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Research

Comparison between the traditional study method and AI use in the analysis of an occupational risk prevention law in Nursing students: An experimental study

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ABSTRACT

Background: The efficacy of artificial intelligence (AI) in enhancing university learning remains unproven.
Aim: The aim of this study was to compare the impact of AI tools with that of traditional, text-based study methods on undergraduate nursing students' learning of legal content related to the prevention of occupational risk.
Methods: Experimental study in which students were randomly assigned to two groups: one utilized AI tools, and the other employed traditional text reading methods. Both groups completed an objective multiple-choice questionnaire and a subjective self-assessment before and after the intervention. The objective questions assessed four cognitive domains: knowledge, comprehension, analysis, and application.
Results: Both groups improved their overall knowledge levels ($p < 0.001$), with the control group exhibiting a more pronounced improvement ($p = 0.002$). The control group demonstrated superior performance in the knowledge-based questions ($p = 0.001$). However, no significant differences were observed in comprehension, analysis, or application.
Conclusions: Conventional study methods provide superior knowledge acquisition in comparison to AI methods. The use of AI did not improve critical thinking skills, such as understanding or application.

Introduction

Educators need technological tools that help them filter available information, create new knowledge, organise existing knowledge and promote new ways of teaching (Carbonell-García, 2023). In this context, Artificial Intelligence (AI) has emerged as one of the most transformative technologies in the education field, particularly in Health Sciences training (Smailhodzic, 2024).

The term “Artificial Intelligence” (AI) is defined as machines' ability to use algorithms, learn from data and apply what they have learned to make decisions in a human-like manner (López, 2022). Large Language Models (LLMs) are sophisticated AI systems engineered to process and generate human language through the utilisation of neural networks.

In October 2023, these models underwent substantial advancements in accuracy and reasoning, thereby enhancing context interpretation and aligning with user intent. The research done concentrated on reducing biases, optimising efficiency and enhancing transparency in their decision-making processes. Furthermore, an improvement in understanding was observed during extended conversations, enhancing the effectiveness of dynamic interactions. These developments meant a pivotal moment for LLMs, with an increasing emphasis on ethical and responsible development.

In this context, the term “ChatGPT”—acronym for Chat Generative Pretrained Transformer—emerged in November 2022. The term “chatbot” refers to a sophisticated automated system that utilises AI to respond to user queries in a manner that emulates human conversation. The generation of coherent ideas and texts is achieved by drawing on prior information and online data to formulate answers (Castonguay, 2023; Gutiérrez-Cirlos, 2022).

In the educational field, it is worth highlighting the advantages of the following tools: assistance for teachers, personalized learning, quick access to information and help in the creation of content and questionnaires (Gutiérrez-Cirlos, 2022). Therefore, it is extremely necessary to use Artificial Intelligence to enrich and improve

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teaching, helping to enhance the quality of the students' teaching and learning practices, among other aspects (Dave, 2023). In the health field, the Artificial Intelligence applications are multiple and can drive a drastic change in education, research and healthcare practices (Suarez-Álvarez, 2022).

According to Pascuas-Rengifo, research in the field of how smart devices are used has been oriented to analysing the students' and teachers' perceptions and acceptance level, limiting the objective measurement of their impact on academic performance and the development of innovative practices (Pascuas-Rengifo, 2020).

As Shorey points out in her systematic review, there is some evidence of the benefits that using this technology has for Nursing students, such as: personalized educational content according to each student's individual needs and learning style/pace; immediate and personalized feedback; fostering a dynamic learning environment that contributes to self-directed learning, collaborative efforts in small groups and lifelong learning; improving the development of the students' clinical skills and reasoning by creating virtual simulations; and also its ability to improve their communication skills (Fox & Shorey, 2024). As Dave points out, it should also be considered that when using sensitive data related to people's health, it is imperative to work with regulatory bodies to ensure that the data used to train and work with Artificial Intelligence are employed ethically (Dave, 2023). In addition, White Anne showed that Artificial Intelligence use improves Nursing students' attitude towards older adults (White Anne, 2024).

The integration of Artificial Intelligence (AI) in Nursing education and practice presents various challenges and risks that must be addressed with caution. One major concern is students' over-reliance on AI chatbots, which may hinder the development of critical thinking and encourage plagiarism and unethical academic behaviours (Tam et al., 2023). Additionally, AI systems can present biases and errors, raising concerns about their accuracy in teaching and clinical applications (Castonguay et al., 2023). In practical settings, AI cannot replace human interaction, which may impact empathy and patient care quality (Martínez-Ortigosa et al., 2023). Furthermore, applying AI in clinical decision-making and patient monitoring introduces additional risks, including potential data misinterpretations and limitations in adapting to complex, human-centred scenarios (Wei et al., 2025). Lack of regulation and faculty training further complicates effective implementation, requiring curriculum adjustments and clear policies to ensure appropriate use (Tam et al., 2023; Castonguay et al., 2023). These risks highlight the need for supervision and strategies that ease AI integration in Nursing education and practice without compromising professional training or healthcare quality.

As the implementation of Artificial Intelligence in the training of Nursing students has positive aspects, experimental design studies are required to test the specific learning benefits that the evidence can support, especially when compared to the traditional methodology. Therefore, the objective of this study is to compare Artificial Intelligence use in the study of a legal text on occupational risk prevention (specifically, the Occupational Risk Prevention Law in Spain) in Nursing students versus the traditional study method by reading and analysing texts, to examine whether there are significant differences in the learning and comprehension of a type of text that, due to its characteristics, can be difficult for Nursing students to assimilate and understand, as it has legal jargon and technicalities with which they are not familiar.

Material and methods

Design

An experimental study was carried out with two randomised parallel groups (1:1 ratio) comprised by third-year Nursing students attending a University from Madrid (Spain) during the 2023-2024 academic year.

Study population, setting and protocol

The study population consisted of third-year students enrolled in the "Legislation, Management and Occupational Health in Nursing" subject ($N = 193$). The entire study population was taken as sample.

The inclusion criteria were being enrolled in the third-year "Legislation, Management and Health in Nursing" subject and giving consent to participate in the study.

Participants who either declined to take part in the study or did not complete the questionnaires satisfactorily were excluded from the analysis.

The activity consisted of a review and analysis of the Occupational Risk Prevention Law (Law 31/1995 of November 9th), which is the basic regulation on the prevention of occupational risks in Spain. The students were randomly allocated to two groups: Experimental Group, which used Artificial Intelligence; and Control Group, which resorted to the traditional text analysis teaching method. The Random command was used for randomisation. To work with the students within each group, they were subdivided into subgroups of 4-5. The Control Group was provided with the document with the Law in PDF format and was not allowed to use electronic devices during the activity. The Law document has a total of 41 pages and 26,342 words. The Experimental Group was given instructions to use the ChatGPT-3.5 free version to search for information on the Occupational Risk Prevention Law without access to the official text.

Neither of the two groups had received specific training in Artificial Intelligence prior to conducting the study.

Both groups had 40 minutes to write a summary of the Law (one group based on reading and analysing the text and the other by using the information they extracted with Artificial Intelligence programs) and to present the main contents of the Law to their classmates. Prior to performing the activity, an "*ad-hoc*" multiple-choice questionnaire with questions about the Law was applied using the Wooclap tool, as an objective knowledge assessment method. The questions in the questionnaire were grouped according to Bloom's taxonomy of cognitive processes involved in learning: knowledge, comprehension, analysis and application (Bloom, 1956). In addition, a subjective self-knowledge questionnaire (self-knowledge test) about the Law was administered, with a single question and using a Likert scale with scores from 0 to 10, where 0 meant that they had no knowledge about the Law and 10 that they knew it perfectly. At the end of the activity, both questionnaires were reapplied and the students re-evaluated their knowledge about the Law.

Variables and instruments

The independent variable was the allocation group (Experimental versus Control). The dependent variables were subjective and objective knowledge about the Law. Variations in scores between the initial and final questionnaire and in each of the cognitive processes (knowledge, comprehension, analysis and application) were considered. As covariates, sociodemographic data were collected before the session, as well as data on learning styles and digital competencies using the following scales:

- Learning strategies: measured by means of the ACRA scale. This is an instrument designed to evaluate learning strategies. It consists of 44 items based on cognitive theory and consists of 3 dimensions (Cognitive and face-to-face learning strategies, Learning support strategies and Study habits). It has an adequate reliability index ($\alpha = 0.88$) and is scored on a 4-point Likert scale (1 = Never,

2 = Sometimes, 3 = Almost always and 4=Always) (De la Fuente Arias, 2003).

- Digital literacy: measured through the Digital Competency Questionnaire. This instrument is comprised by 30 items related to the five competency areas analysed by digComp (Information, Communication, Content creation, Safety and Problem-solving). Each item is scored on a 5-point Likert scale (1 = Rarely or never, 2 = Rarely or almost never, 3 = Sometimes, 4 = Often or almost always and 5 = Very often or always). Cronbach's alpha for each dimension ranged from 0.63 to 0.783 (Moscoso Paucarchuco, 2023).

Statistical analysis

Based on the Central Limit theorem, normal distribution of the variables was assumed because the sample size was large ($N = 193$). Additionally, the distribution of the quantitative variables was assessed to verify the normality assumption. For this purpose, the Shapiro-Wilk test was applied to each variable. Pearson's correlation was used to find an association between subjective knowledge about the Law and the total score obtained in the full questionnaire on the Law. To find differences in the questionnaire before and after studying it using different learning tools, a two-factor ANOVA (Time, Group) with repeated measures was performed for the Time factor (PRE-Study, POST-Study), contrasting it with Mauchley's sphericity test. In the case of rejecting the sphericity hypothesis, the univariate *F* statistic was used, adjusting it with the Greenhouse-Geisser corrective index. In addition, the Levene statistic (Levene's test) was applied to assess homogeneity of variances. The effect of the Time (Pre-Post) - Group interaction was also analysed by applying Bonferroni's *post hoc* index for the pairwise comparison. All data were expressed in Mean (M), Standard Deviation (SD) and Confidence Intervals (CIs). In addition, the *Statistical Power* (SP) of the data and the effect size known as partial eta square (ηp2) was determined, categorizing magnitude of the difference as negligible ($\leq$0.01), small (from $\leq$0.01 to $<$0.06), moderate (from $\leq$0.06 to $<$0.14) or large ($\geq$0.14). For the comparison between groups regarding the results obtained in the questionnaires on digital competencies and learning styles, a Student's *t-test* for independent samples was performed. Magnitude of these differences was estimated by calculating the effect size (d), following Cohen's (1988) criteria to determine small (0.2-0.49), medium (0.5-0.79) or large ($>$0.8) magnitude. The statistical significance level was $p < 0.05$. Version 28.0 of the SPSS statistical package (SPSS, Chicago, III) was used.

Ethical considerations

The participants' personal information was anonymised using numerical codes to ensure confidentiality. Data collection took place between October and December 2023. The resulting data were transcribed into a database in the SPSS statistical package (v.25.0) or through anonymous identification codes previously used for each participant. The terms set forth in the Declaration of Helsinki on Biomedical Research in Human Beings were always followed. Each student was handed in a survey form and a written consent detailing the voluntary and anonymous nature of the study. Ethical approval was obtained from the academic board of our university before initiating the activity.

Results

A total of 56 students were excluded from the total population, seven for voluntarily deciding not to participate in the study and 49 for failing to complete the forms properly. Eventually, a total of 137 participants were recruited (Fig. 1). Of these, 31 were women and six were men, with a mean age of 23.2 years old (±4.34). Only 53.3 % of the sample participants were employed and only one person was married. There were no significant sociodemographic differences between the groups (see Table 1).

No significant correlations were observed between the participants' previous subjective knowledge about the Law and the total scores obtained in the objective PRE- and POST-Study questionnaires in the Experimental Group ($r = 0.024$, $p = 0.843$; $r = -0.064$, $p = 0.605$, respectively) or in the PRE- and POST-Study questionnaires answered

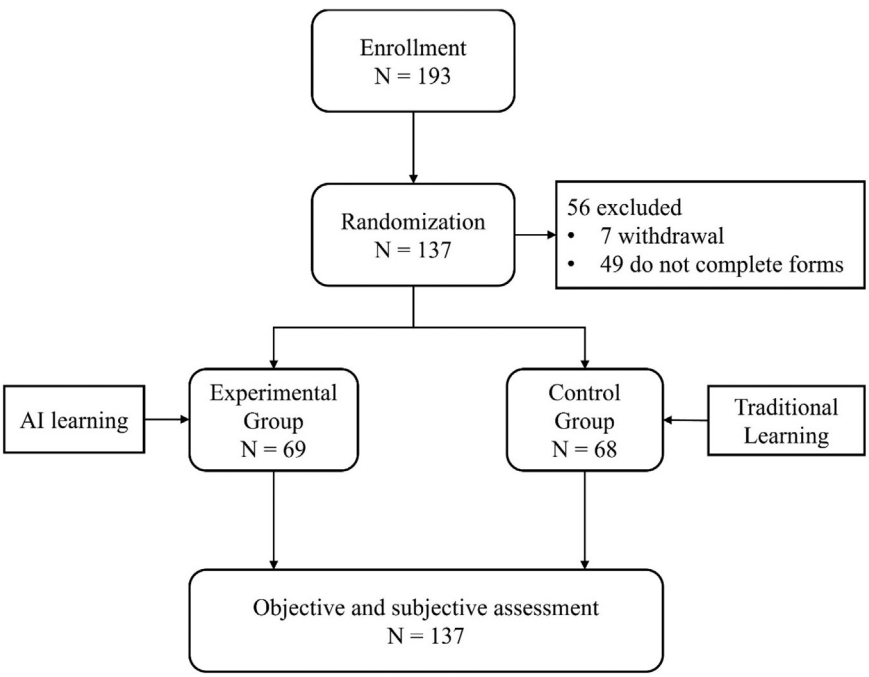

Fig. 1. Flow diagram of participant enrollment and randomization Own elaboration.

Table 1
Sociodemographic differences between the groups.

		Groups		
		With AI N (%) / *M*±SD	No AI N (%) / *M*±SD	p-value
Gender	Male	1 (1.5 %)	5 (7.2 %)	0.099
	Female	67 (98.5 %)	64 (92.8 %)	
Employment status	Employed	39 (57.4 %)	34 (49.3 %)	0.343
	Not employed	29 (42.6 %)	35 (50.7 %)	
Marital status	Married	0 (0.0 %)	1 (1.4 %)	0.609
	Not married	68 (100 %)	68 (98.5 %)	
Age (years old)		23.3 ± 4.36	23.1 ± 4.42	0.738

Note: AI = Artificial Intelligence; SD = Standard deviation; *M* = Mean.

by the Control Group ($r = -0.099$, $p = 0.417$; $r = 0.113$, $p = 0.355$, respectively).

Table 2 presents the results obtained by analysing the questionnaire on the Occupational Risk Prevention Law in Spain, after using the different learning tools (Artificial Intelligence vs Traditional method). First, significant differences were obtained in the total questionnaire score in the Time (Pre-Post) ($F[1,135] = 611.63$, $p < 0.05$]) and Group ($F[1,135] = 5.10$, $p < 0.05$]) factors, as well as in the Time (Pre-Post) - Group interaction [$F(1,135)=5.49$, $p < 0.05$)]. When using Bonferroni's *post hoc* test to perform the pairwise comparison, it was observed that, although better scores were obtained before and after studying the Law in both groups ($p < 0.001$, $p < 0.001$), there was a significantly greater difference in the Control Group when compared to the Experimental Group in the POST-Study ($p = 0.002$), whereas there was no statistical significance in the PRE-Study ($p = 0.945$). Similarly, for the group of questions referring to knowledge about the Law studied, significant differences were found both in the Time (Pre-Post) and Group factors and in the Time (Pre-Post) - Group interaction ($F[1,135] = 180.43$, $p < 0.05$); $F[1,135] = 7.40$, $p < 0.05$); $F[1,135] = 6.72$, $p < 0.05$), respectively]. When analysing the comparison by groups, significantly higher scores were found in the Control Group when compared to the Experimental Group at the POST-Study moment ($p = 0.001$), with no differences detected at the PRE-Study moment ($p = 0.835$). Finally, in the questions related to the analysis of the text studied, differences were found in the Time (Pre-Post) ($F[1,135] = 1,023.68$, $p < 0.05$]) and Group ($F[1,135] = 0.060$, $p > 0.05$]) factors, without finding differences in the Time (Pre-Post) - Group interaction ($F[1,135] = 0.016$, $p > 0.05$]). However, when comparing by groups, no differences were found between the groups either at the PRE- or POST-Study moment ($p = 0.0808$, $p = 0.939$, respectively). Finally, for the questions on text comprehension and application, no significant differences were detected ($p > 0.05$) between the groups.

Regarding the comparison of the results obtained in the questionnaires related to learning styles (ACRA) and digital competencies in the group that used Artificial Intelligence and in the one that did not resort to it, significant differences were only found between the groups in the "Learning support strategies" from the ACRA test ($t = 2.239$, $p = 0.013$), with a small effect size ($d = 0.221$). No differences were found between the groups for the rest of the variables on learning styles and digital competencies (Table 3).

Discussion

In the current study, significant differences were observed in the total scores obtained in the questionnaires as a function of time (Pre-Post) and group, as well as in the interaction between both factors. Although better scores were obtained before and after studying the Law in both groups, the difference was significantly greater in the group that did not use Artificial Intelligence in the POST-Study. This pattern was repeated in the questions referring to knowledge about the Law studied. This makes sense because students that use the traditional method can repeat, which makes it difficult for them to understand and make summaries, as they usually do in their daily practice as students. This result is very different from Makhlouf's finding that Artificial Intelligence learning outcomes were higher (Makhlouf, 2024). This might be due to the type of evaluation used, which did not discriminate the cognitive process involved. On the other hand, Artificial Intelligence offers simpler explanations of the complex concepts that the Law may have, and this may not be enough for direct knowledge tests, requiring certain level of

Table 2
Results obtained in the questionnaire applied before and after studying the occupational risk prevention law in Spain using and not using artificial intelligence.

Variable	AI	PRE-Study (*M* ± SD, 95 % CI)	POST-Study (*M* ± SD, 95 % CI)	*p* Time ηp^2 SP	*p* Group ηp^2 SP	*p* Time x Group ηp^2 SP
Full Questionnaire (Q2-Q11)	No AI (Control)	2.99 ± 1.28* (2.69-3.29)	7.06 ± 1.37‡ (6.74-7.38)	<0.001 0.819	0.026 0.036	0.021 0.039
	With AI	2.97 ± 1.25* (2.67-3.27)	6.34 ± 1.29 (6.02-6.66)	1.000	0.611	0.643
Knowledge Questions (Q2, Q3, Q4, Q9, Q11)	No AI	0.93 ± 0.86* (0.72-1.13)	2.71 ± 1.09‡ (2.47–2.96)	<0.001 0.572	0.007 0.052	0.011 0.047
	With AI	0.90 ± 0.85* (0.69-1.10)	2.10 ± 0.96 (1.86-2.35)	1.000	0.771	0.730
Comprehension Question (Q5)	No AI	0.71 ± 0.46 (0.60-0.82)	0.81 ± 0.39 (0.71-0.91)	0.360 0.006	0.419 0.005	0.221 0.011
	With AI	0.72 ± 0.45 (0.61-0.83)	0.71 ± 0.46 (0.60-0.81)	0.149	0.127	0.231
Analysis Questions (Q6, Q7, Q8)	No AI	0.41 ± 0.52* (0.27-0.54)	2.56 ± 0.50 (2.43-2.67)	<0.001 0.883	0.807 <0.001	0.901 <0.001
	With AI	0.38 ± 0.60* (0.25-0.52)	2.54 ± 0.50 (2.42-2.66)	1.000	0.057	0.052
Application Question (Q10)	No AI	0.94 ± 0.24 (0.89-0.99)	0.99 ± 0.12 (0.96-1.01)	0.104 0.019	0.553 0.003	0.420 0.005
	With AI	0.97 ± 0.17 (0.92-1.02)	0.99 ± 0.12 (0.96-1.01)	0.368	0.095	0.126

AI = Artificial Intelligence; PRE-Study = Results prior to studying the Law; POST-Study = Results after studying the Law; *M* = Mean; SD = Standard Deviation; CI = Confidence Interval; SP = Statistical Power; ηp^2 = Partial eta squared.

* Significant differences between the PRE- and POST-Study ($p < 0.05$);

‡ Significant differences between the group that used AI and the one that did not.

Table 3
Comparison between the learning styles (ACRA) and digital competency questionnaires in the groups that used and did not use artificial intelligence.

Questionnaire	Variable	AI	PRE-Study ($M \pm$ SD, 95 % IC)	p	Cohen's d
ACRA	Dimension 1. Cognitive and learning control strategies	No AI (Control)	82.28 ± 9.46 (80.00-84.55)	0.099	0.221
		With AI	79.97 ± 11.30 (77.23-82.71)		
	Dimension 2. Learning support strategies	No AI	45.87 ± 6.63 (44.28-47.46)	0.013	0.383
		With AI	43.28 ± 6.91 (41.61-44.95)		
	Dimension 3. Study habits	No AI	15.55 ± 3.60 (14.69-16.41)	0.348	0.067
		With AI	15.31 ± 3.62 (0.61-0.83)		
Digital Competency	Dimension 1. Information	No AI	20.04 ± 4.47 (18.97-21.12)	0.207	−0.140
		With AI	20.63 ± 3.93 (19.68-21.58)		
	Dimension 2: Communication	No AI	21.86 ± 15.27 (21.07-22.64)	0.487	0.006
		With AI	21.84 ± 14.58 (21.21-22.46)		
	Dimension 3: Content creation	No AI	11.25 ± 3.95 (10.30-12.20)	0.339	−0.071
		With AI	11.53 ± 4.00 (10.56-12.50)		
	Dimension 4: Safety	No AI	17.77 ± 4.32 (16.73-18.81)	0.473	0.012
		With AI	17.72 ± 3.79 (16.80-18.64)		
	Dimension 5: Problem-solving	No AI	20.09 ± 4.40 (19.03-21.14)	0.101	−0.220
		With AI	20.93 ± 3.14 (20.17-21.69)		

AI = Artificial Intelligence; PRE-Study = Results prior to studying the Law; M = Mean; SD = Standard Deviation; CI = Confidence Interval; Cohen's d = Effect size.

information verification and critical thinking from the students, as stated by Gosak (Gosak, 2024). In the questions referring to the analysis of the text studied, differences were found in the Time factor (Pre-Post) but not in the Group factor or in the Time - Group interaction; this may be due to the fact that the analysis is a very complex cognitive process in which Artificial Intelligence is not yet sufficiently trained and, therefore, it does not allow this cognitive processing to be promoted in the learning of students that use it to study.

No significant differences were found in the questions on text comprehension and application. This highlights lack of critical thinking on the part of the students, as these questions require this skill to be solved. In this sense, Artificial Intelligence has proved to have the same shortcomings as the traditional method, although it is useful as a support and guidance tool, as shown in the studies by Makhlouf and Gosak (Makhlouf, 2024; Gosak, 2024). In this context, while Artificial Intelligence can be an efficient tool for educating Nursing students and supporting documentation, its appropriate use requires critical thinking and verification of information. This may help explain the fact that no correlations were found in our study between the students' self-perceived legal knowledge and their actual test performance.

To address this aspect, the use of validated Spanish-language instruments assessing critical thinking in Nursing students—such as N—CT-4—may be of interest (Zuriguel-Pérez, 2022). Nevertheless, previous studies have demonstrated that applying blended learning strategies enhances students' skills and critical thinking abilities (Niu, 2023). Therefore, a potentially optimal approach could involve integrating combined study methods that incorporate Artificial Intelligence use, following a prior review of the content through traditional instructional methods.

One of the main strengths of this study is the inclusion of a repeated measures design, which made it possible to compare the scores obtained by the participants before and after studying the Law. Another strength to highlight from our study is the control of possible external variables, learning styles and digital skills. The fact that there were no differences between the students' performance in the learning styles and digital skills tests determines that the final differences cannot be attributed to either of these aspects. In addition, the comparison between the group that used Artificial Intelligence and the one that did not do so provides valuable insights into its impact on learning and information retention. On the other hand, having discriminated learning by each cognitive process involved (knowledge, comprehension, analysis and application) provides this study with the opportunity to determine which learning factor most affects Artificial Intelligence use. Finally, no studies with similar characteristics have been found; therefore, this is a novel survey within the field of Artificial Intelligence applied to Nursing education.

Future lines of research

Teachers and students should be aware of the Artificial Intelligence progress and consider adopting its advantages in learning and education (Stokel-Walker 2022). In the education field, Artificial Intelligence opens up other lines of research due to its potential capacity to design novel teaching methodologies that can exert impacts on other important aspects such as motivation and attitude to learn, as is the case with language learning (Chicaiza et al., 2023). On the other hand, the development of technologies and their application in different knowledge areas is an advantage, specifically in the legal field, where *Machine Learning* is beginning to be used (Leyva

Vázquez, 2022). It is necessary to include specific courses and training on Artificial Intelligence in the curricula of Nursing studies and to create supportive environments so that the students can learn to use and implement the study of Artificial Intelligence both in their learning techniques and in their future professional performance (Lukic, 2023).

Limitations

As for limitations, this is a single-centre study; consequently, future surveys with larger samples and from different centres will need to be carried out to refute (or not) the results of our study. It would also be advisable to conduct these surveys in other subjects and/or subject areas to contrast the generalization of our results to any subject and/or to other degrees.

One of the limitations of this study is the absence of an initial assessment regarding the participants' skills in using Artificial Intelligence (AI). No baseline measurement using instruments such as the Meta AI Literacy Scale (MAILS) by Carolus et al. (2023) was made, making it difficult to determine the influence of AI literacy on the results obtained. Having a prior evaluation would allow for a more precise analysis regarding the effectiveness of the intervention and the development of AI-related competencies throughout the study. Future research could incorporate this type of measurement to ensure a deeper understanding of the real impact exerted by AI tools in Nursing education.

In this study, we have not considered measuring the students' satisfaction level in relation to both learning methodologies, an important variable that can be influencing, especially when it comes to texts that are difficult to understand or not very pleasant for the target audience; this aspect should be considered in future studies.

Conclusions

There is no relationship between the subjective knowledge that the students state having in the legal field of Occupational Risk Prevention and their objective knowledge level. Nursing students that learn with methods based on reading legal texts perform better on knowledge questions than those who analyse them using Artificial Intelligence. Artificial Intelligence exerts the same impact on the text analysis questions as the traditional methodology. Artificial Intelligence does not seem to improve the use of critical thinking skills such as comprehension and application. These findings suggest that, while AI can be a useful tool for learning, its effectiveness may vary depending on the context and the type of learning being assessed.

Ethics approval and consent to participate

The authors assert that all procedures contributing to this paper comply with the ethical standards set forth by the relevant national and institutional committees on human experimentation and with the 1975 Declaration of Helsinki, as revised in 2008. Ethical approval was obtained from the academic board of our University before initiating the course. All participants included in the study were informed, both verbally and in writing, of the study objectives and conditions. Informed consent was obtained from all participants.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to a data protection policy but can be obtained from the corresponding author on reasonable request.

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.

CRediT authorship contribution statement

L. Iván Mayor-Silva: Writing – original draft, Project administration, Methodology, Conceptualization. **Antonio G. Moreno-Pimentel:** Writing – review & editing, Validation, Supervision, Investigation. **Marta M. Hernández-Martín:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Guillermo Moreno:** Writing – review & editing, Formal analysis, Data curation. **José Luis Maté-Muñoz:** Visualization, Validation, Software, Formal analysis, Data curation. **Alfonso Meneses-Monroy:** Writing – review & editing, Investigation, Conceptualization.

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