

Research article

An online workshop is effective in improving the oral defense of the bachelor's thesis in nursing students. A real-world cohort study

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ABSTRACT

Aim: This study aims to assess the effectiveness of a short online training intervention to improve oral BT defense in nursing students.

Background: To obtain their undergraduate degree, nursing students must complete a bachelor's thesis and defend it in front of a panel of examiners. Both written work and oral defense competencies are evaluated for the final grade. The literature describes several interventions for improving written bachelor's thesis competencies but none for oral presentation and defense skills.

Design: This real-world cohort study took place over three academic years, from 2020 to 2023, in a Spanish nursing school.

Methods: The effects of a training workshop on the evaluation process were analyzed by comparing mean grades from bachelor's thesis evaluation rubrics.

Results: A total of 816 rubrics were included. The mean grade for the bachelor's thesis oral defense was 8.39 (standard deviation [SD] 1.52) out of 10. The students who did not attend any workshop sessions obtained the lowest grade (8.02 SD 1.62), whereas those who attended the whole workshop scored highest (8.76 SD 1.35). In multivariable analysis, the students who attended the full workshop scored 0.70 points higher, while being a woman increased the final mean score by 0.29 points.

Conclusions: An online workshop was effective in improving nursing students' skills in the oral presentation and defense of their bachelor's thesis, with final grades increasing in correlation to their level of attendance. By improving academic performance and fostering communication competencies, such interventions can be integrated into nursing curricula to support student success, reduce presentation anxiety and better prepare graduates for professional roles that require effective verbal communication.

1. Introduction

The convergence of different university systems within the European Higher Education Area has significantly changed the university landscape across the continent. One of the most relevant changes is the requirement to complete a final thesis for all university degrees, including at the undergraduate level. In the scientific literature, this work is described in different ways: final year dissertation or project, undergraduate dissertation, or—most commonly—bachelor's thesis

(BT) (Karlsholm et al., 2024; Reguant et al., 2018). BTs are small research projects aimed at integrating the knowledge and skills acquired throughout students' undergraduate studies (Reguant et al., 2018), representing the culmination of the university educational process (Campos-López et al., 2024).

1.1. The BT defense presentation: state of the art

Spanish law mandates that students defend their BTs in a public

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event, in accordance with the regulations established by each university. In these settings, the presentation and defense is an important part of the BT assessment process, with oral communication representing one of the most prominent and important competences in the teaching guides of the BT subject for nursing degrees (Canet et al., 2016).

Yet, the lack of presentation skills is a serious issue for university students (Bonetti, 2023; Maldonado et al., 2022; Tuero et al., 2022) and causes significant stress in nursing students (Aguayo-González et al., 2020; Chust-Hernández et al., 2022; El-Nagar et al., 2022; Ramírez-Adrados et al., 2022; Rayani et al., 2023). Research shows that poor oral skills are linked to various problems among university students, including inappropriate behavior during presentations (Mancuso and Miltenberger, 2016; Montes et al., 2019), which may lower final grades in the oral defense (Mowbray and Perry, 2015). Poor public speaking skills also affect students' confidence during the speech, increasing their general anxiety about oral presentations, which in turn hinders their learning of this skill (Charoensukmongkol, 2019; Simpson et al., 2019). Presentation skills are an important skill for future nurses, enabling them to convey health-related knowledge to patients, other healthcare professionals and the community (Chiang et al., 2022; Roso-Bas et al., 2020). Because inadequate training in public speaking skills may compromise this ability in future nursing professionals, there is a need for nursing programs to incorporate training in presentation skills related to health topics (Chiang et al., 2022; Roso-Bas et al., 2020).

In practice, many students feel insufficiently trained to perform the highly demanding tasks comprising a BT and poorly prepared for its subsequent evaluation (Tuero et al., 2022). These deficits are especially evident in the oral BT defense (Hernández-Rodríguez et al., 2022), a task for which many students do not feel competent or self-effective (Tuero et al., 2022). On reaching the final year of the degree, students continue to show significant deficiencies in the skills for oral presentation needed for the defense of a BT, as evidenced in faculty evaluations (de Faramiñán, 2023). Some authors have highlighted that these oral presentation deficits bely the good quality of the papers themselves (Onieva, 2016).

Given that oral presentation skills can be improved through training, not only through experience (Fernández et al., 2010), nursing students could clearly benefit from training in scientific communication focused on BTs. However, there is little research on the impact of interventions to improve students' skills in presenting and defending BTs. Most studies in this regard assess students' satisfaction with the training or self-perception regarding the acquisition of oral presentation (Albort-Morant et al., 2022; Barcenilla et al., 2022; Quintas-Hijos and Latre-Navarro, 2023; Tuero et al., 2022) but do not assess the effectiveness of the intervention in improving academic performance, as reflected in the final grade awarded for BT exposition and defense. This is a significant limitation, because satisfaction with a particular training program and the results of a self-reported test where the student assesses their own ability may not reflect the student's true performance or actual skill level. (Bravo-González et al., 2021). Our literature review identified only one study—which happened to be in nursing students—of the effectiveness of an intervention on BT presentation and defense, which showed that the intervention did not affect the grade (Serrano-Gallardo et al., 2018). Moreover, none of the studies previously described had a large sample of students nor a control group, which poses significant methodological limitations. This creates a knowledge gap regarding the actual effectiveness of training activities aimed at helping students improve their performance and grades in the BT defense. More evidence is needed to fully understand the scope of this type of intervention. This study aims to contribute to that goal.

1.2. BT in the school of nursing at the Universidad Católica de Valencia San Vicente Mártir

The BT was introduced in the Universidad Católica de Valencia San Vicente Mártir in the 2013–2014 academic year. It consists of a research

and writing project on a single topic and counts as a separate module within the degree, taking place during the final year of undergraduate studies and which the student carries out under the supervision of a supervisor. This advisor provides guidance and support throughout the course. The BT has a maximum length of 6000 words, excluding abstract, tables, figures and references.

During the project, students acquire different competencies, which their supervisor and the panel of examiners (consisting of two other lecturers with experience in BT direction) must assess. The supervisor approves the presentation of the work. The panel of examiners then awards a mark for both the paper and the oral defense. Panels are randomly assigned by the faculty undergraduate thesis coordinator, according to the number of theses they supervise. Professors are not eligible to review projects in their own line of research. Three assessment rubrics (one for the supervisor and two for the panel) are used for the different assessment domains. The final grade, awarded on a scale of 0–10, is weighted as follows: the supervisor assigns a grade to the process of carrying out the work through a 7-topic rubric (30 % of the final grade). The panel of examiners marks the written work through a rubric of 13 topics (50 % of the final grade). For the BT defense, the student has 7 min where to present their work, supported by a graphic presentation projected in the classroom. After the presentation, the student must respond to the panel's questions, comments and suggestions. The panel of examiners also assesses the oral presentation by means of a five-topic rubric (20 % of the final grade), assessing the following:

1. The student's oral presentation. The presentation of information in a convincing, clear and precise manner will be positively valued.
2. Adherence to the time interval of 7 min (+/– 30 s).
3. The audiovisual media used during the presentation. Graphic presentations that appropriately use features like font size, images, graphics and number of words and allow the audience to easily follow the presentation are assessed positively.
4. Non-verbal communication skills. Students will earn better marks by making eye contact with the audience, appropriately projecting their voice, modulating their tone, reinforcing the verbal message through gestures and not using speaking crutches.
5. The question and answer (Q&A) segment with the panel of examiners. Positive evaluations will be awarded based on excellent explanations in terms of precision and clarity.

Students submit their BTs and make their oral presentations 3–4 weeks later. During this period, the panel of examiners evaluates the written work and students receive an online training workshop to improve their BT defense, covering the five points mentioned above. The aim of this study is to analyze the effectiveness of an online training workshop for improving the defense of the BT in nursing students at a Spanish university.

2. Methods

2.1. Design

This real-world cohort study analyzed all rubrics completed by the students who presented their BT for the bachelor's degree in nursing at our university from September 2020 to June 2023, over three academic years: 2020–2021, 2021–2022 and 2022–2023.

2.2. Participants

Inclusion criteria were enrolment in the BT course and completion; submission and oral defense of the BT. Exclusion criteria were refusal to participate or failure to sign the informed consent form.

2.3. Sample size

For a deviation of 1.15 in the mean grade of the BT (Pérez-Ros et al., 2021), an alpha value of 5 %, a minimum error of 2 % and a 20 % attrition rate, a sample size of 68 participants was calculated.

2.4. Procedure and data collection

The Universidad Católica de Valencia San Vicente Mártir is a private university located in Valencia, the capital of Spain's third largest city. In 2025, the 70th cohort of undergraduate students completed their degrees. At the time of writing, there were around 360 students enrolled per academic year, for approximately 1440 students in total. Most (82 %) start university at age 18, reaching their fourth year at age 22–23, when they take the BT course. The rest of the students are aged around 25–35 years old, with some working in the health sector. There is also a small percentage (3 %) of students aged 40 years or older with work experience in the health sector. Most are women (73 %).

The study includes three cohorts, which would potentially number up to 1080 students. The more advanced courses (third and fourth year, where students enroll in the BT) have fewer students due to attrition or the need to repeat subjects they had failed in previous years. Of the 883 students who met the inclusion criteria, 67 were excluded for refusing to participate in 2020–2021 ($n = 44$), 2021–2022 ($n = 8$) and 2022–2023 ($n = 15$). The study included a convenience sample of 816 participants from three academic years: 2020–2021 ($n = 244$), 2021–2022 ($n = 291$) and 2022–2023 ($n = 281$). All participants were offered the possibility

of attending a free online training workshop on oral presentation skills for the defense of their BT. Dissemination of the workshop was through informative meetings with the coordinator of the fourth year nursing course and a mailing campaign. The workshop was held 7 days after the BT submission deadline and the dissemination of information. To facilitate student attendance, two morning and two afternoon sessions were scheduled for the three academic years (Fig. 1). Students could attend any of the four sessions.

The following variables were collected: gender, academic year, percentage of the workshop time that students were connected to the online platform and finally, the BT oral defense grade. The workshop attendance groups were created according to the percentage of the workshop time that students were connected to the online platform, categorized as: no attendance (0 %), low-moderate attendance (1–49 %), moderate-high attendance (50–99 %) and complete attendance (100 %).

2.5. Intervention: training workshop “preparing the presentation and defense of the bachelor's thesis”

The training workshop offered at the nursing school is voluntary and lasts 2.5 h. It is an online workshop, conducted by the Psychopedagogical Guidance Service of the school of nursing. The intervention was the same throughout the three academic years, with the same dissemination procedure, implementation, facilitator and materials used for all three courses.

Although the study was conducted during the COVID-19 period, this

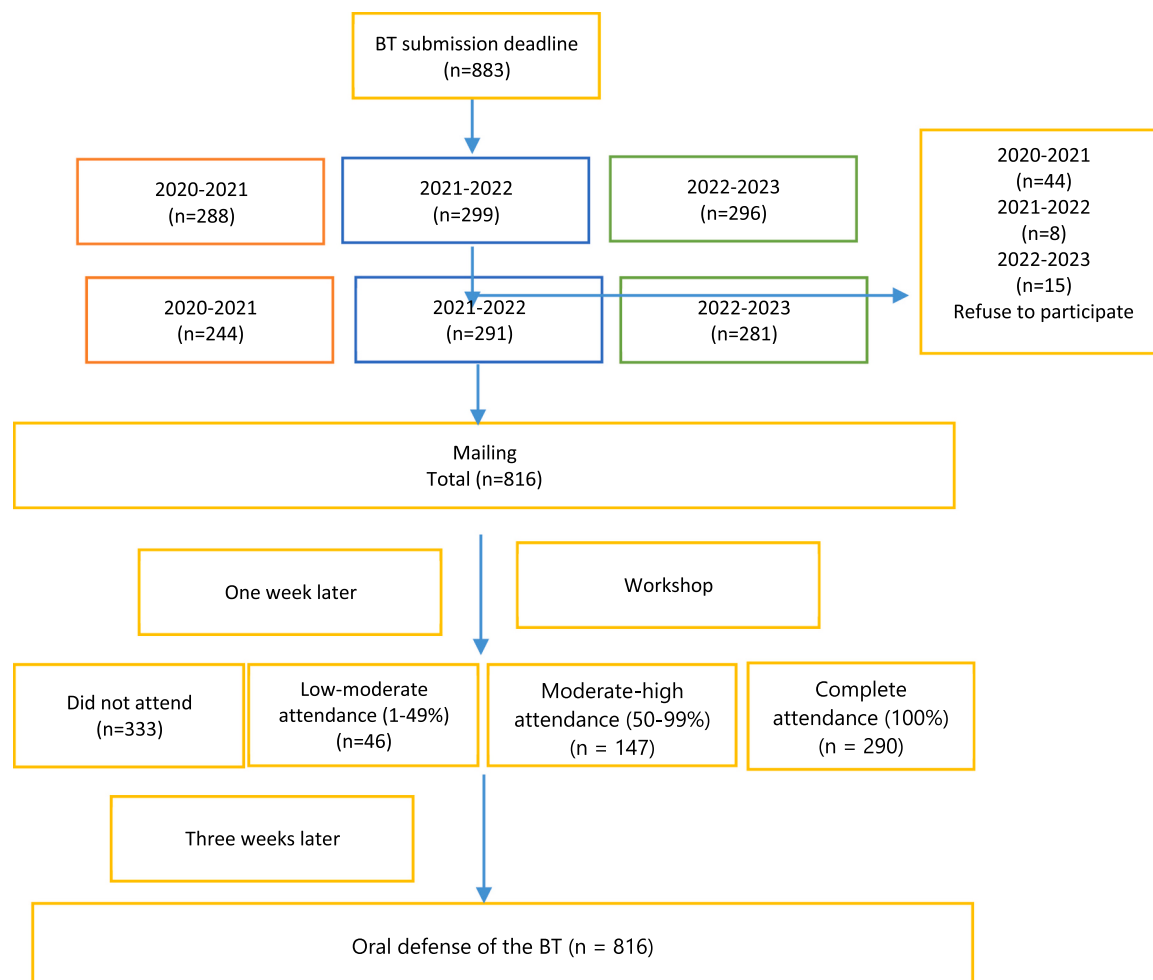


Fig. 1. Participant flow chart.

aspect did not interfere with the intervention due to its online nature. The training workshop was held via the Microsoft Teams platform, which is accessible to the entire university community. During the lockdown and subsequent end of the distance learning academic period, this platform was used to deliver distance learning classes from March 2020 to July 2020, so students were familiar with and skilled at using the platform.

After a brief introduction (5 min), the workshop covers different topics that teach students the behaviors and skills they need to master to obtain the highest quality standard within each of the five elements assessed in the rubric ([Supplementary file 1](#)):

Topic 1: "Presentation of the topic/presentation skills" (30 min). Students work on how to prepare for their presentation in the weeks prior to their oral defense, with an emphasis on the presentation of scientific information in a clear and precise way and the synthesis of the relevant information of the BT.

Topic 2: "Adherence to the presentation time" (10 min). Students receive guidance on how to recognize irrelevant information in the BT to streamline the presentation of the BT contents and minimize the probability of going over time.

Topic 3: "Audiovisual media" (20 min). This topic addresses the appropriate use of visual elements to make the presentation easy to follow: legible font size; use of graphs, figures and images; and amount of text on the slides; etc.

Topic 4: "Non-verbal communication skills" (20 min). Students learn effective non-verbal communication techniques: eye contact with the audience, volume and tone of voice, gestures, body posture and avoidance of speaking crutches, among others.

Topic 5: "Answering the panel's questions" (20 min). The workshop introduces types of questions that the panel may ask, how to argue, how to focus the answer and how to answer in case of uncertainty.

Following these topics, two more modules are taught in the workshop: one discusses practical aspects of the presentation (10 min), including presentation format, errata and appropriate dress. The other (lasting around 35 min) teaches students how to manage their anxiety prior to the oral presentation. The modification of negative and maladaptive thoughts with respect to the BT presentation is worked on through cognitive restructuring. Guidelines are also provided to reduce anxiety in the days and hours prior to the presentation (for example, getting enough rest the night before, controlling caffeine intake in the hours before, familiarizing oneself with the presentation room, attending presentations by peers if possible).

2.6. Data analysis

To assess assumptions and describe sample and data distribution, descriptive statistics were calculated. The variables were presented as means, standard deviation (SD) and/or proportions. Normality was evaluated using the Kolmogorov-Smirnov test. Quantitative variables were compared using nonparametric testing (Mann-Whitney U and Kruskal Wallis test for independent samples). To assess inter-rater reliability of the evaluation rubric, both Cronbach's alpha and the intraclass correlation coefficient (ICC) were calculated. Cronbach's alpha was used to evaluate the internal consistency of the rubric items across evaluators, while the ICC provided a measure of agreement between raters on continuous scoring data. A linear regression model was fitted to assess the importance of the percentage of attendance for the final grade. The variables included in the model were: gender and percentage of attendance. The statistical software Jamovi 2.2.5 and SPSS version 26.0 for Windows (IBM Corp., Armonk, NY, USA) were used to conduct the statistical analysis.

2.7. Ethical considerations

The study was approved by the ethics committee of the Universidad Católica de Valencia San Vicente Mártir (protocol UCV2019–2020–051).

Informed consent was obtained from all participants prior to data collection. Participation in the workshop and inclusion in the study were entirely voluntary, with students free to opt out at any time without academic consequences. To ensure anonymity and confidentiality, all data were de-identified before analysis and individual responses were not linked to personal identifiers at any stage of the research process. The data obtained were processed in compliance with Spanish legislation, specifically the Organic Law on the Protection of Personal Data and Guarantee of Digital Rights (LOPD 3/2018). The study complied with the ethical principles for research cited in the Declaration of Helsinki.

3. Results

Of the total 816 participants, 80 % ($n = 653$) were women. We analyzed the difference in total score by gender and rubric topic; men scored lower on topic 1 (presentation skills) and topic 3 (use of audiovisual media) ([Table 1](#)). Regarding inter-rater reliability, the value of Cronbach's alpha was 0.702, indicating acceptable internal consistency among rubric items across evaluators. The ICC was 0.671, which reflects moderate agreement between raters. Together, these results suggest that the evaluation rubric provided reasonably consistent and reliable scoring across different examiners.

Analyzing the results by academic year showed that the most recent workshops yielded the highest grades in students who attended, although differences were significant only for topics 1 (oral presentation skills) and 2 (adherence to time intervals). When differences were analyzed according to the level of attendance, differences were observed between those who did not attend and those who were connected for at least some of the workshop. The highest grades were obtained by the group of students who attended the entire workshop ([Table 1](#) and [Fig. 2](#)).

For topics 1, 2, 4 and 5, differences were found only between the "no attendance" and "complete attendance" groups, with higher scores for complete attendance ([Fig. 3a, b, d y e](#)). On the other hand, for topic 3, any level of attendance to the workshop yielded significant differences in the grade awarded ([Fig. 3c](#)).

Finally, a linear regression ($F = 18.57$; $p < 0.001$; $R = 0.21$) was performed to determine the impact of gender and attendance level on the final grade. Women obtained 0.295 points more than men, while the final grade increased by 0.232 in students with low-moderate attendance, by 0.464 in those with moderate-high attendance and by 0.696 in those who attended the full workshop ([Table 2](#)).

4. Discussion

This study analyzed the effectiveness of an online workshop for improving the oral BT defense in nursing students at a Spanish university. Our results showed that students who took part in the workshop obtained better grades than those who did not.

Specifically, there were significant differences in the scores for 4 of the 5 topics on the evaluation rubric (presentation skills, adherence to time limits, non-verbal communication skills and Q&A with the panel of evaluators) between those who attended the whole workshop (100 %) and those who did not attend at all. However, there were no significant differences between those who attended only part of the workshop (1–49 % and 50–99 %) and those who did not attend. The reason may be that the students who attended the workshop incompletely (1–49 % and 50–99 %) generally attended the first part, where they worked only on the five topics measured by the rubric; once this part was finished, many of them disconnected from the online session. These students would therefore have missed the module on anxiety management (given at the end of the workshop). As a result, their anxiety management skills at the time of the presentation might have been more limited than those who attended the full workshop, undermining their performance on all aspects of the rubric except the one related to the use of audiovisual media.

Fear of public speaking is related to worse performance in oral communication and worse oral presentation ([Becerra, 2017](#);

Table 1
Mean grades awarded by the panel of examiners.

		Total grade Scale 0–10		Topic 1: presentation skills Scale 0–3.33		Topic 2: adherence to time Scale 0–1.11		Topic 3: use of audiovisual media Scale 0–1.11		Topic 4: non-verbal communication Scale 0–1.11		Topic 5: Q&A Scale 0–3.33	
		Mean (SD)	P	Mean (SD)	P	Mean (SD)	P	Mean (SD)	P	Mean (SD)	P	Mean (SD)	P
Total sample	816 (100)	8.39 (1.52)	-	2.73 (0.73)		1 (0.22)		0.92 (0.23)		0.93 (0.24)		2.81 (0.72)	
Gender													
Men	163 (20)	8.11 (1.76)	0.06 ^U	2.61 (0.79)	0.033	0.97 (0.26)	0.35	0.88 (0.25)	0.026	0.89 (0.27)	0.059	2.76 (0.72)	0.213
Women	653 (80)	8.46 (1.45)		2.76 (0.71)		1.1 (0.2)		0.92 (0.22)		0.96 (0.23)		2.83 (0.71)	
Academic year													
20–21	244 (29.9)	8.19 (1.57)	0.004 ^k	2.64 (0.74)	0.003	0.99 (0.22)	0.018	0.91 (0.23)	0.52	0.90 (0.25)	0.11	0.75 (0.73)	0.14
21–22	291 (35.7)	8.33 (1.52)		2.71 (0.73)		0.99 (0.23)		0.9 (0.24)		0.94 (0.23)		0.71 (0.41)	
22–23	281 (34.4)	8.62 (1.44)		2.84 (0.7)		1.03 (0.2)		0.93 (0.21)		0.93 (0.24)		0.70 (0.41)	
Workshop attendance rate													
0	333 (40.8)	8.02 (1.62)	< 0.001 ^k	2.58 (0.79)	< 0.001	0.96 (0.26)	0.002	0.86 (0.25)	< 0.001	0.88 (0.26)	< 0.001	2.73 (0.75)	0.017
1–49 %	46 (5.6)	8.69 (1.39) [*]		2.82 (0.65)		1 (0.24)		0.96 (0.18) [*]		0.97 (0.23)		2.93 (0.54)	
50–99 %	147 (18.1)	8.42 (1.46) [*]		2.75 (0.65)		1.01 (0.19)		0.94 (0.2) [*]		0.93 (0.23)		2.79 (0.75)	
100 %	290 (35.5)	8.76 (1.35) [*]		2.89 (0.66) [*]		1.04 (0.15) [*]		0.96 (0.21) [*]		0.97 (0.21) [*]		2.91 (0.67) [*]	

U: U Mann Whitney test; K: Kruskal Wallis test.

^{*} Between the 0 and the indicated percentage.

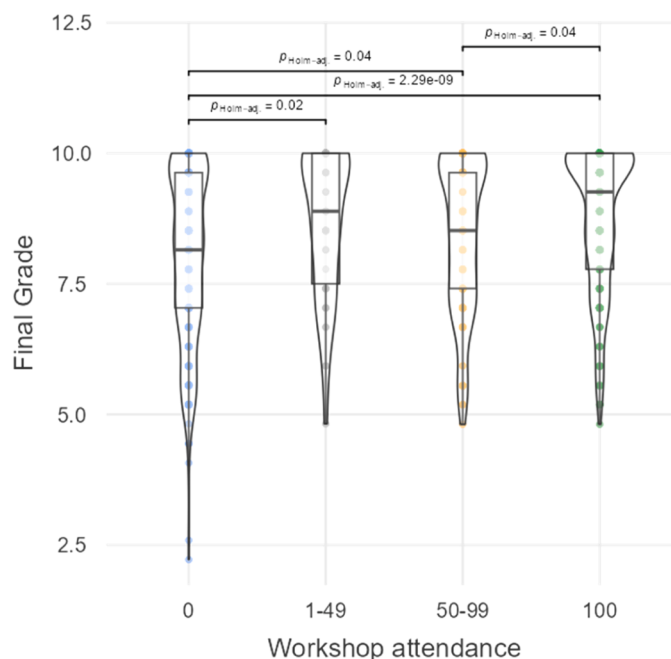


Fig. 2. Violin plot of Kruskal Wallis statistic, analyzing final grade according to level of attendance in the training workshop. Y axis: final grade. X-axis: 0: no attendance, 1–49: low-moderate attendance, 50–99: moderate-high attendance, 100: complete attendance.

Charoensukmongkol, 2019; Housley and Kerckmar, 2016), an aspect assessed in topic 1 of the rubric. Anxiety can cause students to forget information that they had planned to present despite having prepared it (Bravo-González et al., 2021; Pirela, 2022) and may impair their concentration (García et al., 2015), giving the impression that they are not proficient in the topic (Bravo-González et al., 2021). This could also reduce students' confidence in addressing the panel of examiners' questions (topic 5 of the rubric), a segment of the oral defense that is especially worrying to students (Sonllevea et al., 2024).

Adherence to time intervals (topic 2 of the rubric) may also be affected by anxiety before oral presentations. Accelerated speech, or tachylalia, is a behavioral response to stress and speech anxiety and shyness may be associated factors (Ferreira et al., 2020), probably as a response to the desire for the public speaking situation to end as quickly as possible (Rodrigues et al., 2017), which would explain the rapidity of their speech. To obtain the maximum mark in topic 2 of the rubric, students must adhere (within a 30-s margin) to a time interval of 7 min. Accelerating their prepared remarks could result in students' presentations being too short (< 6:30 min), which would penalize their grade in this section of the rubric.

Non-verbal communication, evaluated in topic 4 of the rubric, is another skill that could be hindered by anxiety. For example, fear of public speaking can lead to motor restlessness (García et al., 2015), voice tremor and other speech-related problems (Glassman et al., 2016), lack of eye contact with the audience (Ferreira et al., 2020) and, in general, worse non-verbal communication (Becerra, 2017).

By contrast, in topic 3 of the rubric ("use of audiovisual media") there were significant differences between those who attended any part of workshop versus none of it. This topic evaluates the only aspect of the grading rubric that does not depend on the performance at the time of the presentation, since the student prepares their audiovisual materials beforehand. Therefore, anxiety at the time of the presentation does not influence the grade awarded to the visual presentation. This may be why students with low-moderate and moderate-high attendance levels (who generally attended the module where topic 3 of the rubric was worked on, but usually not the anxiety control module) presented significantly

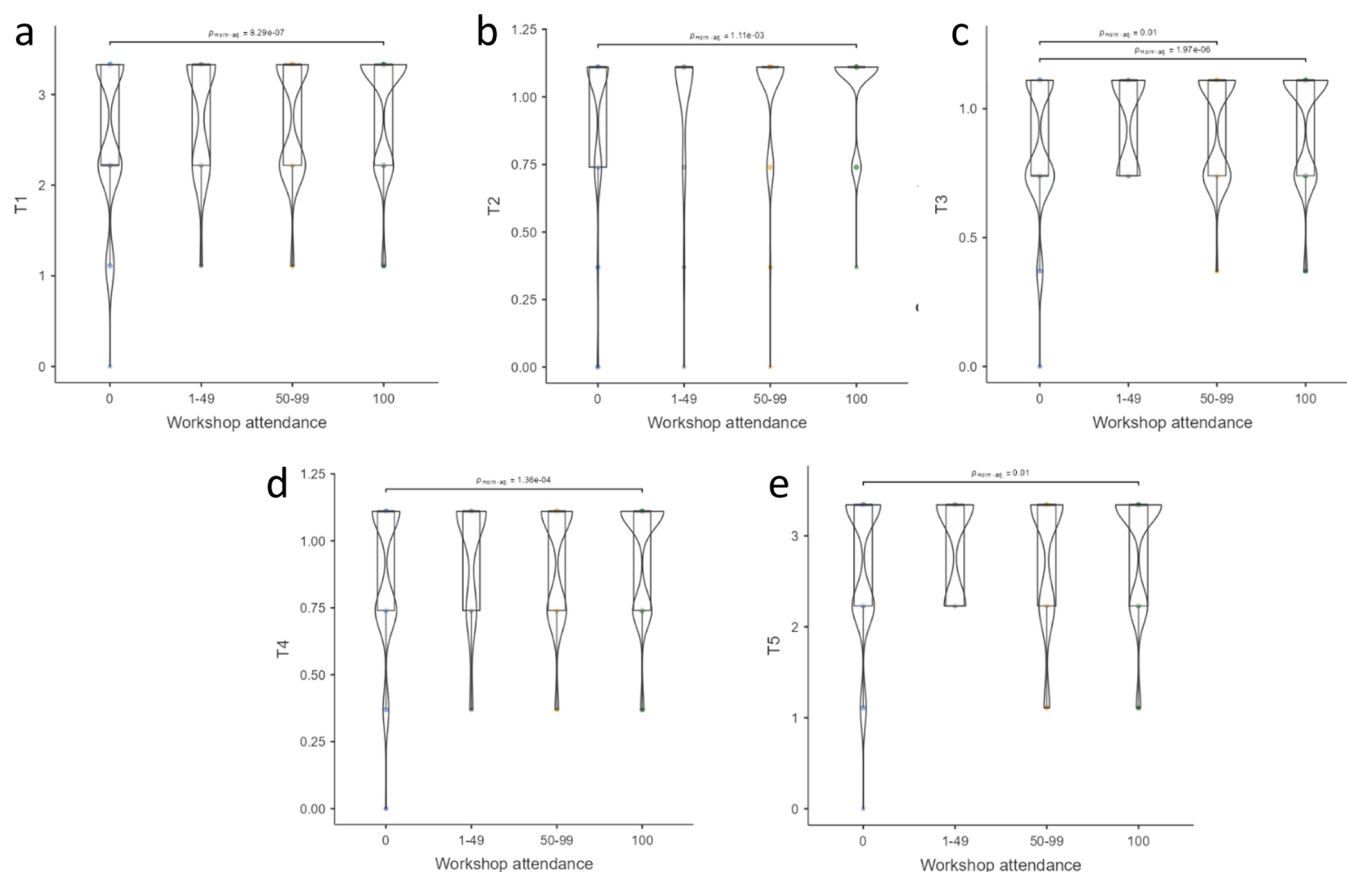


Fig. 3. Violin plot of Kruskal Wallis statistic, analyzing association between grades per topic and workshop attendance rate. (a) Topic 1: presentation skills, (b) Topic 2: adherence to time limits, (c) Topic 3: use of audiovisual media, (d) Topic 4: non-verbal communication, (e) Topic 5: Q&A.

Table 2

Linear regression.

Model	Beta	Standard Error	95 % confidence interval		P
Constant	7.812	0.127	7.574,	8.077	< 0.001
Women	0.295	0.130	0.040,	0.553	0.024
1) Low-moderate (1–49 %)	0.232	0.039	0.097,	0.205	< 0.001
2) Moderate-high (50–99 %)(3)					
Complete (100 %)					

higher scores than the group who did connect to any of the workshop (a finding not observed in the rest of the topics). This reinforces the hypothesis that anxiety in the lead-up to the BT defense could affect students' performance.

When analyzing the overall grade of the BT defense (the sum of the five topics of the rubric), significant differences were observed in the grades between the group of students who did not attend versus the three groups that did (1–49 %, 50–99 % and 100 %) and no significant differences were found between the three attendance groups. The regression model showed that higher attendance at the workshop was a predictor of higher grades in the defense. Based on these results, we can affirm that the intervention analyzed was effective in improving performance in the BT defense. However, the differences in scores were not very large. Although public speaking skills can be improved with training (Fernández et al., 2010), this is a long and complex process that requires time, abundant practice and ongoing training (Chaparro, 2022). Despite this, the training intervention proved to be effective, with the work on managing fear of public speaking potentially representing a

key element of the overall effectiveness.

The regression model also showed that being a woman was a predictor of better performance in BT exposure and defense. This finding is unsurprising considering that female university students obtain higher grade point averages than their male counterparts (Gozalo et al., 2022; Rivas et al., 2023). However, evidence on the influence of gender on oral presentation and fear of public speaking is still inconclusive (Rodero and Larrea, 2022): some studies show that men have better communication skills and greater anxiety control (Silva et al., 2020), while others have found the opposite (Rodero and Larrea, 2022) and others still have found no differences (Broeckelman-Post et al., 2019).

To our knowledge, the present study is the first with a control group and a considerably large sample to analyze the efficacy of an intervention for improving BT defense grades.

The results obtained have a direct, practical relation to students' future graduate and postgraduate studies, which will also require skills in oral defense. The results also allow for extrapolation to the interventions that nursing professionals are called on to perform in their daily work, such as clinical sessions, population-based health education and continuing education for the rest of the healthcare team. Better public speaking skills also help prepare them for participation in discussion forums, conferences and professional networking opportunities.

Although the study was conducted in Spanish students from a single nursing faculty, it is possible to replicate the intervention in other cultural and linguistic contexts beyond Spain. To do so, nursing schools should adapt the content of the training workshop to the assessment criteria for oral presentations in their BT.

Nevertheless, the results of this study should be considered in light of its limitations. First, we were unable to analyze the influence of confounders related to the students, which could have affected the results (average grade in the nursing degree, grades in the oral presentations

made during the nursing studies, previous level of skills in oral presentation, fear of public speaking and anxiety levels) The results may also be influenced by a selection bias, where more diligent students may have been more likely to take part in the training and to complete the entire session. Furthermore, the number of students who prepared the presentation and defense with their directors was not analyzed, although such guidance could have influenced the grade of the BT defense regardless of whether or not they attended the intervention. Additionally, there are variables related to the panel of examiners that are very difficult to control for but may have affected the students' grades. For example, different panels may have posed questions of variable difficulty or could have evaluated the defense with different levels of subjectivity. Regarding this last aspect, although evaluation rubrics help to reduce the impact of heterogeneity in BT assessment (Pérez-Ros et al., 2021), the truth is that, despite their use, it is not possible to eliminate all subjectivity in the evaluation of these papers (Shipman et al., 2012). The study sample was composed mainly of women (80 %), reflecting the feminization of nursing students (Chust-Hernández et al., 2022; Dogan et al., 2025). This gender imbalance may have influenced the magnitude of the associations between workshop attendance and performance, as women obtained slightly higher grades in the oral defense. Although gender was included as an independent variable in the regression model, a possible residual bias cannot be ruled out. Therefore, the results should be interpreted with caution, as they mainly represent the experience of female students. Future studies with more gender-balanced samples, or which consider gender as a moderating variable, could help determine whether the intervention benefits men and women equally. It would be interesting if future research could overcome, as far as possible, the limitations described.

5. Conclusions

The results suggest that a brief online intervention improves BT defense grades, strengthening the students' performance and increasing their self-confidence. Being a woman and attending the entire workshop increased the final score by 0.295 and 0.696 points, respectively and the final grade was positively correlated with the level of attendance. More research is needed corroborate these findings. Our results support investments in counselling and psycho-pedagogical support programs that help prepare nursing students for different aspects of the BT, as other authors also recommend, including its oral presentation and defense. From this perspective, institutional support is a protective factor against the problems students experience in BTs, including stress and lack of coping skills. Similarly, the lack of training courses is a barrier to successful completion of BTs among future nurses. Therefore, in light of our results, we believe it would be beneficial for nursing degrees to include preparatory workshops for oral defense in the BT curricula, to improve students' academic performance in this subject and their communication skills, thus better preparing graduates for professional roles that require effective verbal communication. Future studies could continue this line of research. It would be of interest to conduct randomized controlled trials, compare experiences between institutions and incorporate pre- and post-self-assessments of anxiety to improve causal inference and the generalizability of results. All of this would contribute to increasing the body of knowledge on the issue of BT in nursing degrees, reducing the research gap decried by different authors in this field.

CRediT authorship contribution statement

Francisco Miguel Martínez-Arnau: Writing – review & editing, Writing – original draft, Formal analysis. **Luisa Alcalá-Dávalos:** Writing – original draft, Data curation. **Pablo Chust-Hernández:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Pilar Pérez-Ros:** Writing – review & editing, Writing

– original draft, Supervision, Methodology, Formal analysis.

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Declaration of competing interest

The authors declare that they have no conflicts of interest.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.nepr.2025.104624](https://doi.org/10.1016/j.nepr.2025.104624).

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