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# Enhancing Learners' Autonomy With E-Portfolios And Open Learner Models: A Literature Review

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### **Abstract**

This article considers how e-portfolios improve learner autonomy in higher education, especially when using open learner models (OLMs). OLMs are artificial-intelligence-built representations of interactions between learners and instructional environments, where learners have access to data about their interaction patterns. The analysis is based on a review of 24 research articles. Results suggest that e-portfolios improve learner autonomy, especially by strengthening self-reflection capabilities. The review also identifies areas of e-portfolio and OLM research that require further investigation.

### **Keywords**

e-portfolio; self-directed learning; learner autonomy; open learner models

The importance of supporting learner autonomy has been widely acknowledged (King, 2011). Learner autonomy is often referred to through self-directed learning (Long, 1989). Knowles (1975, p. 18) initially defined self-directed / self-regulated learning as “a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes”. Similarly, Holec (1981, p. 3) defined autonomy in learning as “determining the objectives; defining the contents and progressions; selecting methods and techniques to be used; monitoring the procedure of acquisition properly speaking (rhythm, time, place, etc.); evaluating what has been acquired”.

Autonomy in learning does not mean isolating the learner. Other people can be a crucial learning resource. Collaboration between learners is considered an important part of autonomy development (Eneau, 2008; Eneau & Develotte, 2012).

Portfolios are a way to foster learner autonomy (Beckers et al., 2016). The portfolio is a digital or paper-based file used to collect, store and manage data (Bélair & Van Nieuwenhoven, 2010). Portfolios are designed to support learning, assessment and

employability (Wolf & Dietz, 1998; Zeichner & Wray, 2001; Butler, 2006; Barrett 2010; Matthews-DeNatale 2014) and are respectively referred to as learning portfolios, credential portfolios and showcase portfolios (Zeichner and Wray, 2001). Portfolios are used in general education, vocational training and professional development (Eneau, Lameul & Bertrand, 2014). They enhance students' reflexive practice (Le Boucher et al., 2018).

Portfolios may be combined with Open Learner Models (OLMs), which is an important class of learner awareness tool. OLMs stem from research into artificial intelligence in education, specifically, intelligent tutoring systems (ITS). ITSs are artificial intelligence settings designed to tutor learners by defining learning problems and solutions and by identifying the learner's learning process. Data collected can be used to map the Learner Model, i.e. the interactions between the learner and the instructional environment (Holt et al., 1991), as well as the learner's knowledge, difficulties and misconceptions (Bull, 2004; Guo, 2007). OLMs open up sharing information with the learner to support their learning processes (Bull, 2004). Learners can thus access data to consider, apply and use in their portfolios. The OLM thus strengthens self-reflection, metacognition and motivation (Guo & Greer, 2007; Raybourn & Regan, 2011) and reinforces the learner's aptitude to self-regulate the learning process, a component of learner autonomy.

This article is part of the SEDELA ("SElf-Data for Enhancing Lifelong learning Autonomy") research project. The project aims to enhance learner autonomy skills in lifelong learning through the design and implementation of an innovative self-data management approach based on an electronic portfolio in higher education (El Mawas et al. 2017; Kiffer et al., 2018). The research question addressed in this paper is: how can an e-portfolio approach using open learner models enhance learner autonomy in higher education?

Several authors have reviewed the literature on e-portfolios. Some focus on specific areas such as medical or nursing education (Green et al., 2014); secondary education (Romero, 2014); and formative assessment in foreign language learning (Burner, 2014). Alan and Sunbul (2015) reviewed 17 experiences of implementing and using e-portfolios in the Turkish education system. However, these reviews have not fully addressed higher education or the issue of developing autonomy skills.

Although Butler's review of the literature on implementation and impact of e-portfolios (2006) did not consider their role in developing autonomy in higher education students, it showed that implementing e-portfolios is a long-term process that "need(s) to be an integral part of a program of study, not an 'added-on' assessment, which may necessitate the review and restructuring of courses" (Butler, 2006, p.19). This research also underlined that the type of portfolio, its purpose and its audience must be clear for successful implementation.

Bryant and Chittum (2013) highlighted the lack of strong empirical evidence that could help implement e-portfolio approaches. As noted by Scully et al. (2018, p. 8), they found that only 18 out of a set of 118 articles presented "data on learning outcomes, or outcomes associated with learning, such as motivation and reflective practice".

Panke (2014) identified instructional scaffolding and peer feedback as the two main factors to support learning and reflection in an e-portfolio approach. The author emphasized the need for a "careful reflection of pedagogical motives, organizational context and instructional setting to successfully orchestrate an e-portfolio process to trigger reflection and learning" (Panke, 2014, p. 1536).

Beckers et al. (2016) pointed out that portfolios may help develop self-directed learning skills. They argue that development of self-directed learning skills can be supported when “faculty development aimed at supervising self-directed learning skills development is provided; the portfolio is integrated into the educational routine (e.g., it is implemented school-wide, it is aligned with course outcomes); teachers coach their students regularly; scaffolding is applied to increase student motivation; the portfolio is designed to at least facilitate basic elements common to most SDL theories: goal-setting, task-analysis, plan implementation, and self-evaluation” (Beckers et al., 2016, p. 44).

These reviews reveal factors and conditions which may support self-directed learning using an e-portfolio approach. However, they tell us little of the links between autonomy, e-portfolios and OLMs; hence the need for the present review.

### **Method**

From the Education Resources Information Center database, Google Scholar and the Web of Science databases, a primary list of 1243 references containing the keywords “portfolio” or “e-portfolio” was drawn up. The keywords “autonomy”, “self-directed learning” and “learner model” were then used as filters to select references relevant to the research question. This left 24 peer-reviewed articles issued from 2007 to 2018, which constitute the corpus analysed for the present literature review. These articles address the research question – how can an e-portfolio approach using open learner models enhance learner autonomy in higher education? – from two different yet complementary angles. The first explores the material, human, technical (including OLMs) and pedagogical conditions that may encourage autonomy. The second questions the effects of the e-portfolio approach. The results outlined below shed light on both aspects.

### **Results**

Four major conditions for the successful use of portfolios emerge from the literature. First, collaboration between students appears crucial for helping learners develop autonomy (Jimoyiannis & Tsiotakis, 2016, p.127): “meaningful reflection is best facilitated by peer collaboration and mentoring within a learning community evolving in the e-portfolio spaces”. More specifically, a pedagogic strategy based on the principles of social constructivism supporting learners’ collaboration is to be set up. In this context, activities promoting collaboration and critical thinking should be favoured or privileged. These authors suggest that the e-portfolio design should make room for self-reflection and active learning as well as “communication, collaboration and critical thinking within a supportive community of learning”. These results are in line with research showing the importance of collaboration for developing autonomy in adult education (Eneau, 2008; Eneau & Develotte, 2012). Autonomous learning implies that other people are required as a resource by the learner when necessary. This makes collaboration a key skill of autonomy development. Collaboration also involves teachers, whose role is to accompany the learners by providing them with scaffolding.

Second is the learner model. Guo (2007) and Guo & Greer (2007) emphasized that information provided by the learner model must be as clear and accessible as possible. This

is essential to enable teachers to put in place teaching activities that best help the learner. It is also essential to provide the learner with more food for thought when carrying out reflexive practice.

Third is taking into consideration the students' views about how the e-portfolio should be structured. Alexiou and Paraskeva (2013) show that student participation in structuring the e-portfolio can help to enhance self-regulated learning.

Fourth is setting the e-portfolio approach in a long-term perspective. Lopez and Rodriguez-Illera (2009) show that, although some positive effects of e-portfolios on users' self-efficacy can be seen from the second month of use, students need more time to identify how the platform, the methodology and the activities are working. This result is consistent with the findings of Butler (2006) according to which e-portfolio implementation is more efficient in a long-term perspective.

On the effects side, a range of papers conclude that e-portfolios have an overall positive effect on learner autonomy and self-directed learning (Alexiou & Paraskeva, 2010; Büyükduman & Şirin, 2010; Gonzalez, 2009; Ivanova, 2017; Khoosf & Khosravani, 2014; Nguyen & Ikeda, 2015; Šliogerienė, 2016; and Yildirim, 2013). Büyükduman & Şirin (2010) showed that the e-portfolio enables students to take the ownership of their learning, raises their awareness of their strengths and weaknesses and allows them to adapt the learning process to their own pace. Some authors highlight the benefits of e-portfolios for developing specific autonomy skills in relation to metacognition (Dominguez-Garcia et al., 2015; Gonzalez, 2009; Ivanova, 2017; Meeus et al., 2008); self-reflection (Slepcevic-Zach & Stock, 2018); and self-regulation (Ciesielkiewicz et al., 2014; Nguyen & Ikeda, 2015). Students become more active and responsible learners (Imafuku et al., 2018) and more engaged into knowledge acquisition (Gorbunovs et al., 2013).

This literature also shows that the e-portfolio approach has other positive effects indirectly or partially related to autonomy development. Using e-portfolios increases learners' ability to mobilize their creativity (Jimoyiannis & Tsiotakis, 2016; Terkowsky et al., 2012). E-portfolios also seem to have a beneficial impact on the development of professional identities (Imafuku et al., 2018) and competences (Rezgui et al., 2017; Slepcevic-Zach & Stock, 2018; van der Schaaf et al., 2017).

## Discussion

The reviewed literature indicates that using e-portfolios improves learner autonomy. However, as pointed out by Bryant & Chittum (2013), these results should be considered with care. The effectiveness of e-portfolio implementation remains insufficiently documented. More empirical evidence is needed as most studies are based on stakeholders' opinions rather than empirical data.

With respect specifically to the relationship between learning autonomy, e-portfolios and learner models, the literature remains scarce as few authors have addressed the topic (mainly Bull, 2004; Guo, 2007; Guo & Greer, 2007; and van der Schaaf et al., 2017). More research is needed; many challenges remain. More attention will have to be paid to standardizing methods and metrics in developing and using learner models (Bodily et al., 2018). Learner access to data needs to be reinforced (Bull & Kay, 2016), while the sharing of data between learners, supervisors and researchers remains problematic and requires sound

procedures (van der Schaaf et al., 2017). Design-based research could be helpful in this respect.

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