

Case-based learning and photovoice in relation to academic performance, satisfaction, and self-efficacy in higher education: a cross-sectional study of related samples.

Bárbara Oliván-Blázquez^{1,2}, Fátima Méndez-López², Sandra León-Herrera^{*1,2}, Ángela Asensio-Martínez^{1,2}, Rosa Magallón-Botaya^{2,3}, Esperanza García-Uceda⁴, Diego Oliván-Blázquez², Raquel Sánchez-Recio^{2,5}

¹ Department of Psychology and Sociology, University of Zaragoza, C/ Violante de Hungría 23, 50009 Zaragoza, Spain

² Institute for Health Research Aragón (IIS Aragón). C/ de San Juan Bosco, 13, 50009 Zaragoza, Spain

³ Department of Medicine, Psychiatry and Dermatology, University of Zaragoza, C/Pedro Cerbuna 12, 50009 Zaragoza, Spain

⁴ Business Management and Organization Department. University of Zaragoza, C/Pedro Cerbuna 12, 50009 Zaragoza, Spain

⁵ Department of Microbiology, Pediatrics, Radiology and Public Health. University of Zaragoza. C/ Domingo Miral, s/n. 50009 Zaragoza, Spain

*** Corresponding author:**

Sandra León-Herrera; C/ Violante de Hungría 23, 50009 Zaragoza, Spain; Telephone: 0034876554547. Extension: 844547; Email: sleon@unizar.es

ABSTRACT

Introduction: Photovoice (PV) is an innovative learning methodology that is gaining relevance in higher education, but research about it is still scarce. Case-based Learning (CBL), for its part, has proven to generate a higher level of student engagement and significant learning. Therefore, due to the lack of evidence related to PV learning, the main aim of this study is to analyse and compare a CBL activity and a PV activity regarding academic performance and undergraduate students' satisfaction in relation to self-efficacy perception.

Methodology: A cross-sectional study was developed. 107 students did a CBL and a PV activity. The order of the activities was randomised. The collected variables were activity score, satisfaction with each activity, and self-efficacy perception. A descriptive, correlational, and comparative analysis using T-Student of related samples was performed.

Results: A significant difference in the activities' scores, with higher marks in the PV activity. There was a good level of satisfaction with both activities and no significant differences across all items asked, except for "It encouraged new knowledge acquisition". This item was evaluated more favourably in the CBL activity. The relation between the marks of both activities and self-efficacy perception were not significant but in the case of PV, the mark is almost significant.

Conclusions: CBL and PV activities are effective in order to achieve a good academic performance. The students' satisfaction with the activities assessed is high.

Keywords: Photovoice; Case-based learning; Academic performance; Satisfaction; Self-efficacy; Higher education.

INTRODUCTION

A student-centred model of learning is gaining ground vs. the model of knowledge transfer by teachers and has even been endorsed by the European Higher Education Area. Active learning methodologies that follow a competency-based model help to achieve student involvement, provide greater dynamism in learning and more significant interaction with the content (Graeff, 2010; Kober, 2015). There are several commonly used active learning methodologies, such as flipped classroom (Basso-Aranguiz et al., 2018), case-based learning (CBL) (Escartín et al., 2015) or problem-based learning (PBL) (Gil-Galván et al., 2020; Harland, 2003; Peng et al., 2021). All these methodologies have shown to be effective in the higher education teaching-learning process in areas of knowledge such as sciences and biomedical sciences (Baepler et al., 2014; Chen et al., 2017; Njie-Carr et al., 2017; Presti, 2016; Sein-Echaluce, ML; Fidalgo-Blanco, A; Esteban-Escano, J; Garcia-Penalvo, FJ; Conde et al., 2018) and also in social sciences (Albert & Beatty, 2014; Roach, 2014) and social work (Gómez-Poyato et al., 2020; Holmes et al., 2015; Olivan-Blázquez et al., 2019; Oliván-Blázquez et al., 2022; Sage & Sele, 2015).

These active learning methods facilitate the transfer of learning and avoid acquiring knowledge as units in a container from where they can be transferred as needed (Gil-Galván et al., 2020; Sellberg & Wiig, 2020). Learning is not only the internalisation and transfer of knowledge or predefined skills into similar practices, but also understanding the relationship between acting individuals and the social and material contexts in which they act (McLean, 2016).

On the one hand, case-based learning (CBL) methodology, also called storytelling or case studies, is a method that organises learning around cases (fictional or real). It is used in many fields and disciplines (Snyder & McWilliam, 2003), social ones among them (Escartín et al., 2015; Fernández García & Ponce de León Romero, 2006). The CBL method is based on the theoretical principles about experiential learning (Banning, 2003). The goal is to create a learning environment close to professional practice. This helps students develop the skills needed in such situations. The use of this technique is specifically suitable to develop diagnostic and decision-making skills in the field of social issues, where interpersonal relationships play a fundamental role (Escartín et al., 2015; Leonard & Cook, 2010). In particular, this teaching and learning method has been established as an effective tool to develop skills such as critical thinking (Popil, 2011), communication skills, and teamwork (Pique Simón & Forés Miravalles, 2012), in addition to seeking the exchange and collective construction of knowledge. The use of case studies promotes the application of theory to practice, that is, the application of conceptual content to real situations, and reduces the gap between the academic and the labour world. It also provides a meaningful learning, improving student satisfaction and learning outcomes (Escartín et al., 2015).

On the other hand, an innovative methodology such as Photovoice (PV) is gaining relevance in the higher education learning process (Cho et al., 2021; Cooper et al., 2017; Cornell & Kessi, 2016; Coronado et al., 2020; Haffejee, 2021; Hernandez et al., 2014; Schell et al., 2009; Steren dos Santos & Musanti, 2020; Trout et al., 2019; Zeglin et al., 2019). PV is a pedagogical methodology originally designed to combine photography with digital narration and social participation (Casals & Calvo, 2022). Photovoice started as a participatory research method, in which the research is a cooperative process between researchers and participants, both of whom actively are involved in the process and hence in the co-creation of knowledge (Haffejee, 2021). PV allows for critical dialogue and action to emerge from the discussion of the photographs (Hernandez et al., 2014). The teaching experiences at the university where PV was used have been evaluated as very positive by students and lecturers.

Both CBL and PV usually include interactive and group learning activities (Bergmann & Sams, 2012; Cho et al., 2021; Cooper et al., 2017; Cornell & Kessi, 2016; Coronado et al., 2020; Haffejee, 2021; Hernandez et al., 2014; Peng et al., 2021; Schell et al., 2009; Steren dos Santos & Musanti, 2020; Trout et al., 2019; Zeglin et al., 2019) within the classroom so that students can benefit from collaborative learning. Moreover, the processes of acquisition and application of theoretical knowledge are enhanced.

It is also pertinent to examine the role of self-efficacy perception in academic performance. Self-efficacy can be defined as “people's beliefs about their capabilities to produce designated levels of performance that influence events that affect their lives” (Bandura, 1994, p.71). Bandura (Bandura, 1977) claims that beliefs about self-efficacy in performing certain tasks

(for example, being able to read academic texts or analyse cases and photographs) better predict the performance on those tasks. In other words, the greater the match between the measured auto-efficacy beliefs and the analysed behaviour, the greater the predictive power of self-efficacy. This concept has been studied in educational contexts (Ramos-Villagrasa et al., 2018), and discussed within CBL methodologies (Bi et al., 2019; Keshmiri et al., 2021; Zhu et al., 2021), but no studies have addressed the association between self-efficacy and photovoice learning activities.

To the best of our knowledge, there are several studies that prove the effectiveness of CBL on academic performance and satisfaction in higher education (Escartín et al., 2015; Leonard & Cook, 2010; Popil, 2011), but there are few that analyse the effectiveness of photovoice as a learning method in higher education, nor compare it with other active methods that have already proven to be effective. This is especially relevant for social sciences since these methodologies can be widely used in that field. Furthermore, there is scarce research about the role of the perception of self-efficacy in CBL or PV activities. Therefore, the main aim of this study is to compare a CBL activity and a PV one regarding academic performance and satisfaction of undergraduate social work students. It also aims to analyse the relationship between the self-efficacy perception and both learning activities.

MATERIAL AND METHODS

Design

A cross-sectional descriptive study was developed. 107 students distributed in 26 groups performed a CBL activity and a PV activity. Both the PV and CBL activities were based on psychology of groups contents, specifically the concept and types of groups used when grouping people together. Their objective was the application of the theoretical content to practice.

These learning activities were carried out at the University of Zaragoza (Spain), under the Social Work degree programme, in the "Social Work with Groups" subject. The Social Work degree at the University of Zaragoza comprises 240 ECTS credits spread out over four years. "Social Work with Groups" is a compulsory subject taught in the second semester of the second academic year. It is divided into two parts: the first one is presented from a social psychology point of view and is made up of the five curricular topics of the subject; the second is taught from a social work/social services perspective, which focuses more on the specifics of the profession (four subject curriculum topics). This study was conducted in February 2023, during the implementation of the social psychology component of the subject and the first topic: meaning and types of groups.

At the university of Zaragoza, in the Social Work degree, each student attended four teaching hours a week at the faculty: two of theoretical content and two of practical activities related to the theoretical content. The teacher who led the activities was the same person for all the groups and had ten years of previous experience teaching this subject.

Participants and sample size

The participants were students enrolled in the "Social Work with Groups" subject at the University of Zaragoza (Spain) during the 2022-2023 academic year who attended the practical class related to the first curriculum topic "group meaning and types of groups". The sample size was 107 students, divided into 26 student groups.

Given that no studies have been found to analyse the combination of the proposed methodologies using a quantitative and quasi-experimental design, we relied on the study of (Bi et al., 2019) for the calculation of the sample size, since the objective of that study was to determine whether CBL is superior to the traditional teaching methodology (control group). In this study, the exam result in the CBL group was 40,12 (SD: 4.39) and in the control group it was 37.39 (SD: 4.54). Considering the data obtained, and assuming an error of 5%, a probability of success of 95%, a confidence level of 95%, a precision of 5%, and adding 10% for potential

participant withdrawal from the study or data missing, at least 80 students were needed. Finally, 107 students participated in the study, which exceeded the necessary sample size.

PASS software was used to compute the sample size [PASS 14 Power Analysis and Sample Size Software (2016). NCSS, LLC. Kaysville, Utah, USA, ncss.com/software/pass].

Learning activities developed

Both activities were developed during the two hours of classes in which the theoretical contents are applied to practice. None of them was done at home.

The CBL activity consisted of reading an excerpt from the book *A day in the life* [Un día en la vida] by Manlio Argueta (Argueta, 1984). Students working in groups had to read, analyse, and identify the groups that appeared in the story and classify them according to the classification seen in the theoretical class. They had 55 minutes to do it.

The PV activity consisted of showing 8 photographs provided by the teachers of the subject. The students had to identify the groups that appeared in the photos and classify them according to the concepts and classification seen in the theoretical class. The activity's duration was limited to 55 minutes,

Randomly, 13 groups performed the CBL activity first, and the PV activity second, and the other 13 did it the other way around in order to avoid learning bias.

Variables and instruments

The outcome variable of this experimental study was academic performance, assessed by the grade obtained in the CBL and PV activities with a rating from 0 to 10, where a higher score indicates better performance. In the case of CBL, this mark showed the number of times the groups in the text were correctly identified and classified. In the case of the PV activity, the mark was also based on the number of times a group from the photographs was correctly extracted, identified and classified.

The secondary variables were students' satisfaction with the activity performed and self-efficacy.

The students' satisfaction data with the activities performed was collected using a self-reporting questionnaire made up of seven statements (Gómez-Poyato et al., 2020; Oliván-Blázquez et al., 2019; Oliván-Blázquez et al., 2022), that were answered on a Likert scale from 0 to 4, with 0 meaning *not at all* and 4 meaning *to a great extent*. The statements were as follows: The teaching methodology used has encouraged new knowledge acquisition; it has favoured deep learning; it has helped me to think more critically; it has helped me to apply theoretical content to practice; it has helped me to apply theoretical content to assessments; it has helped me to understand concepts better; I believe it is an appropriate teaching methodology. A free response section was also included so that students could express themselves openly.

The General Self-Efficacy Scale (GSES) was used to assess self-efficacy (Baessler & Schwarzer, 1996). This tool assesses a global perception of efficacy. The Spanish adaptation by Sanjuán, Pérez, and Bermúdez was followed (San Juan Suárez & Pérez García, 2000). This scale has 10 items in a Likert scale that ranges from 0 (strongly disagree) to 10 (strongly agree) and goes from 0 to 100. Its internal consistency is $\alpha = .91$. The obtained Cronbach alpha in this study was 0,929.

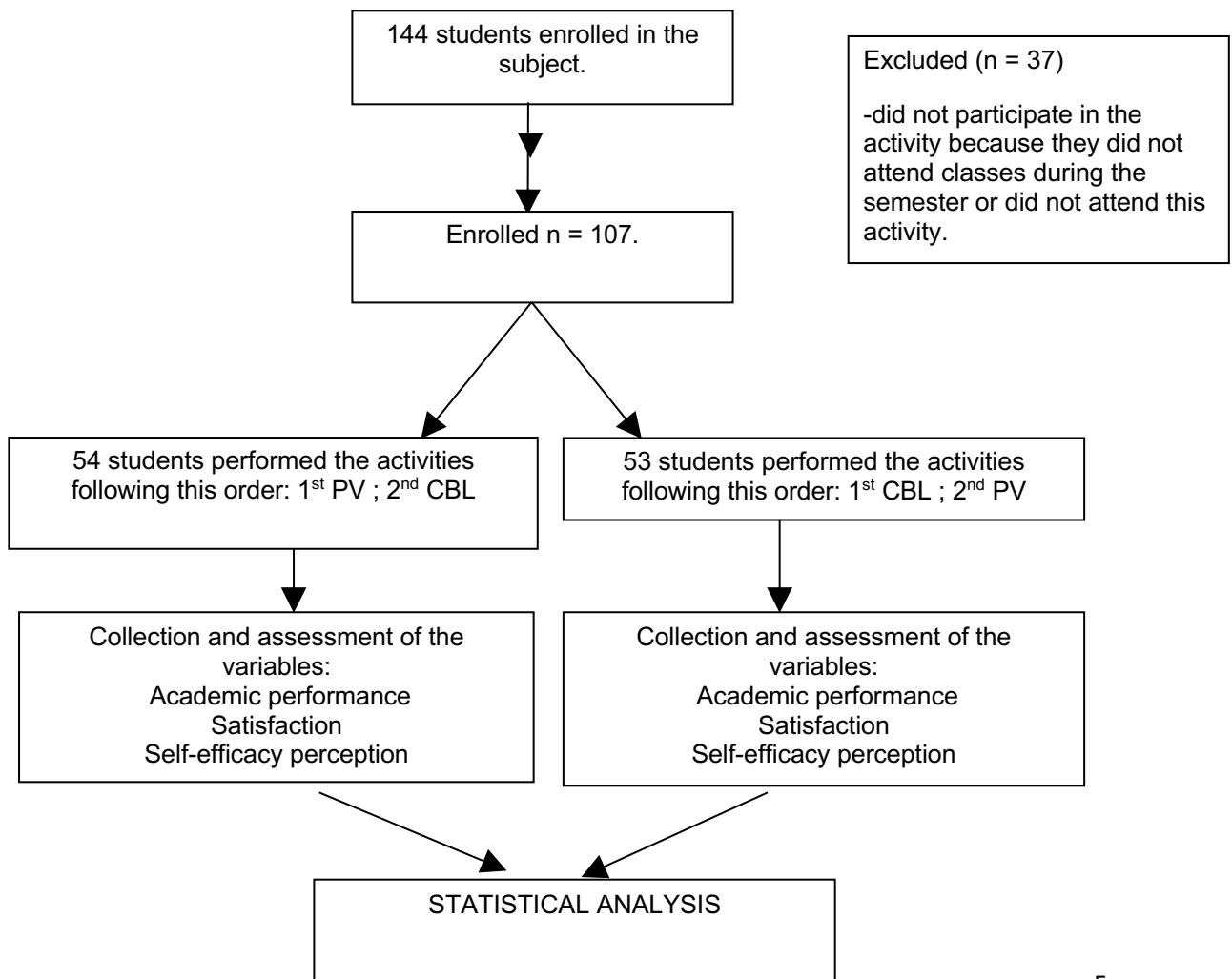
Age, gender and university admittance marks (range from 0 to 14 points) were also obtained. These factors were collected in order to describe the sample. The study variables and the instruments are shown in Table 1. Figure 1 shows the procedure followed.

The researcher who assessed the academic performance did it based on a rubric of each activity. This rubric collected the number of correctly extracted groups in the case and in the photographs as well as their classification.

Table 1: Variables and instruments used.

VARIABLES	INSTRUMENTS
Primary outcome: Academic performance in both activities (CBL and VP activities)	Marks obtained in CBL and VP activity ranging from 0 to 10.
Secondary outcomes: - Satisfaction with both learning activities.	Self-reporting questionnaire made up of seven statements on a Likert scale from 0 to 4 and a free response section.
- Self-efficacy	General Self-Efficacy Scale
Sociodemographic and previous academic variables: Gender, age, university admittance mark.	Self-reporting questionnaire

Figure 1: Flowchart



Statistical analysis

Due to the large sample size, parametric tests were deemed appropriate, since in large samples statistics tend to be normal even if the data distribution is not (Lubin Pigouche, Maciá Antón, 2005). First, a descriptive analysis of the sample was conducted, obtaining the mean and standard deviation for the quantitative variables, and the frequency and percentages for the qualitative variables. To analyse the comparison of both activities (CBL and PV) regarding academic performance and satisfaction, Student's T-test of related samples was used. Also, a bivariate (correlation) analysis using Pearson statistic was performed between the scores of the CBL activity, the PV activity and the GSES score.

Statistical analysis was performed using the SPSS 25.0 statistical software package (IBM Corp. Released, 2017), with p -values of less than 0.05 being considered significant.

Ethical aspects

The University of Zaragoza reviewed and funded this research project (call for teaching innovation PIIDUZ 22_1_572), and also granted its ethical approval. However, the University of Zaragoza has not interfered in the study or dissemination of findings. The objective and procedure of this study was established for groups of students at the beginning of the activities, and all of them gave their written informed consent and decided to participate.

RESULTS

First, a description of the participants was made in terms of the variables of gender, age, university admittance mark, GSES and order of the exercises performed. As shown in Table 2, most of them were female (88,8%), with an average age of 21,31 years (SD: 2,33), who had gained admittance to the degree with an average score of 9,04 (SD: 1,69). The score in GSES was 73,76 (SD 12,45).

Table 2: Description of the sample regarding the variables of gender, age and university admittance mark, perception of self-efficacy and order of the exercises performed.

VARIABLES	TOTAL SAMPLE N=107 N (%) Mean (SD)*
Gender (% women)	95 (88,8%)
Age*	21,31 (2,33)
University admittance mark*	9,04 (1.69)
GSES score*	73,76 (12,45)
Order of exercises	
1° PV- 2° CBL	54 (50,5%)
1° CBL- 2° PV	53 (49,5%)

Table 3 shows the results of the bivariate analysis, the correlations between CBL activity marks, PV activity marks and GSES score. As it can be observed, there was a significant correlation between the marks obtained in the CBL activity and the PV one. Regarding the GSES score there was not a significant correlation between the perception of self-efficacy and the mark obtained in both activities, but the relationship between PV activity mark and GSES score was almost significant.

Table 3: Correlation between CBL activity marks, PV activity marks and GSES score.

VARIABLES	CBL activity mark		PV activity mark		GSES	
	Pearson	Pvalue	Pearson	Pvalue	Pearson	Pvalue
CBL activity mark	1					
PV activity mark	0,409	<0,001	1			
GSES	0,082	0,401	0,180	0,065	1	

Regarding the comparison of the academic performance and the satisfaction for both activities, as shown in Table 4, in general there were high marks for CBL and PV, as well as a good satisfaction level. However, marks were higher for the PV activity. There were no significant differences in satisfaction between the two activities across all items asked, except for “It has encouraged new knowledge acquisition”, which was evaluated more favourably in the CBL activity.

Table 4: Comparison of the academic performance and the satisfaction for both activities (CBL vs PV).

VARIABLES	CBL activity	PV activity	Pvalue (CI)
Academic performance (Marks)	8,26 (1,33)	8,87 (0,79)	<0,001 (-0,85; -0,37)
Satisfaction			
Encourages new knowledge acquisition	3,04 (0,76)	2,82 (0,72)	0,030 (-0,43; -0,02)
Favours deep learning	3,09 (0,67)	3,09 (0,76)	1,00 (-0,21; 0,21)
Helps critical thinking	2,95 (0,85)	2,77 (0,86)	0,178 (-0,42; 0,08)
Helps to apply theory to practice	3,35 (0,74)	3,34 (0,66)	0,924 (-0,23; 0,21)
Helps to apply theory to assessment	3,08 (0,83)	3,24 (0,70)	0,170 (-0,07; 0,17)
Helps to understand concepts better	3,28 (0,79)	3,24 (0,68)	0,715 (-0,19; 0,27)
Good teaching methodology	3,17 (0,80)	3,22 (0,73)	0,708 (-0,27; 0,18)

CI: confidence interval

In terms of qualitative assessment of student satisfaction, they considered both activities as good and dynamic and helpful in delving into the theoretical contents. Several students assessed the photovoice activity as more pleasant as well as a novelty, and reported it stimulated their critical thinking and creativity more than the CBL activity did.

DISCUSSION

The students achieved a higher academic performance in the PV activity compared to the CBL one, even though it had been high in both of them. For this reason, the two of them may be considered as stimulating and appropriate in order to apply theory to practice.

In terms of academic performance, there are studies that state the effectiveness of CBL as a learning methodology in higher education (Escartín et al., 2015; Leonard & Cook, 2010; Popil, 2011). Regarding the effectiveness of the PV as a learning methodology, there are no studies that address this issue using quantitative variables, since most of the studies describe the PV experience or use a qualitative methodology. (Cho et al., 2021; Cooper et al., 2017; Coronado et al., 2020; Haffejee, 2021; Hernandez et al., 2014; Schell et al., 2009; Steren dos Santos &

Musanti, 2020; Trout et al., 2019; Zeglin et al., 2019). Therefore, considering the results of this study, we could assert that PV is a good teaching methodology for learning in higher education, or even a better one when compared to CBL activity, flipped classroom alone or lecture-based learning (Oliván-Blázquez et al., 2019; Oliván-Blázquez et al., 2022).

It should also be noted that the outcome variable, academic performance, is evaluated by looking at the mark obtained in both activities. They train students to identify theoretical concepts in hypothetical or real cases, which they access either through a text or a photographic image. That is, these activities work on the skills or competencies. The latter are translated into observable behaviours (Berrocal & Pereda Marín, 2001) and are an underlying characteristic of an individual, causally related to good or excellent performance in a specific job and company (Boyatzis, 1982; Forrier et al., 2009). For this reason, this study validates the PV as a good technique to work on student competencies and prepare them for a good performance in the workplace.

Delving into the similarities and differences between CBL and PV, it may be considered that CBL is similar to PV, at least in the way they have been developed in this study. CBL is effective for students who have already acquired foundational knowledge, and has the advantage of being flexible in terms of how the case study is used. It is also considered to induce a deeper level of learning by activating critical thinking skills (McLean, 2016). PV may be regarded as similar since it is useful once foundational knowledge has been acquired. It can also be flexible in its use, and encourages critical thinking as well as discussion based on theoretical concepts.

Regarding the perception of self-efficacy, as the results show in this study, there is an almost significant relationship between self-efficacy and the mark obtained in the PV activity. Given that the self-efficacy construct predicts the performance of the tasks, it can be stated that students with a higher self-efficacy perception are likely to obtain a better performance when facing a new learning activity. Bandura's theory is endorsed (Bandura, 1994) following this data. An interesting aspect is the fact that the participants in this study usually performed CBL activities, so it could be less stimulating for them. In the literature, there are studies that address the improvement of self-efficacy perception when implementing a CBL activity (Bi et al., 2019; Keshmiri et al., 2021), but there are no studies that analyse the correlation in a cross-sectional study.

Regarding satisfaction, all the items have high scores in both activities. This is relevant because the students' perception and satisfaction are related to the performance of the activity (Maqableh et al., 2021); the higher the satisfaction, the better the performance. There is only one significant difference between CBL and PV activity assessment related to the item "Encouraged new knowledge acquisition". The evaluation of this statement is higher for the CBL activity. This could be explained by the fact that in the CBL activity, students have to extract from the text the groups that underlie the text (Escartín et al., 2015), and have to perform a more thorough analysis of the text, and it involves more mental activity, while in the VP activity, it is easier to identify the groups, since they are "visible". Nowadays students are very accustomed to audio-visual language (Gonzalez-Gonzalez, Gallardo-Gallardo & Jimenez-Zarco, 2014). On the one hand, students usually perceived the CBL activity as a good one that improves critical thinking, and fosters their creativity (McLean, 2016; Mena Araya, 2020; Oliván-Blázquez et al., 2022). On the other hand, students and lecturers usually considered PV as a good activity in relation to the perception of satisfaction (Cooper et al., 2017; Haffejee, 2021; Santos & Sandra Ines Musanti, 2020; Schell et al., 2009; Steren dos Santos & Musanti, 2020; Trout et al., 2019; Zeglin et al., 2019). So, the results of this study are consistent with the existing literature.

However, these results must be interpreted with caution, mainly because of their quasi-experimental design, and also due to the study's procedure, since in both activities, students had to identify concepts from a deductive perspective. Both CBL and PV as learning methodologies can be implemented from an inductive perspective, asking the students to create a case or take a photograph. In these last procedures, there are other factors such as creativity at play. Engaging the creative process is essential in problem-solving (Daly et al., 2014). In fact, teamwork, creativity, and problem-solving stand out among the most in-demand generic competencies (Foundation of Young Australians, 2017).

This study highlights that PV activities are useful to facilitate the learning process of university students, and are easily implementable in social sciences as other studies have shown (Cho et al., 2021; I., 2017; Cornell & Kessi, 2016; Coronado et al., 2020; Haffejee, 2021; Hernandez et al., 2014; Schell et al., 2009; Steren dos Santos & Musanti, 2020; Trout et al., 2019; Zeglin et al., 2019). Studies such as Coronado et al. (2020), Cooper et al. (2017) y Haffejee (2021) have used PV activities in environmental sciences and biosciences. In disciplines such as physics, chemistry, medical specialties such as family and community medicine, epidemiology and public health, dermatology, nursing, physiotherapy, etc., students can use photographs (either taken by themselves or proposed by faculty) to facilitate their learning.

This study presents strengths and limitations. Among its strengths are the novelty and contribution of this research to evidence on PV as a useful learning activity compared to CBL, which has widely demonstrated its effectiveness. Another strength is the quantitative research methodology and the sample size, since most of the studies that analyse photovoice use qualitative methodology and smaller samples. The last strength is the analysis of the relationship with the self-efficacy construct, since it has not been studied in relation to PV in higher education. However, there are certain limitations to this research. The most significant is the use of a group level randomisation but an individual assessment of the activity performance. This was done since the CBL and PV activities used to be developed in groups of students, fostering collaboration, mutual learning and critical thinking. Another limitation is the fact that the research was only conducted at one university. A third limitation is the absence of a control activity. However, CBL activity may be considered an "active control activity" since this methodology has widely shown its effectiveness in learning. The last limitation is the use of a general scale to assess self-efficacy as GSES, since there is not a specific scale to assess self-efficacy perception in these activities. In order to enhance knowledge in this area, it would be necessary to develop an experimental study assessing the effectiveness of the PV activities versus another control activity or another active learning activity by performing pre-activity and post-activity knowledge assessment. In this way, it will be possible to analyze the effect on learning. It would be also interesting to develop it in different knowledge areas.

CONCLUSIONS

When comparing CBL and PV activity, both of them have shown their effectiveness regarding academic performance. However, the marks for the PV activity were higher than those for the CBL one. The students' satisfaction perception is also high for both activities. The relation between the self-efficacy perception and the mark for the PV activity is close to being significant when compared to the same relation for the CBL one.

Acknowledgements

The authors would like to thank the University of Zaragoza, the "Innovation in Health" Action Group of the Campus of International Excellence (CEI) of the Ebro Valley (Campus Iberus), and the B21_23R Research Group at the Department of Research, Innovation and Universities of the Government of Aragon (Spain), and Feder Funds "Another way to make Europe".

Competing interests

No potential conflicts of interest were declared by the authors.

Funding

The University of Zaragoza funded this research project (call for teaching innovation PIIDUZ 22_1_572). However, the University of Zaragoza has not interfered in the study or distribution of findings.

Availability of data and materials

The dataset is available at ZENODO with doi: 10.5281/zenodo.8216088

REFERENCES

- Albert, M., & Beatty, B. J. (2014). Flipping the Classroom Applications to Curriculum Redesign for an Introduction to Management Course: Impact on Grades. *Journal of Education for Business*, 89(8), 419–424. <https://doi.org/10.1080/08832323.2014.929559>
- Argueta, M. (1984). *A day in the life (Un día en la vida)*. Alfaguara.
- Baepler, P., Walker, J. D., & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers & Education*, 78, 227–236. <https://doi.org/10.1016/j.compedu.2014.06.006>
- Baessler, J., & Schwarzer, r. (1996). Evaluación de la autoeficacia: Adaptación Española a la Escala de Autoeficacia General. [Assessment of self-efficacy: Adaptation of the General Self-Efficacy Scale into spanish]. *Ansiedad y Estress*, 2, 1–8.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bandura, A. (1994). Self-efficacy. In Ramachaudram (Ed.), *Encyclopedia of human behaviour* (Vol. 4, pp. 71–81). Academic Press.
- Banning, K. C. (2003). The Effect of the Case Method on Tolerance for Ambiguity. *Journal of Management Education*, 27, 556–567.
- Basso-Aránguiz, M., Bravo-Molina, M., Castro-Riquelme, A., & Moraga-Contreras, C. (2018). Propuesta de modelo tecnológico para Flipped Classroom (T-FliC) en educación superior. *Revista Electrónica Educare*, 22(2), 1. <https://doi.org/10.15359/ree.22-2.2>
- Bergmann, Jonathan., & Sams, Aaron. (2012). *Flip your classroom : reach every student in every class every day*. International Society for Technology in Education. <https://www.iste.org/resources/product?ID=2285>
- Berrocal, F., & Pereda Marín, S. (2001). Formación y gestión del conocimiento. *Revista Complutense de Educación*, 12, 639–656.
- Bi, M., Zhao, Z., Yang, J., & Wang, Y. (2019). Comparison of case-based learning and traditional method in teaching postgraduate students of medical oncology. *Medical Teacher*, 41(10), 1124–1128. <https://doi.org/10.1080/0142159X.2019.1617414>
- Boyatzis, R. E. (1982). *The competent manager: a model for effective performance*. Wiley. [https://books.google.es/books?hl=es&lr=&id=KmFR7BnLdCoC&oi=fnd&pg=PR11&dq=Boyatzis,+R.+\(1982\).+The+competent+manager:+a+model+for+effective+performance&ots=ww6IWnNsXA&sig=BxpatJQIIRXnJJOQb-qVFYvoEfo#v=onepage&q=Boyatzis%2C](https://books.google.es/books?hl=es&lr=&id=KmFR7BnLdCoC&oi=fnd&pg=PR11&dq=Boyatzis,+R.+(1982).+The+competent+manager:+a+model+for+effective+performance&ots=ww6IWnNsXA&sig=BxpatJQIIRXnJJOQb-qVFYvoEfo#v=onepage&q=Boyatzis%2C) R. (1982). The competent manager
- Casals, L., & Calvo, F. (2022). Cuando las imágenes hablan: La percepción de usuarios en tratamiento residencial de drogodependencias sobre su inserción a través del Photovoice. *Acciones e Investigaciones Sociales*, ISSN 1132-192X, N° 43, 2022, Págs. 63-89, 43, 63–89. <https://dialnet.unirioja.es/servlet/articulo?codigo=8721246&info=resumen&idioma=ENG>

- Chen, F., Lui, A. M., & Martinelli, S. M. (2017). A systematic review of the effectiveness of flipped classrooms in medical education. *Medical Education*, 51(6), 585–597. <https://doi.org/10.1111/medu.13272>
- Cho, C. K., Kim, B. Y., & Stoltman, J. P. (2021). Design, implementation, and outcomes of an in-service program with photovoice as a pedagogical tool for geography teachers. *International Research in Geographical and Environmental Education*, 31(2), 123–138. <https://doi.org/10.1080/10382046.2021.1924983>
- Cooper, C., Sorensen, W., & Yarbrough, S. (2017). Visualising the health of communities: Using Photovoice as a pedagogical tool in the college classroom. *Health Education Journal*, 76(4), 454–466. <https://doi.org/10.1177/0017896917691790>
- Cornell, J., & Kessi, S. (2016). Black students' experiences of transformation at a previously "white only" South African university: a photovoice study. *Ethnic and Racial Studies*, 40(11), 1882–1899. <https://doi.org/10.1080/01419870.2016.1206586>
- Coronado, C., Freijomil-Vázquez, C., Fernández-Basanta, S., Andina-Díaz, E., & Movilla-Fernández, M. J. (2020). Using photovoice to explore the impact on a student community after including cross-sectional content on environmental sustainability in a university subject: a case study. *International Journal of Sustainability in Higher Education*, 21(7), 1331–1350. <https://doi.org/10.1108/IJSHE-01-2020-0031/FULL/XML>
- Daly, S. R., Mosyjowski, E. A., & Seifert, C. M. (2014). Teaching creativity in engineering courses. *Journal of Engineering Education*, 103(3), 417–449. <https://doi.org/10.1002/jee.20048>
- Escartín, J., Saldaña, O., Martín-Peña, J., Varela-Rey, A., Jiménez, Y., Vidal, T., & Rodríguez-Carballeira, Á. (2015). The Impact of Writing Case Studies: Benefits for Students' Success and Well-being. *Procedia - Social and Behavioral Sciences*, 196, 47–51. <https://doi.org/10.1016/j.sbspro.2015.07.009>
- Fernández García, T., & Ponce de León Romero, L. (2006). El proceso de intervención en el trabajo social con casos: una enseñanza teórica-práctica para las escuelas de trabajo social. *Acciones e Investigaciones Sociales*, ISSN 1132-192X, N° Extra 1, 2006, Pág. 371, 1, 371. <https://dialnet.unirioja.es/servlet/articulo?codigo=2002376>
- Forrier, A., Sels, L., & Stynen, D. (2009). Career mobility at the intersection between agent and structure: A conceptual model. *Journal of Occupational and Organizational Psychology*, 82(4), 739–759. <https://doi.org/10.1348/096317909X470933>
- Foundation of Young Australians. (2017). *7 New Job Clusters To Help Young People*. <https://www.fya.org.au/wp-content/uploads/2016/11/The-New-Work-Mindset.pdf>
- Gil-Galván, R., Martín-Espinosa, I., & Gil-Galván, F. J. (2020). University student perceptions of competences acquired through problem-based learning. *Educacion XX1*, 24(1), 271–295. <https://doi.org/10.5944/educXX1.26800>
- Gómez-Poyato, M. J., Aguilar-Latorre, A., Martínez-Pecharromán, M. M., Magallón-Botaya, R., & Oliván-Blázquez, B. (2020). Flipped classroom and role-playing as active learning methods in the social work degree: randomized experimental study. *Social Work Education*, 39(7), 879–892. <https://doi.org/10.1080/02615479.2019.1693532>
- Gonzalez-Gonzalez, I., Gallardo-Gallardo, E., & Jiménez-Zarco, A.I. (2014). Using films to develop the critical thinking competence of the students at the Open University of Catalonia (UOC): Testing an audiovisual case methodology in a distance e-learning environment. *Computers in human behaviour*, 30, 739-744. <https://doi.org/10.1016/j.chb.2013.09.013>

- Graeff, T. R. (2010). Strategic Teaching for Active Learning. *Marketing Education Review*, 20(3), 265–278. <https://doi.org/10.2753/MER1052-8008200307>
- Haffejee, F. (2021). The use of photovoice to transform health science students into critical thinkers. *BMC Medical Education*, 21(1). <https://doi.org/10.1186/s12909-021-02656-1>
- Harland, T. (2003). Vygotsky's Zone of Proximal Development and Problem-based Learning: Linking a theoretical concept with practice through action research. *Teaching in Higher Education*, 8(2), 263–272. <https://doi.org/10.1080/1356251032000052483>
- Hernandez, K., Shabazian, A. N., & McGrath, C. (2014). Photovoice as a Pedagogical Tool: Examining the Parallel Learning Processes of College Students and Preschool Children through Service Learning. *Creative Education*, 05(22), 1947–1957. <https://doi.org/10.4236/CE.2014.522219>
- Holmes, M. R., Tracy, E. M., Painter, L. L., Oestreich, T., & Park, H. (2015). Moving from Flipcharts to the Flipped Classroom: Using Technology Driven Teaching Methods to Promote Active Learning in Foundation and Advanced Masters Social Work Courses. *Clinical Social Work Journal*, 43(2), 215–224. <https://doi.org/10.1007/s10615-015-0521-x>
- Keshmiri, F., Jafari, M., Dehghan, M., Raei-Ezzabadi, A., & Ghelmani, Y. (2021). The effectiveness of interprofessional education on interprofessional collaborative practice and self-efficacy. *Innovations in Education and Teaching International*, 58(4), 408–418. <https://doi.org/10.1080/14703297.2020.1763827>
- Kober, L. (2015). *Reaching Students: What Research Says About Effective Instruction in Undergraduate Science and Engineering*. National Academies Press. <https://doi.org/10.17226/18687>
- Leonard, E. C., & Cook, R. A. (2010). Teaching with cases. *Journal of Teaching in Travel and Tourism*, 10(1), 95–101. <https://doi.org/10.1080/15313220903559296>
- Lubin Pigouche P, Maciá Antón MA, R. de L. P. (2005). *Mathematical psychology*. Universidad Nacional de Educación a Distancia.
- Maqableh, M., Jaradat, M., & Azzam, A. (2021). Exploring the determinants of students' academic performance at university level: The mediating role of internet usage continuance intention. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10453-y>
- McLean, S. F. (2016). Case-Based Learning and its Application in Medical and Health-Care Fields: A Review of Worldwide Literature. *Journal of Medical Education and Curricular Development*, 3, JMECD.S20377. <https://doi.org/10.4137/jmeecd.s20377>
- Mena Araya, A. E. (2020). Critical Thinking for Civic Life in Elementary Education: Combining Storytelling and Thinking Tools. *Revista Educación*, 23–43. <https://doi.org/10.15517/revedu.v44i2.39699>
- Njie-Carr, V. P. S., Ludeman, E., Lee, M. C., Dordunoo, D., Trocky, N. M., & Jenkins, L. S. (2017). An Integrative Review of Flipped Classroom Teaching Models in Nursing Education. *Journal of Professional Nursing: Official Journal of the American Association of Colleges of Nursing*, 33(2), 133–144. <https://doi.org/10.1016/j.profnurs.2016.07.001>
- Oliván-Blázquez, B., Aguilar-Latorre, A., Gascón-Santos, S., Gómez-Poyato, M. J., Valero-Errazu, D., Magallón-Botaya, R., Heah, R., & Porroche-Escudero, A. (2022). Comparing the use of flipped classroom in combination with problem-based learning or with case-based learning for improving academic performance and satisfaction. <https://doi.org/10.1177/14697874221081550>

- Oliván-Blázquez, B., Masluk, B., Gascon, S., Fueyo-Díaz, R., Aguilar-Latorre, A., Artola Magallón, I., Magallón Botaya, R., Oliván Blázquez, B., Masluk, B., Gascon, S., Fueyo Díaz, R., Aguilar-Latorre, A., Artola Magallón, I., & Magallón-Botaya, R. (2019). *The use of flipped classroom as an active learning approach improves academic performance in social work: A randomized trial in a university*. *Plos One*, 14(4). <https://doi.org/10.1371/journal.pone.0214623>
- Peng, W. S., Wang, L., Zhang, H., Zhang, Z., Wu, Y. M., Sang, X., Zhou, R., Xu, J. L., & Chen, X. (2021). Application of virtual scenario simulation combined with problem-based learning for paediatric medical students. *Journal of International Medical Research*, 49(2). <https://doi.org/10.1177/0300060520979210>
- Pique Simón, B., & Forés Miravalles, A. (2012). *Propuestas metodológicas para la educación superior*. <http://hdl.handle.net/2445/30702>
- Popil, I. (2011). Promotion of critical thinking by using case studies as teaching method. *Nurse Education Today*, 31(2), 204–207. <https://doi.org/10.1016/j.nedt.2010.06.002>
- Presti, C. R. (2016). The Flipped Learning Approach in Nursing Education: A Literature Review. *The Journal of Nursing Education*, 55(5), 252–257. <https://doi.org/10.3928/01484834-20160414-03>
- Ramos-Villagrasa, P. J., Sánchez-Iglesias, I., Grande-de-Prado, M., Oliván-Blázquez, B., Martín-Peña, J., & Cancer-Lizaga, P. (2018). Spanish version of “Self-Efficacy for Writing Scale” (SEWS). *Anales de Psicología*, 34(1). <https://doi.org/10.6018/analesps.34.1.264931>
- Roach, T. (2014). Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education*, 17, 74–84. <https://doi.org/10.1016/J.IREE.2014.08.003>
- Sage, M., & Sele, P. (2015). Reflective Journaling as a Flipped Classroom Technique to Increase Reading and Participation with Social Work Students. *Journal of Social Work Education*, 51(4), 668–681. <https://doi.org/10.1080/10437797.2015.1076274>
- San Juan Suárez, P., & Pérez García, A. M. (2000). Escala de autoeficacia general: Datos psicométricos de la adaptación para la población española. *Psicothema*, 12(2), 509–513.
- Santos, B. S. dos, & Sandra Ines Musanti, P. (2020). Transforming the University Classroom: The use of Photovoice as a methodological tool. *Práxis Educativa*, 16(41), 525–542. <https://doi.org/10.22481/praxisedu.v16i41.6514>
- Schell, K., Ferguson, A., Hamoline, R., Shea, J., & Thomas-MacLean, R. (2009). Photovoice as a Teaching Tool: Learning by Doing with Visual Methods. *International Journal of Teaching and Learning in Higher Education*, 21(3), 340–352. <http://www.isetl.org/ijtlhe/>
- Sein-Echaluce, ML; Fidalgo-Blanco, A; Esteban-Escano, J; Garcia-Penalvo, FJ; Conde, M., García-Peñalvo, F. J., Red Iberoamericana de Investigación sobre Cambio y Eficacia Escolar., Gonçalves Pereira, Z. T., Quaresma da Silva, D., Cho, K. K., Marjadi, B., Langendyk, V., Hu, W., Wu, J.-C., Chi, S.-C., Wu, C.-C., Kang, Y.-N., Chen, F., Lui, A. M., Martinelli, S. M., Chen, K.-S., Monrouxe, L., Lu, Y.-H., ... Segal, E. A. (2018). Using Learning Analytics to Detect Authentic Leadership Characteristics in Engineering Students. *International Journal of Engineering Education*, 34(3), 851–864. <https://doi.org/http://dx.doi.org/10.14201/eks2016172714>
- Sellberg, C., & Wiig, A. C. (2020). Telling Stories from the Sea: Facilitating Professional Learning in Maritime Post-Simulation Debriefings. *Vocations and Learning*, 13(3), 527–550. <https://doi.org/10.1007/s12186-020-09250-4>

- Snyder, P., & McWilliam, P. J. (2003). Using case method of instruction effectively in early intervention personnel preparation. In *Infants and Young Children* (Vol. 16, Issue 4, pp. 284–295). Aspen Publishers Inc. <https://doi.org/10.1097/00001163-200310000-00003>
- Steren dos Santos, B., & Musanti, S. I. (2020). Transforming the university classroom: The use of photovoice as a methodological tool. *Práxis Educacional*, 16(41), 525–542. <https://doi.org/10.22481/praxisedu.v16i41.6514>
- Trout, I. Y., Perez, B., & Christensen, M. C. (2019). Connecting Classroom to Community through Photovoice: Pedagogical Implications. *LEARNING Landscapes*, 12(1), 285–301.
- Zeglin, R. J., Niemela, D. R. M., Rosenblatt, K., & Hernandez-Garcia, J. (2019). Using Photovoice as a Counselor Education Pedagogical Tool: A Pilot. *Journal of Creativity in Mental Health*, 14(2), 258–268. <https://doi.org/10.1080/15401383.2019.1581116>
- Zhu, X., Xiong, Z., Zheng, T., Li, L., Zhang, L., & Yang, F. (2021). Case-based learning combined with science, technology, engineering and math (STEM) education concept to improve clinical thinking of undergraduate nursing students: A randomized experiment. *Nursing Open*, 8(1), 415–422. <https://doi.org/10.1002/nop2.642>