

# Disposition Towards Critical Thinking and Student Engagement in Higher Education

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## Abstract

Developing student critical thinking skills is a core purpose of higher education, and requires the cognitive and disposition components of critical thinking to be fostered. The present study aims to examine the relationship between disposition towards critical thinking and engagement in higher education students. Participants were 836 students from two universities in Spain. Results showed a direct and positive relationship between student critical thinking disposition and several aspects of student engagement, such as reflective learning and participation in high-impact practices. These results could inform general pedagogical practices within the higher education curriculum so as to foster critical thinking disposition among future graduates.

## Introduction

Educational institutions recognise that fostering critical thinking is fundamental in the era of misinformation, disinformation and fake news (Bezanilla et al., [2021](#); Chan et al., [2011](#)). Although educators play a crucial role in fostering student critical thinking (Janssen et al., [2019](#)), teaching staff in higher education show insufficient knowledge of how to promote critical thinking in their classrooms (Bezanilla-Albisua et al., [2018](#)), and research that analyses to what extent educational practices can promote critical thinking needs to be carried out (Abrami et al., [2015](#); Hyytinen et al., [2018](#)). In relation to this, numerous investigations have focused on the effect of various aspects of education on critical thinking, namely educational experiences (Bezanilla et al., [2019](#); Snyder & Snyder, [2008](#)), teaching methods (Abrami et al., [2015](#)) or learning styles (Myers & Dyer, [2006](#); Shirazi & Heidari, [2019](#)). Likewise, student critical thinking may be enhanced through greater engagement with the educational context (Carini et al., [2006](#); Loes et al., [2012](#); Pascarella et al., [2001](#)).

Developing student critical thinking skills requires the fostering of both the cognitive and disposition components of critical thinking (Facione et al., [1995](#); Sosu, [2013](#)). The cognitive dimension of critical thinking implies problem-solving (Sosu, [2013](#)), whilst the dispositional dimension refers to a willingness to do so (Facione et al., [1995](#), [2000](#)). Critical thinking skills are unlikely to be employed in practice without a strong disposition toward doing so (Chen et al., [2020](#)). Accordingly, analysing the relationship between educational context and student disposition to critical thinking is necessary, particularly as critical thinking disposition shows a stronger association than skills with the educational environment (Cheng & Wan, [2017](#)).

To our knowledge, the relationship between critical thinking and engagement has not been analysed from the dispositional perspective nor has it been analysed in the Spanish higher education context. Our study is one of the first of its kind to be conducted in Spain, where there is a need to improve strategies to promote critical thinking in students (Agudo Saiz et al., [2020](#); Bezanilla et al., 2018). Consequently, the primary aim of the present study is the exploration of the relationship between student engagement and disposition toward critical thinking in the Spanish higher education context.

### **Disposition to Critical Thinking**

Critical thinking is widely considered a core learning skill to be developed by graduates in higher education (Indrašienė et al., [2021](#); Liyanage et al., [2021](#)). There is evidence that critical thinking is a key factor in problem solving (Snyder & Snyder, [2008](#)) and decision-making (Noohi et al., [2012](#)), and can predict academic achievement (Akpur, [2020](#)). Critical thinking has also been associated with other skills such as metacognition and creativity (Magno, [2010](#); Qiang et al., [2020](#)).

Various definitions of critical thinking have been developed; most have in common that they include both cognitive abilities and a disposition towards critical thinking (Facione et al., [1995](#); Sosu, [2013](#)). The cognitive dimension of critical thinking implies the ability to understand a problem and find reasonable solutions (Sosu, [2013](#)) and includes characteristics such as analytical and argumentation skills and the ability to draw conclusions (Chan, [2019](#)). Disposition towards critical thinking has been defined as a motivation towards addressing problems and making decisions (Facione et al., [1995](#); Giancarlo & Facione, [2001](#)), all of which are essential for critical thinking to occur (Chen et al., [2020](#)). According to Sosu ([2013](#)), there are two domains to be found in a disposition towards critical thinking: critical openness and reflective scepticism. Critical openness reflects the tendency to be open to new ideas, to critically evaluate those ideas, and to modify thinking in light of the evidence. For its part, reflective scepticism refers to the tendency to learn from past experiences and to know how to question the evidence.

Research on critical thinking disposition in education is a more recent phenomenon than research on the cognitive domain, and it has been shown that critical thinking disposition is associated with the use of higher-order thinking skills to solve problems (Darby & Rashid, [2017](#)). Likewise, it has been shown to lead to better academic performance among doctoral students (Comer et al., [2019](#)) and to greater creative self-concept among university students (Álvarez-Huerta et al., [2021](#)).

### **Student Engagement and Disposition to Critical Thinking**

Research studies on how to promote critical thinking in university contexts are frequent in the academic literature (Abrami et al., [2015](#); Arslan et al., [2014](#); Bezanilla et al., [2019](#); Halpern, [2003](#); Huber & Kuncel, [2016](#)). Overall, findings show that critical thinking can be promoted at all educational levels and across all disciplines through

different strategies (Abrami et al., [2015](#)). According to Bezanilla et al. ([2019](#)), methodologies that enhance critical thinking include cooperative work, problem and project based learning, case studies, oral presentations by teacher and students and real-world activities. Nonetheless, there are still uncertainties about how to promote critical thinking in the higher education domain and in different socio-educational backgrounds (Liyanage et al., [2021](#)). In the Spanish university context, according to Agudo et al., (2020), students request that faculty dedicate more time to promoting critical thinking, whilst educators themselves request support to be able to do so appropriately. In general, European university teachers indicate a preference for integrating critical thinking into their daily teaching, without addressing it specifically (Dumitru et al., [2018](#)). Thus, in recent years, attention has turned to the analysis of whether students' critical thinking can be enhanced through greater engagement with the learning process and educational activities (Yuan et al., [2020](#)). The literature suggests that student engagement is positively linked to critical thinking (Carini et al., [2006](#); Loes et al., [2012](#); Pascarella et al., [2001](#); Yuan et al., [2020](#)).

There is general agreement that engagement has behavioural, cognitive, and affective dimensions (Kahu, [2013](#); Ketonen et al., [2019](#)), and that it plays a significant role in students' personal and academic development (Álvarez-Huerta et al., [2022](#); Bakadorova et al., [2020](#)). Under the behavioural approach to engagement, where engagement refers to student's participation in educational practices associated with high levels of personal and academic development (McCormick et al., [2013](#)), The National Survey of Student Engagement (NSSE), managed by Indiana University, is one of the most widely used tools universities use for assessing student engagement in higher education and facilitate student learning (Morris & Clark, [2018](#)). NSSE annually collects student engagement information in relation to collaborative learning with peers, approaches to learning, interactions with faculty, and the campus environment.

There is evidence that collaborative learning is associated with gains in critical thinking in first-year university students, although only for white students and those less prepared academically (Loes & Pascarella, [2017](#)). In addition, course-related student-faculty interaction based on students perceptions and experience was found to be related with the critical thinking gains of Kim and Sax's ([2009](#)) sample of 58,281 University of California students. Moreover, reflective learning, or the connection between what students learn and the world around them, and to the reconsideration of problems and ideas from diverse perspectives (Campbell & Cabrera, [2014](#)), has been related to critical thinking enhancement in higher education (Arend, [2009](#); Burbach et al., [2004](#)).

The NSSE also explores students' participation in what are known as high-impact practices, namely service learning, research projects, learning communities, internships, and study abroad. According to Kuh ([2008](#)), these practices are effective because they require dedication on the part of students and oblige them to communicate with both peers and faculty about meaningful topics. They also provide students with regular assessments of their work and expose students to diverse ideas and people of different backgrounds (Kilgo et al., [2015](#)). Likewise, research has found that engagement in

diversity experiences may have important implications for critical thinking development of substantial numbers of students during the first year of college (Loes et al., [2012](#); Pascarella et al., [2001](#)).

### **The Present Study**

The Spanish higher education system has undergone profound changes, due to the modifications introduced after the publication of Organic Law 6/2001 on Universities (LOU). This regulation included a series of measures to adapt the Spanish university system to the European Higher Education Area. These regulations seek to turn universities into active agents for the transition into the knowledge society. The Spanish higher education system, in line with European guidelines, follows a methodological approach based on key competences and learning outcomes. Accordingly, in the Spanish university system, active and collaborative learning is prioritized (Vieira et al., [2007](#)). Among European universities, Spanish universities exhibit more participatory forms of self-governance (Jayadeva et al., [2020](#)), and acknowledge the need to improve the representation of minority groups among its students (Gallego-Noche et al., [2021](#)).

The main aim of the present study was to examine the relationship between student engagement and critical thinking disposition in Spanish undergraduates. To this end, students from various degree programs completed the NSSE along with a tool to measure critical thinking disposition. Overall, we expected to find a positive relationship between student engagement and critical thinking disposition. Our study had two further objectives. The first was to identify the dimensions of engagement that contributed most to the relationship with critical thinking disposition in students at year 2 and year 4 of their degrees.

In the Spanish Higher Education system, undergraduate degree studies have an average duration of four academic years and require a total of 240 credits of the European Credit Transfer System (ECTS), with 1 ECTS being equal to between 25 to 30 h. In this context, the first two years of study are characterized by a learning approach aimed at enabling students to acquire broader knowledge. In the final years, greater emphasis is placed on more experiential and specialist learning, through the final research project or dissertation and opportunities for internships, service learning, or study abroad. Accordingly, in final-year students, we expected that participation in high-impact practices would be more closely related to critical thinking disposition as participation in such experiences are prioritised towards the end of a degree program in our context.

The second objective was to explore possible gender differences in the relationship between student engagement and critical thinking disposition. According to Mayhew et al. ([2016](#)), the weight of the evidence suggests that the relationship between higher education and its effects on student cognitive and intellectual growth is gendered. Nonetheless, the evidence regarding gender differences in relation to student critical thinking development presents conflicting results. While some studies suggest gender differences in favour of men (Rodzalan & Saat, [2015](#)) and some in favour of women

(Turan & Koç, [2018](#)), other studies reported no significant gender differences (Kang, [2015](#); Sahanowas & Santoshi, [2020](#)). These conflicting results may have been due to the nature of the different samples, which suggests there is a need to carry out research in a variety of contexts and to specify the framework in which the research has taken place, in order then to develop effective strategies for the development of critical thinking among students.

Cultural differences in critical thinking have been reported (Lun et al., [2010](#)). Although studies (Carini et al., [2006](#); Loes & Pascarella, [2017](#); Pascarella et al., [2001](#); Yuan et al., [2020](#)) have suggested a relationship between critical thinking and student engagement, to our knowledge, this relationship has not been analysed from the dispositional perspective of critical thinking in the Spanish higher education context. In Spain, a need to improve strategies to promote critical thinking in students has been seen (Agudo et al., 2020). Although critical thinking is viewed as essential by Spanish university teaching staff, their insufficient knowledge of how to promote critical thinking in their classrooms has been shown (Bezanilla, [2018](#)). The present study may therefore shed light on which aspects of student engagement need to be addressed in order to enhance the critical thinking disposition among Spanish undergraduates.

## **Method**

### **Participants**

The sample for this study comprised 836 undergraduates (52.87% women, 46.77% men, 0.36% other) from two universities in Spain. The two Spanish universities in which this research was been carried out are medium-sized universities located in different Spanish regions. Both universities share a participatory model and a significant commitment to the use of active methodologies. Participants ranged in age from 17 to 46 years ( $M = 20.89$ ,  $SD = 3.15$ ). Participating students were enrolled in either year 2 ( $n = 610$ ) or year 4 ( $n = 226$ ) of a degree program in a technical field (392) or social sciences (444). Of the 610 s-year students, 268 were enrolled in a technical study program and 342 in a social sciences degree; the figures for final-year students were 124 enrolled in a technical field and 102 students in social sciences. Regarding gender, second-year students were 53.7% women and 46.3% men, while those in year 4 were 51.3% women and 48.7% men. Our conceptualisation of gender recognises its existence on a spectrum and accordingly, participants were able to self-identify as non-binary when completing the questionnaires. Nonetheless, the number of students who did not self-identify as man or woman was very small and this sub-group could not be considered in the statistical analysis.

### **Procedure**

In order to maximize statistical power for detecting effects of reasonable magnitude, we began by determining the optimum sample size using the G\*Power tool (Faul et al., [2007](#)). This indicated that 89 participants would be required for a power of 95%. We thus proceeded to recruit a sample of year 2 and year 4 students from the two

aforementioned universities during the 2020–21 academic year. The invitation to take part in this research was extended to all students in years 2 and 4 enrolled in the different degree programs offered by the university. Response rates were 32.10% in year 2 and 11.89% in year 4. Data were then collected using the two instruments described below. Potential participants were informed about the nature and purpose of the study, and, and it was made clear that participation was voluntary and that all the information collected would remain confidential, in accordance with current data protection legislation. All students who agreed to participate signed informed consent prior to any data collection. The study protocol was reviewed and approved by the Research Ethics Committee of the universities involved.

## **Instruments**

### **Disposition Towards Critical Thinking**

This was evaluated using the Critical Thinking Disposition Scale (CTDS; Spanish adaptation by Bravo et al., [2020](#); original instrument by Sosu, [2013](#)). The CTDS comprises 11 items that measure critical openness (e.g., I usually try to think about the bigger picture during a discussion) and reflective skepticism (e.g., I often re-evaluate my experiences so that I can learn from them), two components of the disposition towards critical thinking. Each item is rated on a 5-point Likert-type scale (1 = Totally disagree; 5 = Totally agree) and around four minutes are needed to complete the scale. Internal consistency of scale scores (Cronbach's alpha) in the present sample was 0.86.

### **National Survey of Student Engagement (NSSE; (Kuh, [2010](#); Zilvinskis et al., [2017](#)))**

Items used with permission from *The College Student Report*, National Survey of Student Engagement, Copyright 2001–18, The Trustees of Indiana University. The NSSE examines various dimensions of student engagement. For the present study we focused on those aspects of engagement more relevant both to our educational context and to the proposed theoretical framework, namely higher-order learning (4 items, min = 0; max = 240), collaborative learning (4 items; min = 0; max = 240), student-faculty interaction (4 items; min = 0; max = 240), reflective learning (7 items, min = 0; max = 420), and participation in high-impact practices (5 items). With the exception of high-impact practices, item scores are converted to a 60-point scale, with higher scores indicating greater engagement on the corresponding indicator. For high-impact practices, students must indicate whether they have already participated or not in each practice (service learning, research projects, learning communities, internships, and study abroad), those answers are recoded to binary variables and then summed to determine total number of HIPs completed. Around ten minutes are required to complete the questionnaire.

Vieira et al. ([2007](#)) analyzed the validity of the NSSE questionnaire in the Spanish context, and confirmed the reliability and validity of the tool in the Spanish context. Furthermore, since some dimensions of engagement were not included in our

questionnaire, in order to confirm a factor structure for the survey tool comprising five first-order dimensions within the higher-order factor of student engagement, we conducted a second-order confirmatory factor analysis (CFA), implementing the Lavaan 0.6–1 package (Rosseel, [2012](#)) in R 4.0.2 (R Core Team, [2021](#)). Model parameters were estimated using the robust maximum likelihood method. The model proposed by the CFA had acceptable fit indices:  $\chi^2[247] = 559.436$ ;  $p < 0.001$ ; CFI = 0.910; TLI = 0.899; GFI = 0.932; RMSEA [90% CI] = 0.044 [0.039; 0.049]; SRMR = 0.046. Measurement invariance by gender was also confirmed. All dimensions yielded acceptable coefficients of internal consistency, ranging between 0.67 and 0.81. (Cronbach's  $\alpha$ ). A total score for student engagement was obtained by summing mean scores on each of the five first-order dimensions.

## Data Analysis

To determine the relationship between student engagement and disposition to critical thinking, we began by conducting both a descriptive and bivariate correlation analysis, computing means and standard deviations and Pearson coefficients, respectively. Furthermore, we used the Student's  $t$  test to examine whether there were significant differences between the means on each variable for gender and academic year. The effect size associated with any observed differences was estimated by calculating Cohen's  $d$ . We then performed a linear regression analysis to examine the relationship between the variables. Finally, and with the aim of exploring the relationship between the different dimensions of engagement and critical thinking disposition, we carried out a series of multiple linear regression analyses controlling for gender, age and academic year. In all cases, we tested the assumptions regarding linearity, absence of collinearity, independence, normality, and homogeneity of variance. All analyses were carried out using SPSS 26.0.

## Results

### Descriptive Statistics and Correlations

Table [1](#) shows descriptive statistics for the study sample.

#### **Table 1 Mean scores and standard deviations for critical thinking disposition, student engagement, and the five dimensions of engagement by gender and academic year**

Insert table 1 here

As can be seen in Table [1](#), year 2 students, scored higher on disposition to critical thinking scores than their year 4 counterparts ( $t(834) = 3.105$ ;  $p = 0.002$ ;  $d = 0.24$ ). However, year 4 students scored higher in the engagement variables of student-faculty interaction ( $t(694) = -2.766$ ;  $p = 0.006$ ;  $d = 0.23$ ) and high-impact practices ( $t(681) = -2.152$ ;  $p = 0.032$ ;  $d = 0.18$ ), with the exception of collaborative learning ( $t(701) = 3.105$ ;  $p = 0.0001$ ;  $d = 0.29$ ). No statistically significant differences were

observed for higher-order learning and reflective learning and the associated effect sizes were of small magnitude.

Regarding gender differences in year 2 students, women scored higher than men did in disposition to critical thinking ( $t(607) = 2.381; p = 0.0018; d = 0.19$ ). With regards to their engagement, their scores were lower in relation to student-faculty interaction ( $t(471) = -3.766; p = 0.006; d = 0.23$ ). No statistical significant differences were found in collaborative learning, reflective learning, higher order learning and high-impact practices, and the associated effect sizes were small.

Regarding year 4 students, women also scored higher than men did in disposition to critical thinking ( $t(222) = 1.977; p = 0.049; d = 0.26$ ). With regards to their engagement, women scored higher in reflective learning ( $t(219) = 2.708; p = 0.007; d = 0.37$ ) and participation in high-impact practices ( $t(213) = 2.931; p = 0.004; d = 0.40$ ). However, their scores were lower in relation to student-faculty interaction ( $t(218) = -2.477; p = 0.014; d = 0.33$ ). No statistical significant differences were found in collaborative learning and higher order learning and the associated effect sizes were small.

As can be seen in Table 2, there were positive and statistically significant associations between the different indicators of student engagement. Likewise, these indicators, with the exception of student-faculty interaction, yielded positive and statistically significant correlations student disposition to critical thinking.

## **Table 2 Pearson correlations between critical thinking disposition and the different dimensions of student engagement**

Insert table 2

### **Effect of Student Engagement on Critical Thinking Disposition**

To examine the relationship between student engagement and critical thinking disposition, we conducted a linear regression analysis, controlling for the effect of gender, age, and academic year.

It should be noted that the student-faculty interaction variable was not included in the model because a statistically significant correlation with the disposition to critical thinking was not found. The model obtained explained 28.7% of the variance in critical thinking disposition. The results showed that reflective learning ( $\beta = 0.470, t = 11.061, p = 0.0001$ ) and high-impact practices ( $\beta = 0.106, t = 2.929, p = 0.004$ ) predict critical thinking disposition. No statistically significant relationship was found between critical thinking disposition and collaborative learning and higher order learning. Both the highest standardized regression coefficient and the highest semi-partial correlation coefficient correspond to the reflective learning variable.

We then conducted separate independent linear regression analyses for women and men, controlling for the effect of academic year and age. A statistically significant

relationship was found between the disposition to critical thinking and reflective learning among women ( $\beta = 0.541, t = 9.124, p = 0.0001$ ) and among men ( $\beta = 0.392, t = 6.264, p = 0.0001$ ). Likewise, a statistically significant relationship was also found between the disposition to critical thinking and high-impact practices among men ( $\beta = 0.125, t = 2.256, p = 0.0025$ ) but not among women ( $\beta = 0.094, t = 1.910, p = 0.057$ ). In terms of relative predictive weight and contribution to overall fit of the model, reflective learning was the most important variable in both men and women. Summary tables displaying the results of the regression analyses for women and men, controlling for the effect of academic year and age, are available upon request (Tables [3](#), [4](#) and [5](#)).

### **Table 3 Regression analysis with student engagement and critical thinking disposition as a criterion variable**

Insert table 3

### **Table 4 Regression analysis in the year 2 students sub-sample**

Insert table 4

### **Table 5 Regression analysis in the year 4 students sub-sample**

Insert table 5

### **Effect of Student Engagement on Critical Thinking Disposition in year 2 Students**

To examine the relationship between student engagement and critical thinking disposition in the subsample of year 2 students, we conducted a linear regression analysis controlling for the effect of gender and age. The results showed that reflective learning ( $\beta = 0.525, t = 10.352, p = 0.0001$ ) predicts critical thinking disposition. No statistically significant relationship was found between critical thinking disposition and the other indicators of student engagement. In the regression analyses by gender, both among women ( $\beta = 0.594, t = 8.551, p = 0.0001$ ) and among men ( $\beta = 0.443, t = 5.778, p = 0.0001$ ) statistically significant associations were found between critical thinking disposition and reflective learning.

### **Effect of Student Engagement on Critical Thinking Disposition in year 4 Students**

To examine the relationship between student engagement and critical thinking disposition in the subsample of year 4 students, we conducted a linear regression analysis controlling for the effect of gender and age. Here the results showed that reflective learning ( $\beta = .327, t = 3.923, p = 0.0001$ ) and high-impact practices ( $\beta = 0.241, t = 3.295, p = 0.001$ ) predict critical thinking disposition. The highest value of both the standardized regression coefficient and the semi-partial correlation coefficient corresponded to reflective learning.

In the regression analyses by gender and age, the results for women showed statistically significant associations between critical thinking disposition and reflective learning ( $\beta = 0.381, t = 3.224, p = 0.002$ ) as well as between critical thinking disposition and

participation in high-impact practices ( $\beta = 0.211, t = 2.054, p = 0.043$ ). Similarly, among men, a statistically significant relationship was also found between critical thinking disposition and reflective learning ( $\beta = 0.271, t = 2.249, p = 0.027$ ) and between critical thinking disposition and participation in high-impact practices ( $\beta = 0.276, t = 2.540, p = 0.013$ ), reflective learning being the variable of greater relevance in both cases.

## Discussion

The main aim of this study was to examine the relationship between student engagement and critical thinking disposition in undergraduates. As expected, the results showed a positive association between these two variables. Moreover, we found that disposition towards critical thinking was related to reflective learning and to participation in high-impact practices.

Reflective learning, the core of which is gaining awareness of the learning process by analysing experience with questions (Bourner, [2003](#)), was the variable most closely related to critical thinking disposition in our study. This is a process that has been previously linked to students' creative activity (Author, n.d.a; Miller & Dumford, [2016](#)) The association found between disposition to critical thinking and reflective learning supports previous studies that suggest a positive relationship between reflective thinking and critical thinking (Akpur et al., 2020). According to our results, a plausible approach to fostering student critical thinking disposition might emphasize reflective learning across disciplines in the higher education context. Approaches for cultivating student reflective learning include, for example, feedback aimed at guiding students to analyse the learning process they have followed (Daradoumis & Arguedas, [2020](#)), student reflective diaries applied to practical situations (Fullana et al., [2016](#)), or the use of rubrics to analyse university student reflective narratives (Alsina et al., [2017](#)). Our results show that reflective learning was the variable most strongly associated with critical thinking disposition in both year 2 and year 4 students, reinforcing the idea that institutions should promote reflective learning in order to promote student cognitive growth.

One of the main characteristics of high-impact practices is that they expose students to diverse ideas and people of different backgrounds (Kilgo et al., [2015](#)). The positive relationship between high-impact practices and critical thinking disposition is thus consistent with evidence indicating that engagement in diversity experiences may have implications for the development of complex modes of thought (Garvey et al., [2018](#); Loes et al., [2012](#); Pascarella et al., [2001](#)). Our results suggest that participation in practices that promote multiculturalism, collaboration and feedback from educators may lead to higher critical thinking disposition among students. Nonetheless, this positive relationship was only found in the case of year 4 students and, interestingly, high impact-practices such as learning communities, service-learning projects, research projects, internships in companies and stays abroad are only prioritized after the third year of study in the universities where the research was carried out. Our results suggest

that extending participation in this type of practice to previous years of the educational program may be a plausible way of fostering critical thinking disposition and student engagement.

Contrary to our expectations, no relationship has been found between student disposition towards critical thinking and other dimensions of engagement such as collaborative learning, higher order learning or student-faculty interaction. Although previous studies suggested a positive relationship between these dimensions of engagement and critical thinking, to our knowledge, this relationship has not been analysed from the dispositional perspective of critical thinking. Although further studies are required, one might speculate that the motivation to use critical thinking skills may require specific pedagogical strategies.

A final objective of the present study was to explore possible gender differences in the relationship between student engagement and critical thinking disposition. In this regard, for both genders a positive relationship was found between engaging in reflective learning processes and their disposition to critical thinking. The positive relationship between high-impact practices and critical thinking disposition was only found in the case of men. This result adds to the body of literature that suggests that such experiences seem to be more effective in the case of students with initially lower levels of critical thinking (Loes et al., [2012](#)), and highlights the need to consider different subgroups of students in future research in order to thoroughly understand the cognitive benefits of engagement in high-impact practices.

### **Limitations**

This study has a number of limitations. First, the results reported here should be interpreted with caution given the cross-sectional design of our research. Although there are theoretical arguments to assume the proposed relationship between critical thinking disposition and student engagement, causality cannot be established with the present research design and there is a possibility of bidirectionality among the variables. Second, although the number of students who participated in this study is relatively large, response rates might limit the validity of the findings. In this regard, future longitudinal research would provide significant information regarding the relationship between student disposition towards critical thinking and their participation in practices aimed at improving reflective learning, thus providing specific guidelines to higher education educators. Finally, self-perceptions validity has been questioned, for being prone to biases and inaccuracies (Dunning et al., [2016](#)). Nonetheless, several studies suggest that, in the higher education context, self-reports and actual abilities are related (Anaya, [1999](#); Hayek et al., [2002](#); Zilvinskis et al., [2017](#)).

### **Conclusion**

The results of this study reveal that there is a positive relationship between student critical thinking disposition and student engagement in higher education. In particular, this research highlights the importance of ensuring that university students have the

opportunity to engage in reflective learning and to participate in practices that promote and encourage the interaction of students with diverse ideas and people of different backgrounds. Ultimately, these findings inform general pedagogical practices within the higher education curriculum so as to foster critical thinking disposition among future graduates.

### Data Availability

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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## **Contributions**

PAH conceived the research; AM analyzed the data; IL contributed to the interpretation of the results. PAH, AM and IL wrote the manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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## **Ethics declarations**

### **Ethics Approval**

The study protocol was reviewed and approved by the Research Ethics Committee of Mondragon University (Mondragon Unibertsitatea).

### **Consent for Publication**

All authors agree with the content, and all gave explicit consent to submit this article for publication with this journal.

### **Conflicts of Interest/Competing Interests**

On behalf of all authors, the corresponding author states that there is no conflict of interest.