: (a) design teaching around course goals and students' initial skills, (b) implement learning-centered teaching, (c) make a plan for competence-based teaching, (d) obtain good classroom performance, (e) use new technologies in teaching, (f) create valid and reliable assessment tools, (g) adopt formative evaluation strategies, (h) use the ePortfolio, (i) develop students' soft skills, (j) promote inclusive teaching, and (k) plan a flipped classroom. The module titled "The Portfolio in Skill Development and Assessment Processes"—to which this contribution refers—examined the tool, highlighting the different types, purposes, and construction strategies. The module also took an in-depth look at the portfolio's role in the teaching-learning process and in formative and summative evaluation.

Each module included the presentation of a specific topic that was connected to the above-listed skills, detailed theoretical studies (e.g., models, theories, research results on the subject in question), included critical reflections and collective discussion, and proposed individual distance work aimed at exploring opportunities for change and innovation in the everyday teaching activities of the participating teachers (Coggi, 2019a). Each of the 10 modules included exercises and in-depth studies with the creation of a *teaching ePortfolio* (Bruschi & Torre, 2018), through which participants received individual feedback on their activities. During the course, participants were given overall feedback on the work done and development opportunities were discussed. In the final workshop, participants presented individual and group reflections and research on the innovations implemented (Coggi, 2019a).

Study Sample

The first edition of the course was attended voluntarily by 50 teachers belonging to 23 of the University of Turin's 27 departments. They were selected based on certain heterogeneous criteria (gender, age, years of experience, academic career, disciplinary field) in order to promote the exchange of experience between the participants and the institutional impact as much as possible. The final sample was characterized by a slight prevalence of women (58%), a mean age of 48 years (SD = 7.31), a good level of experience in teaching (M = 14.42, SD = 7.4 years), and a prevalence of teachers from scientific fields (70%). In any case, there was a good measure of variability, such as first-year teaching staff and teachers at the end of their career and adequate representation of the various courses at the University (Coggi, 2019a). A total of 48 participants completed the course.

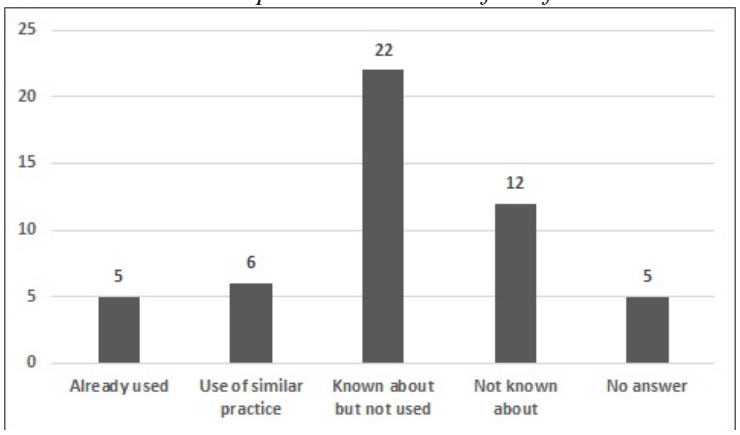
With specific attention to the previous experience in the use of portfolios in teaching, the initial survey shows the inadequate diffusion of portfolio use: only five of the participants had already used the tool in their teaching (n = 2) or throughout the degree course (n = 3, all taught the same course). Another six participants (all in scientific fields) affirmed that they asked students to produce materials and exercises that were collected and, in some cases, used for the purposes of exams, while acknowledging that they had never organized such requests in a framework that can be considered a portfolio. Finally, most of the participants (n = 34) declared that they had never used the tool and, in some cases (n = 12), did not know how to or that their first experience with one was during the IRIDI course, when they were asked to compile a personal portfolio (Figure 2).

Outcome Measures

The effectiveness of the IRIDI program was assessed through various tools: (a) a questionnaire and a self-assessment rating scale for the initial identification of the participants' experiences and beliefs, (b) a brief preliminary questionnaire for each module to examine the participants' previous knowledge on the specific contents of the course, and (c) a final survey aimed at verifying changes produced by the course.

For the module on portfolios in particular, the participants' knowledge of the tool, previous experience, and opinions on its introduction in teaching and assessment were initially examined. At the end of the classroom activities, the teachers were given an exercise on designing a portfolio. This made it possible to detect changes in the participants' knowledge of the tool, their understanding of the strategies of use, and their willingness to introduce it into their teaching practices, adapting it to the specific needs of the course.

Figure 2
Previous Experience in the Use of Portfolios



The final results showed the transfer of the proposed applications into the participants' teaching. To this end, it was possible to refer to the overall questionnaire proposed at the end of the training activities and final workshop of the IRIDI course, during which the participants presented a few proposals, also concerning the use of the ePortfolio.

Results

Initial Survey

Perception of portfolios. Portfolios were mainly thought to be a kind of archive of students' works and linked to a single subject. In some cases, reference was made to the possibility of the tool documenting students' knowledge and skill-building processes. Only in one case was explicit reference made to the fact that portfolios can help students gain awareness of achieved outcomes. In two cases, the use of a portfolio was perceived as a link to the working world.

Portfolios and assessment. Only a few teachers (*n* = 7) associated portfolios with assessment. Again, it was regarded as an archive of the outcomes achieved by the students in intermediate assessments. Some participants perceived the possibility that its use was able to provide additional information and assessment elements with respect to traditional exams, and that it could promote self-assessment by students. For those who already used the portfolio in their teaching, it was regarded as a starting point for oral exams.

Benefits and critical aspects. The teachers recognized in general that portfolios provided added value since they enabled students' progress to be documented, especially in advanced courses and in courses spread over several semesters, or for evaluation strategies based on exercises and reports produced by the students during their course. Portfolios were also recognized as being useful to promote coherence between the teaching provided and the skills expected on the outside, as it implies shared systematization and clarification of expected goals (this is the case for courses with very clear and defined exit profiles), or, in the case of courses with more fluid and diversified career opportunities, allowing students to present themselves more transparently and highlighting their strengths.

Portfolios did not seem to be particularly applicable in basic courses or in courses with a large number of students. Finally, the participants recognized that when the digital form was used, teachers needed to master technologies as well as the tool itself. These reservations echo those already highlighted in the literature (Clark & Eynon, 2009; Kelly-Riley et al., 2016; Deneen et al., 2018).

Final Survey

At the end of the module, participants were given the opportunity to do an exercise consisting of the design or revision of a portfolio for a single subject or an entire degree course. For this purpose, they were given a worksheet containing the essential elements that needed to be explained (Table 1). Qualitative analysis of completed products makes it possible to identity elements that reflect the short-term effect of the training received, with particular reference to the ability to design the tool and willingness to use it in teaching.

Of the 48 participants who completed the course, 39 carried out the exercise, uniformly distributed across all the represented disciplinary areas. The proposals were distributed across all levels of education (bachelor's degrees, master's degrees, doctoral degrees). Out of these, 33 of the participants designed a portfolio from scratch whereas six reviewed an existing one (Table 2).

Table 1
Proposed Exercise

Assignment: Design or revise a portfolio

• Type of portfolio chosen
• Reference subject or degree course
• Expected goals/exit profile
  o Some examples to contextualize
• Documentation methods
  o Briefly describe the products, how you plan to develop any reflections, possible assessment or self-assessment tools, etc., and explain your choices
• Strategies for using the portfolio in assessment
• Reflections on possible critical aspects identified or envisaged in the use of the planned portfolio and on the possible solutions that have been or will be adopted

Table 2
Characteristics of Portfolios Designed

	Portfolio ex novo	Portfolio revision	Total
Single subject	29	3	32
Degree course	4	3	7
Total	32	6	39

In 32 cases, the proposal was for a single subject and seven were for an entire course. Of those seven cases, three of the participants taught in courses where a portfolio was already used to document the students' entire educational path, and four hypothesized the introduction of the tool in areas where it was not used.

Next, we describe the characteristics of the portfolios presented by topic, highlighting their strengths and weaknesses and providing some examples chosen in order to give an idea of the variety of subjects involved.

Documentation of the learning process. Overall, the course participants proposed, articulated, and justified original methods for documenting the students' learning process, consistent with the goals set for the reference subject. For example, one participant proposed the following:

> Schematic diagram (by hand or in power point) of the internal structure of a chloroplast. Subsequent comparison with an example model for self-correction. Choice of a video (internet search) considered suitable to explain the mechanism of photosynthesis, with the student's comments on the strengths and weaknesses. The student's arguments on the influence of climate change on photosynthesis. (Biology and Plant Diversity Teacher)

In some cases, like the following, an initial recognition of prerequisites was expected.

> Self-assessment test. Two ongoing tests (as a simulation of the exam), one on historical knowledge and the other on skills in exegesis and communicating history starting from a source, with self-assessment based on criteria given by the teacher. Self-produced video on a detailed topic of the course, with reflections on the effectiveness and limits of the student's elaboration process and presentation attached. Logbook in which to note reflections raised during lectures and ongoing tests, with an assessment of the completed course compared to the starting point. (Greek History Teacher)

The level of complexity of the requests and the framework that linked the assignments given to the students varied. In the following example, the materials required for the documentation took the progressive development of students' skills into account:

> *Activity 1 (evaluation of incoming skills): My linguistic biography and motivations.* Linguistic autobiography, text or diagram, and a questionnaire on your individual profile as a Language student (motivation and entry skills). *Activity 2 (phonetic competence)* 1. The student records a sample reading of a chosen text and are then given a written diagnosis of the reading and suggestions for exercises to improve imperfections. 2. The student uploads a report of the observations made during the session and documents how he/she performed the exercises. 3. The student uploads the second

> reading of the text (together with the first one). Followed by feedback from the tutor. *Activity 3:* Written analysis of the morphological characteristics (verb and name) of German in a level A2 text. Teacher's feedback. *Activity 4:* Written analysis of word formation processes in a level A2 text. Teacher's feedback. *Activity 5:* Written analysis of sentences based on the model of the type of sentence. Teacher's feedback. (German Teacher)

In some cases, like the following, particular attention is paid to ensuring that the portfolio allows the student to observe their progress, consequently motivating their learning:

> Students must produce a "Field Notebook" in which they describe in detail the morphological characteristics of the different species being studied, and which includes their drawings, original photographs and any dried plants. The field notebook must provide detailed information and be easy for other students in the laboratory to read. Students are required to draw the plants they observe. About halfway through the course, I ask them to compare their first drawings with their latest ones: there is almost always a very clear improvement in all of them, and it seems to me that this motivates them a lot. (Laboratory for the Identification and Phenology of Cultivated Plants and Pests Teacher)

Portfolios are also used to document practical experience and encourage reflection on links to the theory. Portfolios thereby become a useful support for the professional development process. For example, one participant noted:

> In the portfolio, the student noted the pathologies detected in the various visits made (at least 10 different pathologies), noting the clinician's behavior during semeiotic, diagnostic and therapeutic processes. Before the exam, the student compares what he/she has seen at the clinic with that learned in class, and discusses (in the portfolio) how the clinician works with respect to what he/she has been taught, trying to note differences and similarities, in a critical and responsible manner. (Oral Medicine Teacher)

An important element that recurs in some of the proposals is interdisciplinarity: while the comprehensive portfolio for the entire degree course is not contemplated, it is proposed that students construct a product that integrates several subjects. About this, one trainee proposed, "Write an interdisciplinary project that concerns at least three of the courses attended in the first semester" (Advanced Cell Biology and Biotechnology Teacher).

Ideas that include peer-to-peer file sharing at different levels are also interesting, ranging from peer assessment to a group portfolio that is useful to cooperative learning. For example, one participant proposed:

> Collaborative annotation of a text: after having read and commented on some texts in the classroom, the teacher uploads them to a text annotation platform (e.g., Google Docs) and the students, divided into groups, must then annotate them independently. Each group deals with a different aspect (structural, linguistic, stylistic, thematic . . .). (Romanian Literature Teacher)

Similarly, another participant wrote:

> The student is asked to collect photographs of dogs and cats, and, for each subject, speculate on the corresponding genotype at the main loci involved, based on the coat color. The data collected is subsequently shared with the whole class. Then, using all the observations gathered, the allelic and genotypic frequencies for the entire sample are calculated and it is verified whether the population is balanced. Finally, students write a personal reflection, formulating hypotheses on the mechanisms of evolutionary changes taking place in the observed population. (Applied Animal Genetics Teacher)

The participants' assignments rarely require students to reflect on both their achievements ("What I learned") and their knowledge construction and learning development process ("How I learned"), which is an aspect that the literature highlights as being a characteristic element of the portfolio and useful for the development of metacognition. The following proposal is focused on metacognitive aspects:

> We propose a conclusive "narration" of the work carried out, in which the students are asked to describe the analysis, design and development process they experimented with for a selection of created products, and to make a presentation that highlights the relationships between the different stages of the process and the critical aspects, and explains the solutions to the critical cruxes. The ideal student will not do everything in this assignment perfectly (because it is not possible!) but is aware of the difficulties he/she has encountered, strengths and weaknesses, and of the reasons why it was difficult to meet certain quality criteria. To offer support to students for this activity, you could provide a series of questions

> which the narration must in some way answer. (Software Development Laboratory Teacher)

Strategies for using portfolios in assessment. The portfolios presented are rich with references to continuous and formative evaluation, and contain a variety of points-of-view: in addition to the teacher's feedback, they propose the use of self-assessment (guided by criteria provided upstream and shared) and peer assessment, thereby enriching the student's opportunities for reflection and improvement. For example, one trainee proposed diversified feedback:

> (a) Compilation of a paper or electronic prescription for a veterinary medicinal product. The prescription is written and printed, and its accuracy is discussed collectively as a group exercise (peer assessment). (b) Use of software for autonomously compiling a report on an adverse reaction or decreased effectiveness of a veterinary medicinal product. The document is sent to the regional Pharmacovigilance Centre, which in turn sends personalized feedback to each student. (c) Short written report on the choice of medicine based on the indications / case provided by the teacher. Critical discussion of the choice made (group exercise). Feedback from the teacher. (Veterinary Pharmacology Teacher)

Another participant suggested self-assessment:

> I leave some rather complex questions on the platform, the answers to which require some knowledge of my course topics and those of parallel courses, and the integration of information from both. I ask students to write their answers after about 10 hours of lessons - and towards the end of the course, I ask them to answer the same questions again. I do not want them to look at or change the answers they gave previously. This will be the subject of a self-assessment. (Developmental Biology Teacher)

Others proposed peer-assessment. One participant wrote, “In addition to a ‘laboratory notebook,’ the students prepare a presentation of a scientific article, and then discuss it in class. The presentation is usually followed by a general discussion to highlight strengths and weaknesses” (Laboratory of Cell Biology and Pathology Teacher). Similarly, another participant proposed, “Reading of a scientific article on a historical linguistic topic and the compilation of a reading form. Peer feedback (each student reads another student’s form and makes annotations)” (German Teacher).

With regard to formative vs. summative assessment, some participants fear that the use of the portfolio during the exam limits its intrinsic motivational and educational value. For example, one participant noted:

> So far, I have used these activities to promote learning without the assessment contributing directly to the final assessment. I prefer to insist on the fact that the activities help students understand the topics, freeing them from only having to do them to get a mark. (Advanced Molecular Biology Teacher)

Similarly, another participant wrote:

> At the moment a specific evaluation is not given, the purpose of the analysis of the products being making the student understand what could be improved. Due to how I am currently using it in this subject, I wonder if it should actually be part of the assessment. (Laboratory for the Identification and Phenology of Cultivated Plants and Pests Teacher)

Others believed that the tool could be the starting point for conducting the final exam, thereby reducing the importance and complexity of the oral examination. Some teachers suggested that the portfolio should only be used in individual cases where there are elements of uncertainty. For instance, one participant wrote, “It would be possible to use the portfolio as a tool for formative assessment, and reduce the coursework actually discussed during the final oral examination of the course” (Romanian Literature Teacher). Another stated, “After a structured written test on the coursework, I would use the portfolio to verify individual borderline assessments” (Biology and Plant Diversity Teacher).

In the event that the course included group activities (e.g., project presentations), the portfolio being discussed during the oral examination was also seen as an opportunity to distinguish the individual contribution of each student. For example, one participant wrote:

> Currently the presentation of the final projects is guided by the teacher. This means that discussions about the projects are very similar to each other and makes it difficult to assess. Furthermore, since the project is presented by a group, I cannot always be completely sure that there are no differences between the various components. Using the portfolio, I would still ask questions about the aspects that I consider critical, but I would also consider the students’ ability to assess their strengths and weaknesses. (Software Development Laboratory Teacher)

Critical aspects identified in the adoption of the portfolio. The critical aspects that the participants associate with the adoption of the portfolio reflect those highlighted by the literature. There are teacher-centered reservations about the amount of time needed to manage the tool, the difficulty of providing adequate feedback to everyone, an elevated number of students, and the need for adequate teacher training. For example, one trainee identified critical aspects concerning the teacher:

> The critical aspect regards the high number of students in the class each year (about 250) and therefore the impossibility of a targeted revision, also due in terms to the amount of time available. It would be difficult to even offer everyone one piece of feedback on the work handed in. We could ask the students which product they would like to be assessed. (Italian Linguistics Teacher)

Similarly, another wrote, "Institution-wide teacher training is needed, implemented by the universities themselves. Teachers, in fact, show a certain resistance towards topics regarding teaching, which is less promoted than research in career progression."

Another set of concerns regarded the students: difficulty in involving them, the need to adjust the overall workload required, and the risk of penalizing students who are already in difficulty. For example, one participant identified critical aspects concerning the student: "Convincing students of the usefulness of the portfolio as a formative assessment tool: keeping up with the portfolio activities requires time and energy that not all students are willing to invest" (Romanian Teacher). Similarly, another wrote, "The students have many other courses asides from mine. It is necessary to clarify the commitment required from the start, and to limit the activities to a reasonable number" (European Union Law Teacher).

Likewise, another participant noted:

> The time spent on project discussions is longer; the students' workload increases; people with difficulties in expressing themselves (not only those with learning disabilities) could be penalized. For the latter you could allow alternative report formats, such as a recorded video presentation. (Software Development Laboratory Teacher)

Finally, some critical aspects related to technology were mentioned, like in the following example:

> The adoption of the portfolio requires the adaptation of material currently available on Moodle and the development of new materials (for example, video capsules for feedback . . .), therefore planning and implementing it all requires competence, composure and time. Then there is the problem of students who are moving from other courses, since they do not have access to Moodle due to problems concerning university credentials, and therefore have to find different solutions. (Analysis of Experimental Data Teacher)

Transfer

The final questionnaire and the contents of the presentations given during the final workshop made it possible for us to analyze the teachers' willingness to use the portfolio in their teaching and assessment activities (transfer of acquired skills). At the end of the course, the participating teachers broadened the range of assessment tools introduced during their courses and foresaw using them according to the principles of formative evaluation. Some of the proposed tools (e.g., self and hetero-assessment rubrics, diversification of information sources that contribute to the final assessment) can be a useful part of a student's portfolio. In the case shown next (in the humanities field), explicit reference was in fact made to the portfolio being introduced into a specific subject:

> I introduced the "study portfolio," a different written exam method from the one I have been using for some years now; the portfolio allows the student to write down the knowledge acquired during the lessons (with sections that must be updated weekly), integrating them with individual research. The composition of the portfolio is more gradual, controlled and progressive, but requires the student's constant commitment, and an even greater commitment from the teacher to correct it. Compared to a traditional written test, I believe that there are already interesting results—and useful to the student—during the construction process, as it requires the use of skills (preparation of a word file, bibliographic research, academic writing) which are beneficial in themselves, including separately to the final assessment; however, it can only be used by a limited number of students for each course, due to the feedback required from the teacher.

The intended method of use referred to the same principles, highlighting benefits, limitations, and possibilities of adaptation even in contexts where there is a high number of students.

Of the 46 teachers who answered the final questionnaire, 26 stated that finding general assessment methods for the course they taught was useful. Seventeen of these identified a student skills portfolio (mostly digital) as a strategy able to document different learning experiences, highlight acquired skills, constitute an

element of the final assessment to complement the thesis discussion, and become a tool for graduates to present themselves in the world of work. Of particular interest is the proposal made by one participant (in the scientific field), which again reflected the philosophy of the portfolio, appropriately contextualizing it in the specificities of university courses:

> I am referring to a five-year degree course, which in the fourth year offers the choice of three different curricula. This is when the student should start creating his/her portfolio, through the development of a document or multimedia product, compiled in order to motivate the choice of curriculum (and increase awareness). The last part of the student's career will in fact all be based on the creation of a professional profile and an extremely personalized study path. Since this choice will naturally be based on achieving an informed choice, the portfolio will be the ideal tool to accompany the student on this path, allowing him/her to create a tool with which to be assessed by both the degree examination board and the professional world.

The final workshop also enabled us to gain an understanding as to whether and how much the portfolio training experience stimulated participants to reflect on the potential use of this tool teaching and evaluation. Twelve groups presented the introduced innovations, starting from the input provided by the IRIDI course. Of these, half referred to the portfolio and presented its use at different levels (e.g., single subject, degree course, department). The variety of disciplinary areas represented in the presentations should be noted. In the initial survey, on the other hand, the teachers who claimed to use or be familiar with the tool were mainly limited to those from the scientific field.

Discussion

We conducted this research in a context in which the use of portfolios was still significantly limited. Furthermore, the training module was shorter than other courses directed at building portfolio literacy (e.g., Eynon & Gambino, 2018). This was in part due to the organization of the module within a university teaching training course.

Overall, analysis of the exercises carried out by the participants shows the persistence of a few critical aspects. These could be resolved when implementing the tool through progressive support from teachers who have already completed the training module. Some teachers continued to perceive the portfolio as something that contains products rather than a framework for understanding the learning path. In some cases, a student's reflection on his or her own learning process was not adequately nurtured, which in actual fact is one of the characterizing elements of the tool, especially with reference to a single subject and the progressive construction of knowledge.

In general, however, the proposals included various articulated documentation methods, which often required students to genuinely commit themselves to reaching a certain learning goal or to demonstrate that they have already reached the goal. Other particularly interesting aspects were the interdisciplinarity and the push towards peer-to-peer file sharing and comparison. Much attention is given to the feedback that should be provided, whether it be directly from the teacher, during self-assessment or from peers. Furthermore, it is evident that there was an adequate problematization of the use of the portfolio in assessment and of the workload that the tool required from the students and the teacher. As is also underlined in literature, the portfolio proposals from the participants required a more student-centered approach to teaching, albeit implicitly. Said proposals were consistent with the elements of effectiveness of use of the tool found in a lot of present-day experience reported in recent literature on the subject (e.g., Eynon & Gambino, 2018; Yancey, 2019).

The statements in the final questionnaire and the proposals for innovation presented at the final workshop, show an increased level of willingness to use the tool across the disciplinary fields. The results of the module dedicated to the portfolio in the IRIDI course therefore show how theme-based training—contextualized in a systematic course and focused on changes in teaching that are consistent with the aims of the tool—made it easier for teachers to understand its functions and potential, thereby increasing their willingness to consider introducing it into their teaching.

In this study, we examined the outcomes of a training module on portfolios, which was organized as part of a pilot university teaching and evaluation teacher training course. This context, together with the number of participants and the structure of the specific task on portfolios, prompted us to favor a qualitative analysis of the products and the participants' answers to questionnaires at the beginning and end of the course. Subsequent research developments, which will take into account further editions of the course and will be able to count on a numerically larger sample, will allow for more analytical assessments, including quantitative assessments.

The level of the participants' knowledge of the tool at the beginning of the course and their experience using it was low and homogeneous in general within the sample. The organization of the research did not allow for a control group. Systematic comparisons

between those who attended the course and those who did not can therefore not be drawn. Future research paths could investigate this aspect, examining, for example, the level of adequacy—in relation to the evidence found in literature—of the portfolio structures proposed by teachers who had attended the training course and by those who had not attended it, or potential differences between different subject areas. Further elements of reflection could derive from the analysis of the portfolios produced by the students of the course participants.

The third edition of the IRIDI training course will begin in 2019-20, raising the number of teachers involved to 150. Two other courses aimed at specific study courses (veterinary sciences and law) have also begun in parallel. This will allow further interesting developments in the research, aimed not only at the use of portfolios by a single teacher but also at the adoption of the tool within a course of study. Further insights could derive from the analysis of the effects that the use of the teaching ePortfolio proposed to the teachers attending the course may have on their perception of the educational value of the tool for students.

Conclusions

Portfolios are gaining recognition in universities, in particular for their effectiveness in promoting in-depth learning processes and strategies in students, which are useful for academic success and lifelong learning. To some extent, the introduction of portfolios into single subjects or entire curricula also contributes to moving teaching towards student-centered learning, promoting the use of active strategies supported by diversified media and authentic formative evaluation. There are undoubtedly tangible problems concerning the application of the tool that are linked to several factors such as digital skills, technical rigidity and the increase in workload perceived by teachers and students. These critical aspects can, to some extent, be overcome by providing adequate teacher training.

The structure of the training module on the use of portfolios (e.g., theoretical presentation, illustration of practical examples and solid cases, exercises and feedback) and the outline for the design task presented in this paper can be adapted to a wide range of subjects and has proven to be effective in reinforcing teachers' skills in using portfolios in accordance with the examples found in literature and their willingness to introduce their use in their teaching.

The research presented, even with the limitations highlighted previously, is therefore able to offer ideas for the development of training directed at increasing the knowledge and skills of teachers in the construction of portfolios to be proposed within their teaching or to be implemented within an entire course of studies, thus contributing to increasing portfolio literacy (Yancey, 2019) by teachers and students.

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EMANUELA M. TORRE is Associate Professor of Empirical Research in Education in the Department of Philosophy and Education Sciences (DFE) at the University of Turin. She currently teaches Educational Research and Evaluation. For DFE, she is referent for Guidance and Tutoring since 2013 and a member of the Didactis Commission since 2018. She is part of the research group IRIDI, which is aimed at identifying and experimenting innovative practices of university teaching. Her activities are mainly focused on portfolio and ePortfolio. She has studied the following main topics at the level of empirical research: (a) planning and evaluation in the educational and training fields, (b) educational interventions for cognitive and motivational enhancement for children and adolescents, (c) teachers and educators training, (d) university teaching and tutoring, and (e) skill assessment and portfolio. She is the author of numerous publications about these themes.