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The impact of service learning supported by the ePortfolio on the development of professional competencies

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ABSTRACT

The assessment of experiential learning, such as service learning, and its outcomes, tends to take time and effort. This paper examines how service learning and traditional learning activities help university students acquire both course-specific and key competencies that would be of value in their professional careers. The results show that students consistently indicated they were better able to acquire these competencies, especially key competencies, through the service learning supported by the ePortfolio experience. Furthermore, the responses were statistically significant in 15 out of 20 competencies. The implication arising from this research is any service-learning course should provide evidence of the competencies acquired by the students; otherwise, it might be considered as volunteer service or community work by educational institutions, especially by those with little or no experience incorporating service-learning projects in their programs.

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Service-learning; ePortfolio; experiential learning; professional competencies; higher education

1. Introduction

We live in a world with not only rapid-fire technological advances but also exponential growth of knowledge and unpredictable events that can profoundly affect conditions on a global level. In order to be prepared to live in such a world, our students must have far more than theoretical knowledge of their chosen domains. They need to be able to apply this knowledge to real-world situations, and as such service learning can be very beneficial. As Flannery and Ward (1999) state: ‘service-learning challenges students to apply classroom knowledge to community problem solving’ (p. 325). Students must also be able to learn continuously in different learning environments and adapt to changes swiftly as technologies and the needs of the labor market are in continuous evolution (Organisation for Economic Co-operation and Development [OECD], 2018). The European Union has identified competency-based education as foundational for meeting the education and labor market needs of the citizenry (European Commission, 2019).

Students of any educational institution nowadays need to learn by doing, that is, to integrate what they learn in class as a way of life. To do this, they must have the

opportunity to apply theoretical knowledge acquired in a real-life situation, allowing them to acquire a series of skills that could advance their professional and social development. Activities outside the classroom that enrich and complement learning should, therefore, be part of the academic curriculum and be integrated into the organization of the different degree programs.

Service-learning experiences allow students to be protagonists of their comprehensive training. In addition to requiring active participation, experiential learning helps them reflect upon and adopt a series of skills that will give them tools for the future. Service-learning proposals are becoming more common as stakeholders are beginning to appreciate both long- and short-term benefits in undergraduate and graduate-level studies. However, service learning not only comprises the service experience; it must also be accompanied by the educational component, which requires the participant to reflect on the experience and assimilate it as part of their education. This entails careful preparation and organization.

The use of the ePortfolio as an educational tool has grown in recent decades. In many instances, however, implementation is such that students only reap some of the benefits that the ePortfolio has to offer. For example, traditional ePortfolio systems are usually limited by the existing infrastructure in each educational institution or even by the particular characteristics of a group of students of a specific course. Technological compatibility between tools is currently a topic that is in the limelight. Compatibility issues between platforms have been increasingly common since the Covid-19 pandemic and the resulting increase in digital communication.

Furthermore, the ePortfolio requires students to make an effort to document their work and reflect on it. From the authors' own experiences, students generally prefer to avoid documenting what they do, especially after completing the task. This frequently happens with STEM students, who carry out practical tasks such as experiments, computer programming projects, and once the problem is solved, they no longer wish to continue with the following phases because they do not consider them essential or associate them with learning (Milara et al., 2019). The ePortfolio helps to keep a structured record of the work done. Another critical aspect of ePortfolio development is reflection, as it helps students to integrate learning experiences. It is not just about doing but about capturing the content that can be learned from those experiences. Finally, the ePortfolio has a teamwork component that includes not only fellow students but also allows for collaboration with teachers, mentors, and the entire learning community in which students choose to participate. As can be seen, various aspects of the ePortfolio and the service-learning experiences match. Furthermore, service learning and ePortfolios are both considered high-impact practices (HIPs) and develop similar competencies. Research also suggests that ePortfolios combined with another high-impact practice can enhance the latter's effectiveness and its impact on students' learning (Eynon & Gambino, 2018; Hubert et al., 2015).

This paper combines service learning, ePortfolios, and competencies. In the present study, Spanish students designed and produced textbooks, exercise books, and video tutorials during class. They also collaborated with American exchange students to proof-read and edit said materials. Students reflected on their service-learning experience and the design process and uploaded all the materials on their ePortfolios. Educators presented and explained the didactic materials to teachers from a Maasai school in Kenya,

who then included them in their curriculum and used them to teach students in their respective schools. This service-learning project used innovative technology to teach computer skills to teachers on a different continent. Those teachers used this knowledge to teach said skills to their students, thereby allowing the university to serve an educational community in need.

The main research question of this study is whether service-learning and traditional learning activities help university students acquire both course-specific and key competencies that would be of value in their professional careers. For this purpose, researchers administered a questionnaire created and validated by Ortega-Tudela et al. (2015) to the students who participated in the service-learning project. They were asked to evaluate how well they acquired 20 distinct competencies in the class's service-learning and traditional learning portions.

The novelty of this work lies in the fact that, as far as we know, there are no previous studies on acquiring competencies through an international service-learning project in the Spanish context. The main contributions are twofold. First, students have consistently indicated in the surveys that they can better acquire competencies, especially key ones, through the service-learning experience. Additionally, the participants used ePortfolios to reflect on their experience, which may have contributed to the positive results of this study.

The structure of the paper is as follows: [Section 2](#) summarizes the evolution of competency-based education and analyzes competencies developed through service learning and ePortfolios, citing some related relevant works. [Section 3](#) presents the methodology, describing the main characteristics of the MaTumaini service-learning project, as well as students' ePortfolios content. In [Section 4](#), the results are discussed. Finally, the paper ends with the main conclusions and future research.

2. Literature review

2.1. Competency-based education

The concept of competencies has a long history in psychology and education. Once the industrial revolution shifted the underpinnings of the American economy from agrarian to industrial, education had to adapt to a new paradigm. In the early 1900s, Charles Prosser, who is considered by some as the father of vocational education in the United States, developed a list of abilities that he thought should be acquired for one to be successful in the workplace. These abilities are remarkably similar to some of the competencies identified as necessary for success in the information age. However, the competency meaning was more formally defined by Robert W. White, a Harvard psychologist, in his seminal paper, 'Motivation Reconsidered: The Concept of Competence,' published in 1959 (White, 1959). White defined competency as an 'organism's capacity to interact effectively with its environment' and associated competency with human development as we need to learn what is necessary to engage with our surroundings successfully (White, 1959).

Competencies were brought to the forefront of educational research when another American psychologist, David McClelland, railed against standardized tests that measured only IQ and then were used to determine a student's suitability for advanced studies and entrance into specific fields. He persuasively argued that these test results were not

correlated to academic or vocational success and that, due to poor design and cultural differences, they were vehicles for racism and classism. As an alternative, McClelland called for testing competency and not intelligence. McClelland was instrumental in bringing the concept of competencies for vocational success to Europe in the 1980s.

With the Bologna declaration in 1999, competencies were set to take center stage (Bohlinger, 2008). In 2000, a group of universities began designing a system that created undergraduate and graduate degrees that would be comparable and transferable among member states (González & Wagenaar, 2005). This initiative would be known as the Tuning Project, and competencies were the mainstay of its proposals. Key competencies would become the framework to meet these educational objectives.

The Council of the European Union adopted a Recommendation on Key Competencies for Lifelong Learning in 2006. After a disappointing showing of educational achievements in the PISA survey a decade later, an updated Recommendation was adopted that not only reflected the technological advances but also provided more guidance and best practices in order to integrate successfully the key competencies into the educational systems of the Member States (European Commission, 2019). Table 1 compares the key competencies from 2006 and 2018.

These key competencies are not to be solely attained in formal educational settings, nor only from educational professionals. Instead, lifelong learners should acquire and advance in the Key Competencies ‘through formal, non-formal and informal learning in different environments, including family, school, workplace, neighborhood and other communities’ (European Commission, 2019). It is important to note that no key competency is considered more important than another and that there are skills that overlap and are essential to more than one key competency.

As competency-based education has been implemented in various countries over a span of years, one would expect a plethora of research that either validates or impugns the use of competencies for designing curricula and instruction. However, there is surprisingly little comparative research to be found. Anderson-Levitt and Gardinier (2021) point out that as competency-based approaches to education are being promoted by global, regional, and national organizations in various countries, it is crucial to assess how useful this method is for the students. However, research by Tahirsylaj and Sundberg (2020) shows how ‘competency’ can be used in different ways and have different meanings depending on who is using it. Likewise, the implementation of competency-based education has been varied. For instance, Kilbride et al. (2022) found that students were given a set of competencies to acquire; however, less than 50% of educators in this study reported having students

Table 1. Comparison of key competencies from 2006 and 2018 (European Commission, 2007, 2019.).

Key Competencies 2006	Key Competencies 2018
Communication in the mother tongue	Literacy
Communication in foreign languages	Multilingual
Mathematical competency and basic competencies in science and technology	Mathematical competency and competency in science, technology, and engineering
Digital Competency	Digital Competency
Learning to learn	Personal, social, and learning to learn
Social and civic competencies	Citizenship
Sense of initiative and entrepreneurship	Entrepreneurship
Cultural awareness and expression	Cultural awareness and expression

demonstrate acquisition of said competencies most or all of the time. Other critiques of competency-based education are related to its focus on turning out students who are best equipped to benefit their country instead of centering learning on students as individuals (Petersen, 2022).

2.2. Developing competencies through service learning

Research reveals that service learning has the potential to enhance student learning, engagement, and outcomes. Indeed, students learn more when what they do has value to the people they serve or the organizations they assist.

Astin et al. (2000) conducted a longitudinal study with data collected from 22,236 college undergraduates who took a service-learning course at a baccalaureate-granting college or university. Four in five students stated that their service 'made a difference' (81.3%) and that they were learning from their service-learning experience (83.1%). Additionally, some faculty observed that the students deepened their mastery of the course subject matter through their service-learning experience. They also identified specific competencies that can be developed through service learning, such as critical thinking skills, writing skills, commitment to activism and promoting racial understanding, self-efficacy, leadership, civic and personal responsibility, and interpersonal skills. Service learning can also impact students' GPA (grade point average), engagement, and choice of a service career.

Astin et al.'s research was followed by numerous other studies that have demonstrated that participation in service learning is positively associated with a development of a range of competencies, among which are: awareness of diversity (Baldwin et al., 2007; Chang et al., 2011; Mtawa et al., 2021; Resch & Schritteser, 2021; Simons & Cleary, 2006; Swick & Rowls, 2000), multicultural competency (Eyler et al., 2001; Meaney et al., 2008), capability for affiliation (Mtawa et al., 2021), professional skills (Ciesielkiewicz et al., 2020; Ortega-Tudela et al., 2015; Swick & Rowls, 2000), formation of a global perspective (Ciesielkiewicz et al., 2020; Engberg & Fox, 2011), self-efficacy and confidence (Eyler et al., 2001; Swick & Rowls, 2000); leadership (Eyler et al., 2001), expansion of agency (Mtawa et al., 2021), communication skills (Collins et al., 2020; Eyler et al., 2001), moral judgment (Eyler et al., 2001; Madden et al., 2014), political awareness (Simons & Cleary, 2006), social responsibility and civic engagement (Collins et al., 2020; Engberg & Fox, 2011; Eyler et al., 2001; Madden et al., 2014; Ortega-Tudela et al., 2015; Simons & Cleary, 2006).

Additionally, five meta-analyses offer ample evidence of noteworthy positive outcomes of service learning. The first meta-analysis, performed by Novak et al. (2007), confirms that service learning improves academic understanding of subject matter, skills learned, and the ability to apply knowledge and reframe complex social issues. The second meta-study carried out by Conway et al. (2009) indicates favorable changes in academic, personal, social, and citizenship outcomes. The most significant changes were observed in academic outcomes, beliefs, knowledge, or attitudes toward those served. Changes in personal and citizenship outcomes were minor. Celio et al.'s (2011) meta-analysis suggests significant gains in five different outcomes: attitudes toward self, attitudes toward school and learning, civic engagement, social skills, and academic performance. They stressed the relatively high mean effect for academic performance ($ES = 0.435$). Yorio and Ye's

study (Yorio & Ye, 2012) confirms that service learning positively impacts understanding social issues, personal insight, and cognitive development. Finally, Warren's (Warren, 2012) meta-analysis built on Novak et al.'s (2007) findings and included unpublished literature, as well as self-reported and specific measures of learning such as exams and other assignment scores. Her research indicates that service learning benefits student learning without regard to the learning measure used. Table 2 shows a comprehensive range of measures used in different meta-analyses.

Furthermore, service learning is also considered a high-impact practice (HIP) by the American Association of Colleges and Universities (Association of American Colleges and Universities [AAC&U], 2008). According to the National Survey of Student Engagement (National Survey of Student Engagement [NSSE], 2007), service learning proved to have the most significant impact among the ten high-impact practices on four of the outcomes measured, namely deep learning, gains in general education, gains in personal and social development, and gains in practical competency.

Lovat and Clement (2016) emphasize the 'potent force that service learning can impel around all of the goals of education, including those pertaining to personal and social development as well as to academic achievement' (p. 125). On the other hand, Godfrey et al. (2005) identified four crucial components in a successful service-learning experience: reality, reciprocity, reflection, and responsibility. Yorio and Ye (2012) also point out that students' learning outcomes may significantly vary depending on how a service-learning experience was designed and administered. These authors also stress that rigorous planning, implementation, and assessment are critical for a successful service-learning course.

2.3. Developing competencies through ePortfolios

Kuh et al. (2017) define high-impact practices as 'powerful sets of interventions to foster students' success' (p. 9). Kuh (2008) claims that HIPs can offer significant educational benefits to students. HIPs are positively correlated with a range of outcomes such as solving real problems, improvement of critical thinking and writing skills, collaboration, appreciation for diversity, contributing to the community, higher student engagement, reflection and self-understanding, personal growth, deep learning, higher rates of student-faculty interaction, exam performance, higher GPA, persistence, and retention (Brownell & Swaner, 2010; Eynon & Gambino, 2018; Händel et al., 2018; Kuh, 2008, 2007; Macías Gomez-Estern et al., 2021; Madden et al., 2014; Mtawa et al., 2021). Deep learning includes integrating and synthesizing ideas and information, attending to the underlying meaning of information and content, discerning patterns in evidence or phenomena, applying knowledge in different situations, and exploring issues from multiple perspectives. Diversity is defined in Kuh's (2007) study as an exposure to people and circumstances that differ from those with which students are familiar. Moreover, the ePortfolio, like all HIPs, offers a public demonstration of competency (Eynon & Gambino, 2018, Kuh & O'Donnell, 2013; Kuh et al., 2017), which is a valuable feature since students, faculty, and educational institutions are nowadays under pressure to provide evidence of learning (Clark & Eynon, 2009).

The longitudinal character of ePortfolios permits students to record, evidence, and showcase their competencies, as well as their entire learning experience, by linking their

Table 2. Outcomes and measures of service-learning meta-analyses.

Service-learning meta-analyses	Outcomes	Measures
Novak et al. (2007)	Cognitive outcomes	Enhanced academic understanding of subject matter Ability to apply knowledge and skills learned in one setting to another setting Ability to reframe complex social issues
Conway et al. (2009)	Academic outcomes	Knowledge/GPA/grades Cognitive outcomes Academic motivation and attitudes
	Personal outcomes	Self-evaluations Volunteer motivations Moral development Alienation/deviance Well-being
	Career development	Social outcomes Skill – interacting or working with others Understanding or tolerating diversity Beliefs, knowledge, or attitudes toward those served Beliefs or attitudes toward marginalized people in general
	Citizenship outcomes	Personally responsible citizenship Participatory citizenship Justice-oriented citizenship Combination of citizenship types
	Attitudes toward self	Self-esteem Self-efficacy Personal abilities Feelings of control
Celio et al. (2011)	Attitudes toward school and learning	Students' feelings about school or class (e.g. academic engagement, or enjoyment of the course)
	Civic engagement	Measures oriented toward, or directly affecting, the community (i.e. altruism, civic responsibility, and current and future voting behaviors)
	Social skills	Leadership skills Cultural competency Social problem solving
	Academic achievement	Students' grades or test performance
Yorio and Ye (2012)	Understanding of social issues	Diversity and cultural awareness and sensitivity Perceptions of homeless, elderly, disabled, different races or cultures Ethical and moral values and decision making Interpersonal skills Understanding of the needs of the community Understanding how to help the community Desire to engage in future service activities in terms of both a feeling of responsibility and a commitment to do so.
	Personal Insight	Identity Awareness of oneself in terms of strengths and weaknesses Career aspirations Self-efficacy Self-esteem Determination Persistence
	Cognitive development	Management skill development Writing skills Problem-solving skills Critical thinking skills GPA Course performance
	Learning outcomes	Enhanced academic understanding of subject matter Ability to apply knowledge and skills learned in one setting to another setting Ability to reframe complex social issues

coursework to co-curricular activities and personal experiences (Ciesielkiewicz, 2019; Eynon & Gambino, 2017, 2018; Hubert et al., 2015; Kahn, 2014; Kuh et al., 2017, 2018; Weber & Myrick, 2018). According to Watty et al.'s (2016) study, ePortfolios display their owners' 'personalized body of learning evidence; examples of skills; learning style and preferences; lens through which they view the world, "richer" format of evidence' (p. 28). The ePortfolio provides lifelong learners with a platform to showcase the competencies acquired throughout their lives (Ifenthaler, 2018).

Just as in the case of service learning, the ePortfolio is considered a high-impact practice by the AAC&U. It was added to the list of HIPs in 2017 (Eynon & Gambino, 2017). It should be mentioned that this was the first HIP to be added to the list in nearly 10 years (Kuh, 2017). Furthermore, Eynon and Gambino (2018) indicate that ePortfolios have the potential to enhance the effectiveness of other high-impact practices, such as, for example, service learning, and, therefore, classify it as a meta-high-impact practice. Their experiences with the Connect to Learning (C2L) Project demonstrate that the ePortfolio can significantly impact service learning, internships, first-year experiences, and capstone courses. Hubert et al. (2015) also confirm that the ePortfolio fosters other high-impact practices.

3. Materials and methods

3.1. Context: *MaTumaini* project

The *MaTumaini* Project is a university service-learning initiative that consists of carrying out academic work aimed at helping the Maasai Community in Kenya. Different projects were undertaken by students from the schools of Education, Media Studies, and Business as part of their coursework for which they obtained academic credits. A total of 57 students from the School of Education participated in the ICT project in the following academic years: 2014–15 (27 participants), 2015–16 (17 participants), and 2016–17 (13 participants). The main goal of this part of The *MaTumaini* Project was to improve the quality of teaching.

'*MaTumaini*,' which means hope in Swahili, refers to education as true hope for developing the Maasai Community through professional training of women, young people, and teachers while taking into deep consideration their cultural, social, and economic identity. One of the challenges of the Maasai Community in Kenya is the low schooling rate of children in general and for girls in particular. Due to the scarcity of schools, the number of students in each class grows yearly. Additionally, teachers face governmental mandates to have more qualifications and skills without additional training or support. Therefore, professors and students from the School of Education carried out a digital literacy project in response to substantive needs expressed by the Maasai community explicitly and for which they had also asked for assistance. The Maasai Community Primary School teachers requested didactic materials as they were directed by Kenya's Department of Education to teach computer courses and found themselves needing more knowledge, training, or resources. The project's objective was to meet the urgent needs of the Maasai school teachers by developing a textbook with video tutorials in English on basic computer skills and software tools, specifically Word, Excel, and PowerPoint.

All the materials were developed during the ICT in Education course, which is an elective course in the Elementary and Primary Education Degree Program. Spanish students created the above didactic materials, which were then implemented in a Maasai school in Kenya. Known direct beneficiaries of the project have been 25 teachers and 180 children from the Maasai community, though these numbers are increasing as the didactic materials continue to be in use.

3.2. Students' ePortfolios

All students participated in one of three asynchronous undergraduate sections of an elective course on ICTs in education. The course combined ePortfolio and service learning to generate educational materials that will assist educators in Kenya to teach computer skills. The ePortfolios were used to document and assess the acquisition of the competencies specified in the undergraduate education degree program. The same professor taught the course onsite during the second semester of the academic year, which lasted approximately 14 weeks.

Students designed and created educational materials, which they subsequently uploaded onto their ePortfolios. The textbook taught the use of the Windows operating system, which the school in Kenya used. In addition, students created basic training materials for specific Microsoft programs, such as Word, PowerPoint, Paint, and Excel. Students also designed two activity books in order to help teachers and students to put the new computer skills into practice. The first book offered exercises at a basic level and explained step by step, while the second book provided advanced-level activities. As an additional aid, students recorded video tutorials to accompany the textbook. All the instructional materials were reviewed and edited to ensure the content and design quality. Students also reflected on the design and creation process and their overall service-learning experience on their ePortfolios.

3.3. Instrument and participants

A total of 57 students from the School of Education participated in an ICT in Education class during the following academic years: 2014–15 (27 participants), 2015–16 (17 participants), and 2016–17 (13 participants). This class had two parts. Traditional educational activities were used in one part, while in the second part, students participated in a service-learning initiative. Students compared their experiences in both parts of the class and evaluated how well traditional and service-learning activities helped them obtain competencies. Unfortunately, the organization of the research did not allow for a control group.

For this study, the researchers used a survey developed and validated by Ortega-Tudela et al. (2015). The main objective of the questionnaire was to assess the degree of acquisition of competencies according to the perception of the students involved. The questionnaire consists of 20 items, each featuring a different competency. On a four-point scale (1 for strongly disagree and 4 for strongly agree), students were asked to evaluate how the traditional learning and service-learning activities helped them acquire

competencies. Additionally, we allowed the students to write comments regarding their experiences which added valuable insights to the data gathered.

Two participant surveys were removed (one from 2015–16 and one from 2016–17) before analysis because more than 15% of the responses were missing. Raghunathan (2004) posits that missing values should not be imputed if more than 15% of total values are absent. As a result, 55 surveys were admitted for analysis.

Out of the 20 items, we would like to highlight the following ones due to their significance in the study.

- *Acquisition of practical skills*, as it is a competency that most of the students consider essential for their future professional development.

- *Ability to work within a group*, which was valued quite positively by students in contrast to the competencies that refer more to individual skills that, according to our findings, can be acquired through both traditional learning and service-learning activities.

- *Taking responsibility in society*, since the motivation and focus on these new learning approaches are based on social concerns.

Most of them are, interestingly, related to the change introduced in the definition of key competency by the European Commission in 2019, where ‘learning to learn’ was redefined in a broader sense as ‘personal, social, and learning to learn.’ This is reflected in the responses of the students.

The outcomes from these questions have been quantitatively analyzed in detail in the following section.

4. Results and discussion

After tabulating the survey results, 14 values (0.63%) were missing. As this percentage is well under the threshold of 5% suggested by Fessler and Hero (1994) as an upper limit for expectation maximization, this method was used to impute the missing data.

Next, the internal reliability of the data was calculated by computing Cronbach’s Alpha coefficient. The traditional learning data set had excellent ($\alpha > .9$) internal consistency, while the service-learning data set enjoyed good ($.9 > \alpha > .8$) reliability. The results of these calculations are displayed in Table 3.

As confirmed, the internal reliability of the data was sufficient for further analysis. This means that the data are deemed to be a consistent measure of characteristics measured and are thus deemed sufficiently reliable for further statistical analysis. If a data set has low Cronbach’s Alpha coefficient, then the results of any further analysis may not be reliable.

Next, the authors began to analyze the differences between responses for both learning activities. It is important to note that the service-learning means were significantly larger than the traditional learning means ($\bar{x}_{SL} = 3.46$; $\bar{x}_{TL} = 2.79$), indicating that the service-learning responses were consistently higher than the traditional learning

Table 3. Reliability statistics.

Reliability statistics		
Type of learning	Cronbach’s Alpha	N of Items
Traditional learning	.923	20
Service learning	.881	20

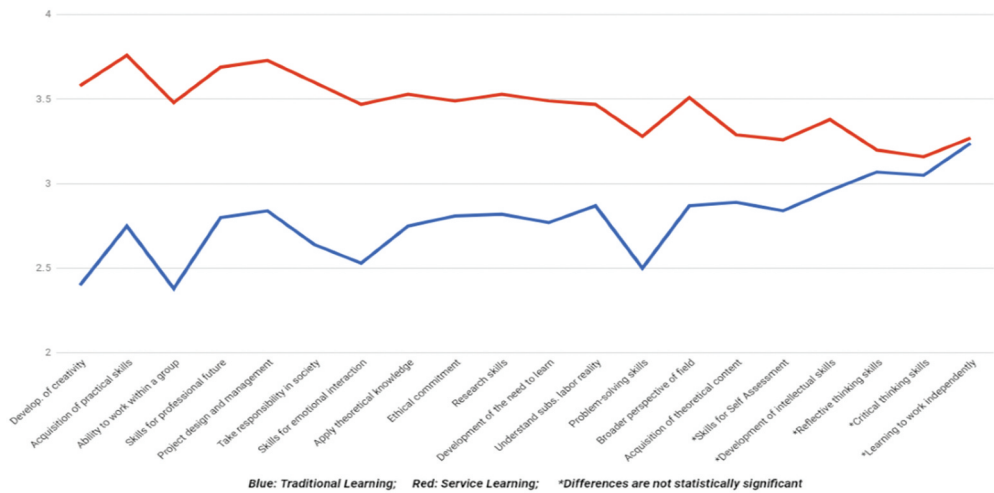


Figure 1. Means of competencies: traditional learning and service learning.

responses. **Figure 1** shows the means of each competency plotted from greatest statistical significance to least.

The researchers calculated cross-tabulations on the data to investigate the relationship between the categorical variables: traditional learning activities versus service-learning activities. Pearson's Chi-Square and p-values were calculated to determine whether there were statistically significant associations between the two categories. After calculating cross-tabulations, we could determine that, indeed, in 15 out of 20 competencies, the responses for the different learning environments were statistically significant. In order to determine statistical significance, we calculated Pearson's Chi-Square and p-values. The threshold for statistical significance is $p\text{-value} < .05$. **Table 4** shows the pertinent tabulations.

The Chi-Square values order the data in **Table 4** (greatest to least), which places the competencies with the most disparity between traditional and service-learning responses at the top. The five competencies with no statistically significant differences between learning conditions are at the end of the table.

It is interesting to note that the competency with the most divergence between groups is that of development of creativity $X^2(3, N = 110) = 36.29, p < .001$. A similar result was found in Ortega-Tudela et al. (2015), as the means for creativity were 2.9 for the traditional learning responses and 3.8 for the service-learning responses, with a $p\text{-value} < .01$.

The second highest Chi-Square value belongs to the competency of acquisition of practical skills: $X^2(3, N = 110) = 28.98, p < .001$. This seems appropriate as service-learning activities should provide the student with contact with real-world situations that would encourage the acquisition of practical skills. This dovetails with the competency that corresponds to the fourth highest Chi-Square score, namely that of the development of skills for a future profession: $X^2(3, N = 110) = 28.14, p < .001$. The ability to conceptualize the field from a broader perspective, another related competency, shows statistically

Table 4. Comparisons of data sets: traditional learning and service-learning.

	Means		Pearson's Chi-Square	<i>p</i> -value
	Traditional learning	Service learning		
Competencies with statistically significant differences between learning conditions				
Development of creativity	2.4	3.58	36.290	<i>p</i> < .001
Acquisition of practical skills	2.75	3.76	28.976	<i>p</i> < .001
Ability to work within a group	2.38	3.48	28.876	<i>p</i> < .001
Development of skills for future profession	2.8	3.69	28.141	<i>p</i> < .001
Project design and management	2.84	3.73	27.364	<i>p</i> < .001
Learning to take responsibility in society	2.64	3.6	26.798	<i>p</i> < .001
Skills for emotional interaction	2.53	3.47	26.000	<i>p</i> < .001
Application of theoretical knowledge	2.75	3.53	19.744	<i>p</i> < .001
Ethical commitment	2.81	3.49	18.197	<i>p</i> < .001
Research skills	2.82	3.53	17.238	<i>p</i> = 0.001
Development of the need to learn	2.77	3.49	17.110	<i>p</i> = 0.002
Understanding of the subsequent labor reality	2.87	3.47	16.955	<i>p</i> = 0.001
Development of problem-solving skills	2.5	3.28	16.765	<i>p</i> = 0.001
Ability to conceptualize their field from a broader perspective	2.87	3.51	13.996	<i>p</i> = 0.003
Acquisition of theoretical content	2.89	3.29	10.575	<i>p</i> = 0.014
Competencies without statistically significant differences between learning conditions				
Skills for self-assessment	2.84	3.26	7.682	<i>p</i> = 0.053
Development of intellectual skills	2.96	3.38	6.246	<i>p</i> = 0.100
Reflective thinking skills	3.07	3.2	1.614	<i>p</i> = 0.656
Development of critical thinking skills	3.05	3.16	1.011	<i>p</i> = 0.799
Learning to work independently	3.24	3.27	0.699	<i>p</i> = 0.873

significant differences between the two learning conditions: $X^2(3, N = 110) = 13.996, p = .003$. This is borne out in the comments made by students (referring to service-learning activities):

- This helps us better understand our job as educators.
- This has seemed very useful and complementary to our formation as educators.
- It has helped me a lot. Nowadays, as teachers, it is essential to know how to work with new technologies. They also propose very varied and motivating activities. Also, learning to use them opens the possibility of proposing more interesting activities in class.
- These activities are more attractive and can be useful in the near future.
- These are very dynamic activities that I think I will be able to use in the future. I also liked that they are activities that encourage teamwork.

It is worth noting the ability to work within a group was also close to the top of the list: $X^2(3, N = 110) = 28.876, p < .001$, while learning to work independently was the competency with the lowest chi-square score $X^2(3, N = 110) = .699, p < .873$, which indicates that the responses for this competency were virtually identical for the two learning experiences. Teamwork figured prominently in some of the comments left by the respondents:

- A lot of teamwork. Very exciting and motivating.

- Teamwork seems very important as well as respect for peers and companionship in class. Practical, interesting, and easy to assimilate the concepts and technological uses.
- These activities have helped me to learn how to structure and organize myself for working as part of a group.

The students indicated that the service-learning activity was much better suited to helping them gain the skills necessary to become productive members of society. We found a significant difference between the two activities regarding the development of an ethical commitment: $X^2(3, N = 110) = 18.197, p < .001$. Likewise, the competency of learning to take responsibility in society had one of the higher chi-square scores: $X^2(3, N = 110) = 26.798, p < .001$, indicating that the service-learning activity was rated much more effective in this regard. These sentiments were also reflected in the students' comments:

- I think that this activity has motivated me a lot in terms of the fact that my work would help others to learn and, above all, children who do not know about these technologies.
- I liked doing it because of the projects for the third world. I think the initiative is great.
- I would like to continue helping people; I loved the experience.

The other competencies for which the respondents indicated that service learning showed no particular benefit for them are: skills for self-assessment $X^2(3, N = 110) = 7.682, p < .053$; development of intellectual skills $X^2(3, N = 110) = 6.246, p < .100$; the development of reflective thinking skills $X^2(3, N = 110) = 1.614, p < .656$; and the development of critical thinking skills $X^2(3, N = 110) = 1.011, p < .799$.

5. Conclusions and future works

Service learning has been known and well-researched in English-speaking countries, especially in the United States; however, it is relatively new to the Spanish education system, and therefore, the practice is often viewed with misgivings and practitioners are expected to provide significant and measurable outcomes to be allowed to incorporate it in their curricula and for continued implementation. However, the number of rigorous service-learning research projects in Spain is minimal. Moreover, since it can often be seen as simply volunteer service or community work by educational institutions, it is crucial to provide clear evidence of learning outcomes, and competencies acquired by the students.

This study adds to the body of knowledge on effective assessment of experiential learning and offers evidence of the acquisition of professional competencies through service learning that others can use to design courses that include service learning. Our research contributes to understanding how students can develop professional competencies through a thoroughly planned and designed international service-learning experience. This research replicates a study conducted in a local community in Spain by Ortega-Tudela et al. (2015) and applies it to an international project in Kenya, providing new findings concerning the topic. Through this initiative, the university was able to assume

a leadership role in helping a school in a developing country through the use of innovative technology.

The participants in this study were asked to self-evaluate their acquisition of 20 different competencies required to complete a service-learning course. The findings show that students consistently indicated that they could better acquire competencies, especially key ones, through the service-learning experience. The responses were statistically significant in 15 out of 20 competencies. The results seem to indicate that service learning is a far better option to help students develop creativity, practical skills, ability to work within a group, skills for future profession, project design, and management, learning to take responsibility in society, skills for emotional interaction, application of theoretical knowledge, ethical commitment, research skills, need to learn, understanding of the subsequent labor reality, problem-solving skills, ability to conceptualize their field from a broader perspective, and acquisition of theoretical content. These findings are consistent with numerous studies such as Astin et al. (2000), Celio et al. (2011), Collins et al. (2020), Conway et al. (2009), Engberg and Fox (2011), Eynon and Gambino (2018), Kuh et al. (2018), Novak et al. (2007), National Survey of Student Engagement (NSSE, 2007), Ortega-Tudela et al. (2015), Yorio and Ye (2012) and Warren (2012), among others.

Higher education should help students become productive, and responsible members of society since one of the key commitments of colleges and universities is to be agents of society. The results of this study seem to indicate that service learning can help students step out as conscientious and responsible members of the global community. However, as Novak et al. (2007) state, 'service learning should be viewed as a means to enrich and contextualize educational processes that currently exist rather than be viewed as a replacement to those practices.' Therefore, traditional methods and experiential learning, such as service learning, can perfectly complement each other.

The five competencies evaluated in this study, whose acquisition were seemingly not specifically aided by a service-learning experience are: skills for self-assessment, development of intellectual skills, development of reflective thinking skills, development of critical thinking skills, and learning to work independently. These results differ from the research conducted by Ortega-Tudela et al. (2015), as the participants of their study stated that service learning helped them more than traditional learning to develop the above competencies.

Another point to discover is whether the paradigm shift in terms of competencies carried out by the European Commission in 2019, compared to the 2006 definition, is reflected in the perception of students regarding their learning. In this sense, some of the questions raised in the questionnaire have given rise to interesting comparisons between traditional activities and those based on service learning and digital tools such as ePortfolios, confirming to a large extent that said shift occurs in teaching methodologies that include service-learning activities.

Additionally, the use of ePortfolios may have contributed to the positive results of this study. According to Kilgore et al.'s (2013) research, ePortfolios help students appreciate the value of their formal and informal experiences and see them as part of their learning process. Furthermore, Eynon and Gambino (2018) indicate that the ePortfolio is highly effective in facilitating the goals and outcomes of other high-impact practices. This is why the ePortfolio is classified as a meta-high-impact practice (Hubert et al., 2015). It would be an interesting topic for future research

projects to examine and compare the competency acquisition of students who participated in service-learning and reflected on their experiences using ePortfolios with a control group of students that did not reflect on their service-learning experience on their ePortfolios. Assessing these results in consideration of the nine other high-impact practices combined with ePortfolio could also offer significant insights. Clearly, there is an existing niche in research.

This research is relevant since it examined the acquisition of professional competencies through an international service-learning project in the Spanish higher education context. The evidence on this topic is lacking in the existing literature. Our findings have significant implications for promoting service learning in Spanish-speaking countries, especially in those countries where clear and measurable outcomes of any innovative practice are demanded in order to be implemented. It is important to reiterate that successfully implementing service learning and ePortfolio requires rigorous planning, preparation, and assessment (Eynon & Gambino, 2017, 2018; Yorio & Ye, 2012). According to Thibodeaux et al. (2020), 'instructors talk themselves out of ePortfolios and genuine learning opportunities because it is unclear how to assess these active learning environments' (p. 29). This paper provides valuable insights into the assessment of experiential learning, such as service learning and ePortfolios.

One of the limitations of this study is the number of participants; this is attributable to the university in which it was conducted having a low teacher-to-student ratio. Also, the service-learning course was an elective, not a compulsory course. In any case, the researchers think the sample was sufficient, being comparable to similar studies, and the outcomes reflect reality as they show students' attitudes toward new learning and teaching practices. However, replicating the study with an extended sample would allow us to assess the results obtained here. Additionally, further insights could be derived from analyzing students' reflections on their service-learning experience posted on their ePortfolios. Another future line of research could be applying this study to students seeking STEM degrees. This could have an interesting outcome as the priorities of the competencies may change for these students. In addition, it is definitively a challenge to develop a service-learning activity for STEM students. Finally, another future work could be to assess and analyze the benefits and outcomes of the community served by the students. This way, it will close the loop of the service-learning practice, considering the point of view of the beneficiaries.

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