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Knowledge and perception of modern learning approaches in Continuing Medical Education: a cross-sectional study

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Keywords: Continuing Medical Education; Engagement; Active Learning; Simulation; Role-playing; Gamification
Parole chiave: Educazione Continua in medicina; Engagement; Apprendimento attivo; Simulazione; Role-playing; Ludicizzazione

Abstract

***Background**. Continuing Medical Education (CME) is essential for enhancing professional performance. Modern CME approaches should prioritize adaptability and engagement through interactive and experiential learning, fostering better knowledge retention, skill application, and innovation to meet evolving healthcare challenges. This study aims to assess knowledge and perceptions of perceived role of engagement and active learning techniques in CME in the Italian population.*
***Methods.** We conducted a pilot study with cross-sectional design among graduate and post-graduate students from the University of Modena and Reggio Emilia in 2023, by administering a 17-item questionnaire about knowledge, and perceptions of CME.*
***Results.** We included 43 participants (median age 25, 72% females). Role of CME was recognized by 72.1%, and 53.5% were aware of its benefits. Likert responses showed high perceived importance of CME and engagement (mean scores 3.79 and 4.40). Active approaches like simulation (68.3%) and role-playing (65.9%) were familiar, but gamification (36.6%) was far less known.*
***Conclusions.** While methods like simulation, role-playing, case-based learning, and problem-based learning were familiar to study participants for their strong evidence of effectiveness, emerging approaches such as gamification and team-based learning were less known. Such approaches require further implementation in educational programs to show their benefits.*

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Introduction

Within a rapidly evolving scientific knowledge, including (and particularly) that related to human medicine, it is mandatory that healthcare workers maintain and develop their professional competences. The rapid pace of technological advancements and healthcare challenges further underscores the need for adaptive continuous education to ensure high standards of care and innovation within healthcare systems (1-5). Lifelong learning and Continuing Medical Education (CME) are therefore pivotal in the modern healthcare sector, as they ensure the ongoing development of healthcare professionals' skills and knowledge for improving the quality of healthcare services (6-8). CME is defined as "*educational activities that serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships a physician uses to provide services for patients, the public, or the profession*" (9,10) and is rooted in the principle that healthcare professionals must be regularly updated on the latest scientific and technological knowledge to provide high-quality, evidence-based care (6,11).

In Italy, the CME has been recognized as mandatory for all health professionals 1992, following the Legislative Decree no. 502. This and the following regulatory framework, Legislative Decree no. 229/1999, made CME a consistent and uniform process across the country integrating national, regional, and organizational levels, supporting the harmonization of healthcare services (12). CME includes a variety of formats—classroom, online, and in-person training—aimed at enhancing clinical, technical, and managerial skills (13). In particular, modern learning approaches prioritize flexibility and dynamism over traditional, static education methods, encouraging healthcare organizations to become learning organizations (14,15). These approaches foster the exchange of knowledge and experiences, allowing professionals to build practical expertise alongside academic knowledge; experiential learning and reflection are crucial for developing critical thinking and problem-solving abilities in real-world scenarios (16). Recent research shows that interactive CME approaches, such as learning by doing, peer learning, and analyzing past incidents, are more effective than traditional lectures, improving both knowledge and clinical practice (17). In particular, they demonstrated to improve healthcare outcomes not only by preventing errors, but also by enhancing innovation within the organization (13,14,18,19).

Despite the benefits of modern education approaches especially for the healthcare providers, the knowledge about available approaches methods, their role and use in biomedical education have not been explored. For these reasons, this study aims to assess the perceived role of engagement and active learning techniques in CME in order to expand the current literature on the topic and highlight the importance of these critical aspects of CME.

Methods

We conducted a cross-sectional study involving a sample of the graduate and post-graduate students from University of Modena and Reggio Emilia, Northern Italy. The inclusion criteria were being adults (≥18 years), having Italian as native language, and being students attending (graduate) or having attended (post-graduate) Public Health courses.

With the help of co-authors expert in didactics, pedagogy, and e-learning, we designed a questionnaire of 17 mixed-type questions to collect socio-demographic information, including educational attainment and occupation, and to investigate the participants knowledge and the perceived relevance of CME using a Likert scale ranging from 1 ("low") to 5 ("high") (Supplementary Material).

The questionnaire was designed for self-administration and online completion. We made available online the questionnaire from May to November 2023 and collected data electronically via Google Forms. We performed analysis using the Software IBM SPSS Statistics Version 29.0.0.0. We then analyzed the collected data, to assess the sociodemographic characteristics of participants and their responses to the questionnaire using descriptive statistics, including frequencies, percentages, means, and standard deviations. We conducted a reliability analysis of the Likert-scale items related to CME and engagement in order to assess their internal consistency using Cronbach's alpha test. We used Chi-square tests to explore relations between categorical variables and dichotomous survey responses. We used Microsoft Excel (Office Package, Microsoft Corp., Redmond, WA, 2024) for data visualization. We conducted the study according to the Declaration of Helsinki. Approval from the Ethics Committee was waived due to the use of entirely anonymous and aggregated data hampering personal identification of participants (20).

Results

Forty-three individuals participated in the study, with a response rate of 45.2%. Table 1 outlines their main sociodemographic characteristics. Participants had a median age of 25 years and were mainly females (72.1%). High school's degree (44.2%) and bachelor's degree (27.9%) were the most frequent educational attainment levels. As regards occupational status, participants were mainly working post-graduate students (55.8%) following by graduate students (44.2%).

Knowledge of CME meaning was high among participants (72.1%), while CME benefits and purposes were clear for 53.5% only. Forty participants (93.0%) believed digital technologies to be useful to rise education engagement, and the almost all of them (97.7%) believed innovative strategies to be useful to rise education engagement. All participants considered that personalized learning to be useful in the healthcare sector.

As shown in Figure 1, CME approaches familiar in the study participants were: increase in interest (53.5%) and development of practical skills (58.1%);

Table 1 - Characteristics of the study sample (N=43). Values expressed as N (%) if not differently reported.

Characteristics	N (%)
Age (years)	
Median (IQR)	25 (23-37)
18-25	25 (58.1)
26-35	7 (16.3)
>35	11 (25.6)
Gender	N (%)
Male	12 (27.9)
Female	31 (72.1)
Educational attainment	
High school	19 (44.2)
Bachelor's degree	12 (27.9)
Post-graduate degree*	12 (27.9)
Occupational status	
Working student	24 (55.8)
Student	19 (44.2)

* *Master's degree, PhD,* Level 5B ISCED (International Standard Classification of Education), Postgraduate Master's degree (first cycle).

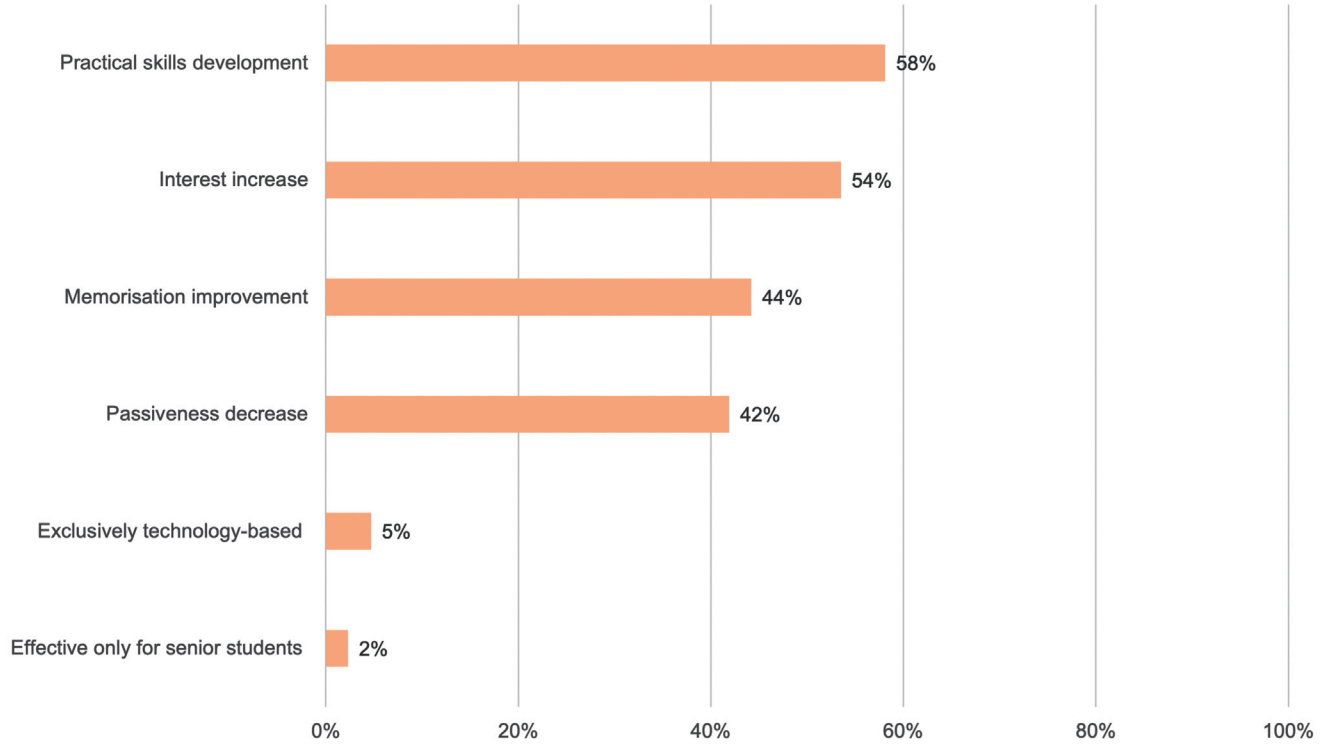


Figure 1. Familiar and unfamiliar approaches to increase engagement in education.

whereas the less familiar were: exclusively technology-based (4.7%) and effective only for senior students (2.3%).

Figure 2 shows the distribution of knowledge about active approaches to increase engagement, with percentages over 60% for simulation, role-playing, case-based learning, and problem-based learning, while the less familiar active approach was gamification (36.6%).

Answers to Likert survey questions are shown in Figure 3. On a scale from 1 to 5 where 1 was "low" and 5 was "high", the rating about the impact

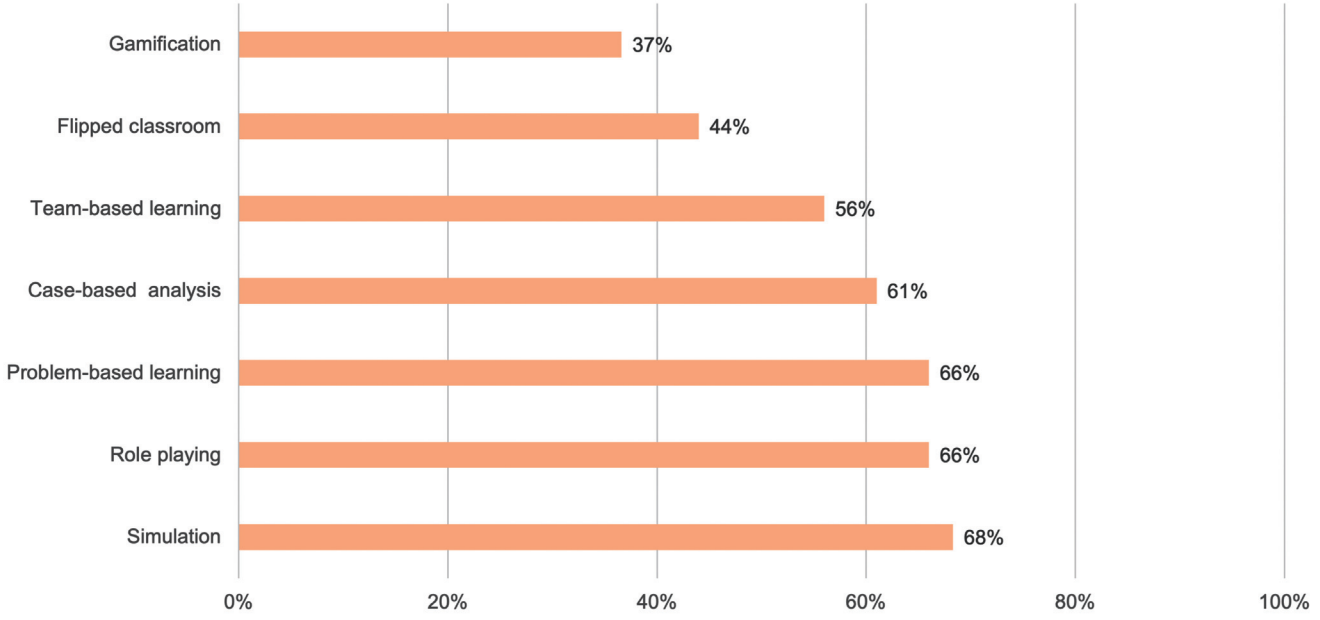


Figure 2. Distribution of knowledge of active learning approaches to increase engagement in the study sample.

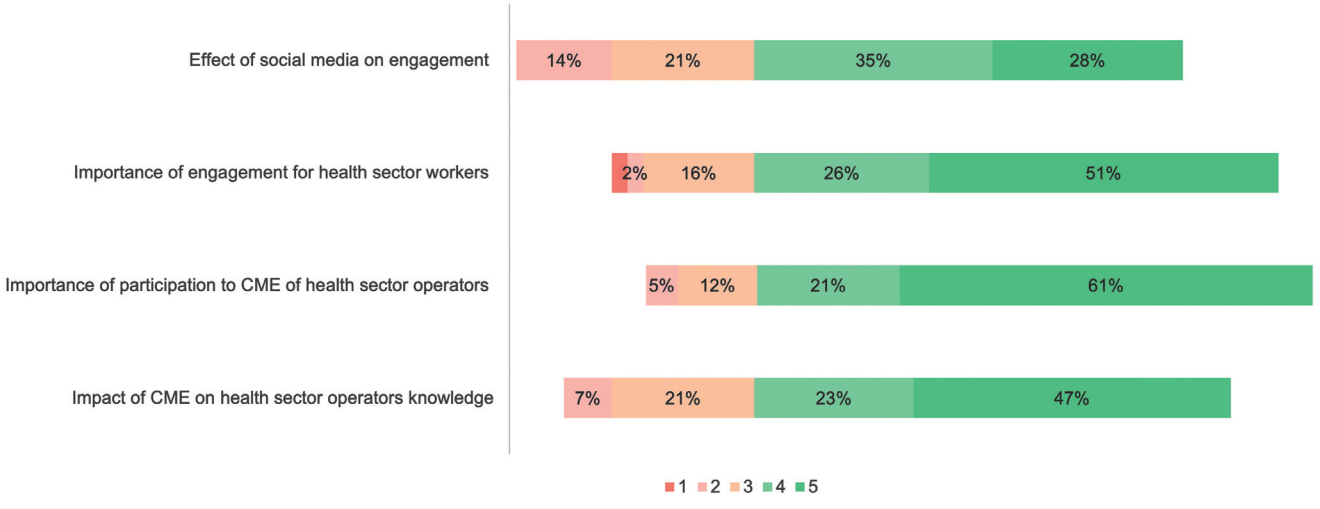


Figure 3. Answers to Likert questions. Scale ranges from 1 ("low") and 5 ("high").

of CME, the importance of participation to CME, and the importance of engagement for healthcare professionals are very high, with mean values of 4.12 (SD 0.99), 4.40 (SD 0.88), and 4.24 (SD 0.98), respectively. Slightly lower values can be noted when assessing the effect of social media on engagement (mean value: 3.79, SD 1.02).

The reliability analysis to assess internal consistency on the four items related to the impact of CME and engagement in the healthcare sector was conducted using Cronbach's alpha, with a value of 0.814, indicating strong reliability, with contribution from all items. In particular, the item "Importance attributed to the participation in CME by healthcare personnel" showed the highest corrected item-total correlation (r = 0.814) and contributed most strongly to the internal consistency of the scale. Exclusion of this item would decrease the Cronbach's alpha to a value of 0.686.

No major differences between the categorical variables. The Chi-square tests were conducted to examine the relation between various categorical variables (gender, educational attainment, and occupational status) and dichotomous questions such as perceived meaning of CME, its benefits and purposes, digital technology, personalized learning and innovative strategies usefulness (Figure 4).

Discussion

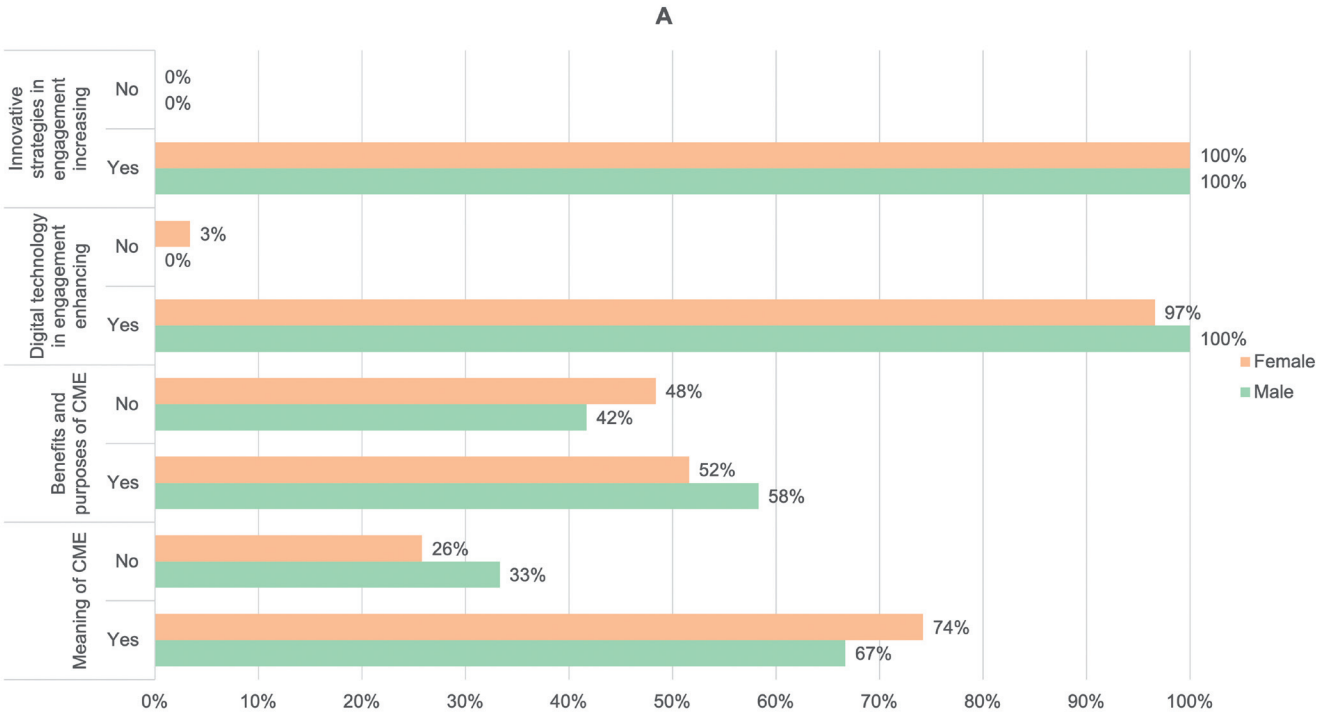
This study highlights how CME is perceived in a sample of Italian students as markedly impactful in enhancing healthcare professionals' knowledge and fundamental for professional development. Also previous studies carried out in Italy underlined such vital role (21,22), but lack of the investigation on the specific role of modern approaches. Specifically, our study highlights that engagement is perceived as equally important compared to traditional learning methods, emphasizing the need for interactive and motivating didactic approaches, given also that CME is mandatory and risks being perceived as a mere obligation without tangible benefits (22). Engagement in education refers to the active involvement, interest, and motivation of participants in their learning processes. Several factors enhance engagement in CME, such as the possibility of benefiting from relevant content, active learning methods, digital tools, and personalized learning. Digital tools like online platforms further boost users' engagement, while self-directed and competence-oriented learning allows healthcare providers to focus on areas most relevant to their practice, fostering greater involvement (23,24). As a consequence, high engagement leads to better knowledge retention, practical application of skills, and long-term learning outcomes (25,26). For these reasons, engagement offers an opportunity to make CME courses more appealing and effective, transforming them into meaningful learning experiences that enhance knowledge retention and ultimately improve the quality of care (27).

Active learning techniques such as simulation, role-playing, case-based learning, problem-based learning, gamification, team-based learning, and flipped classroom methods can increase motivation and foster active participation and are increasingly recognized for their potential to enhance engagement in CME (14). In this study, participants were familiar with simulation, role-playing, case-based learning, and problem-based learning, while gamification was less known. Chi-square analysis revealed that demographic factors, including gender, educational attainment, and occupational status, did not significantly influence perceptions of CME or engagement strategies.

Simulation emerged as the most familiar approach in the sample and is widely supported by literature as a highly effective method in CME of a wide range of disciplines (16, 28-32). It allows healthcare professionals to refine technical and non-technical skills in controlled settings, enhancing readiness for real-world challenges (18,33). However, low-fidelity simulations may interfere with training effectiveness, underscoring the need for realistic scenarios (34).

Role-playing is an active learning technique that allows healthcare professionals to adopt various roles within clinical scenarios, fostering skills such as empathy, communication, and teamwork. Research highlights its effectiveness in enhancing empathy and strengthening interpersonal communication, which is critical in delivering high-quality care (35). In CME, role-playing is particularly relevant for improving non-technical skills, including patient interaction, conflict resolution, and interprofessional collaboration (36). There are studies that found that role-playing activities improve students' abilities (37). However, role-playing has limited evidence supporting its broader impact on CME, warranting further investigation (38).

Case-based learning is vastly used in medical education and training and familiar to the study population (39). Case analysis engages learners in critical thinking by presenting real-life or hypothetical patient cases for analysis and by making content directly relevant to clinical practice. This approach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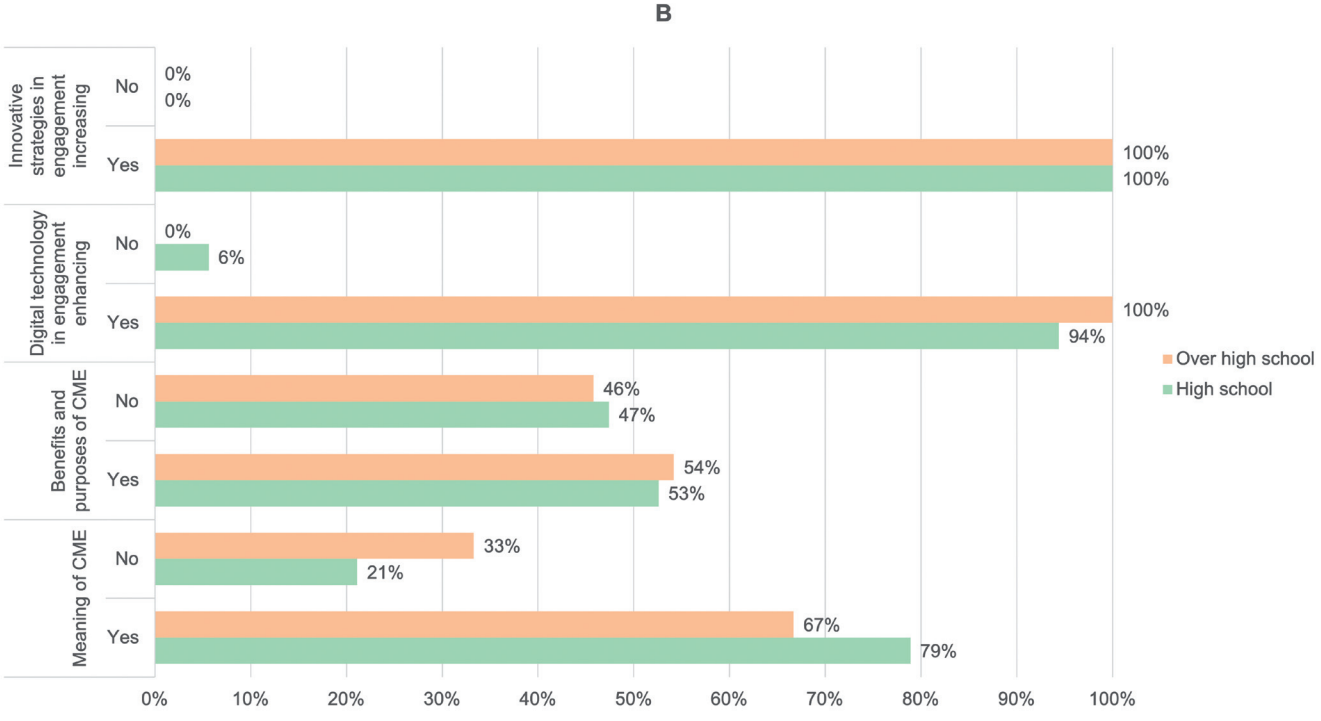
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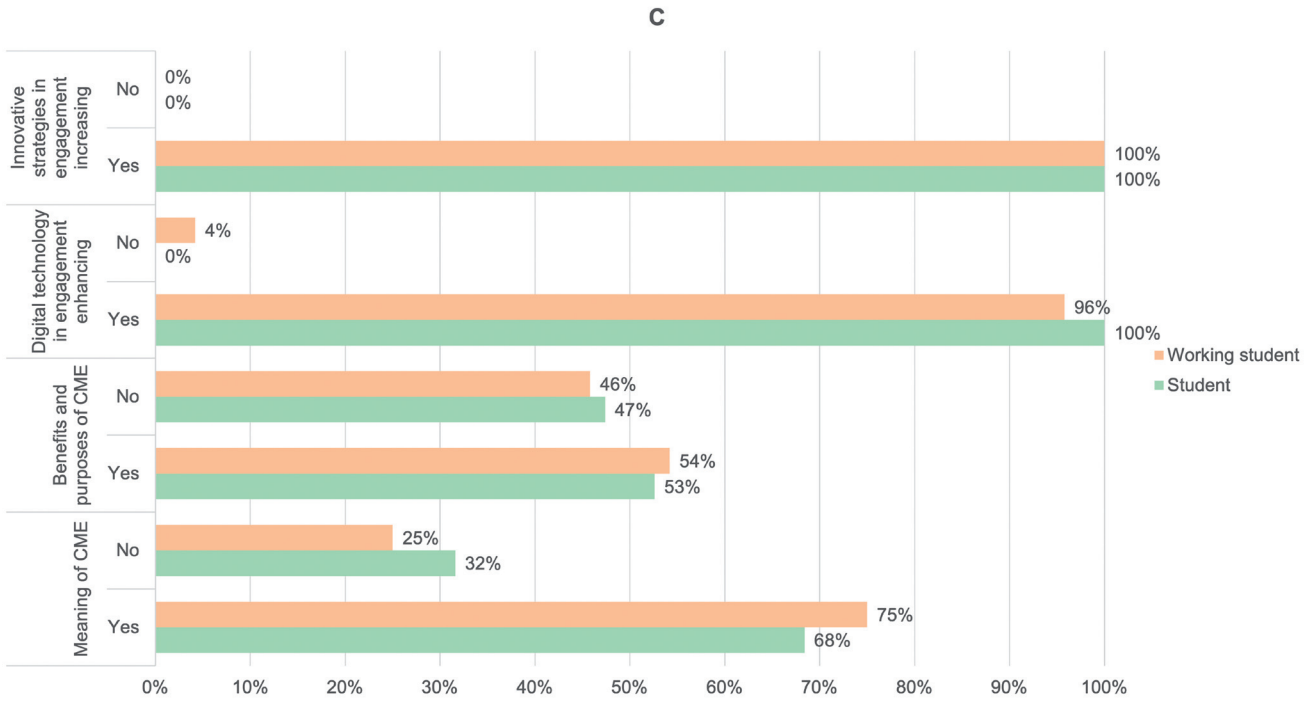

Figure 4. Chi-square tests conducted between dichotomous questions (perceived meaning of CME, benefits and purposes of CME, usefulness of digital technology to enhance educational engagement, perceived usefulness of innovative strategies to increase engagement, usefulness of personalized learning in the healthcare sector) and categorical variables: A) gender, B) educational attainment, C) occupational status.

is particularly effective in fostering diagnostic reasoning and decision-making skills (40). Evidence suggests that case-based learning in CME significantly improves diagnostic accuracy and encourages collaborative problem-solving among peers (41).

PBL is another method that has demonstrated considerable success in medical education (42). It enables healthcare professionals to develop critical thinking and problem-solving abilities by addressing real-world clinical issues (43). Studies indicate that PBL enhances engagement by fostering a self-directed learning approach (44), which is essential in CME where participants often have varying knowledge bases.

Gamification, though less familiar, holds significant potential to make CME more engaging, particularly in digital formats (45). While initial research supports its benefits in motivation and learning, further studies are required to validate its broader applicability, especially in healthcare sector (46-48).

Finally, team-based learning involves small-group activities where learners apply theoretical knowledge to complex cases whereas flipped classroom model involves an independent review of the lecture content before applying knowledge in interactive class sessions. Team-based learning fosters higher engagement levels and supports collaborative learning in medical education contexts (49) as well as flipped classroom. However, their specific impact on CME engagement remains underexplored, highlighting a critical gap for future research.

This study provides valuable insights into the familiarity and perceived utility of active learning techniques in CME in a sample of graduate and post-graduate students. This is especially relevant since all the participants were students in Public Health courses and expected to be exposed to CME within few years as learners and possibly also in the implementation of CME interventions. Therefore, one notable study strength lies in its focus on active learning approaches, addressing a critical gap in medical education research. The findings contribute to the growing body of evidence on engagement-enhancing strategies and emphasize the importance of linking theoretical knowledge with practical applications.

However, several limitations should be acknowledged. The small sample size and moderate response rate limits the generalizability of the findings to broader, more diverse populations. Despite attending (graduate) or having attended (post-graduate) Public Health courses in their educational path, and with all of them being exposed to CME, participant heterogeneity in terms of years and type of education further limits the generalization of the study findings. In addition, the questionnaire has been designed using expertise of co-authors, but it was not previously validated in this or other studies. However, since none of previous studies specifically investigated modern learning approaches in CME (21,22), the present one may represent a helpful pilot survey for planning future studies on the topic. The reliance on self-reported data without external validation introduces the possibility of response bias, as participants may have over- or under-estimated their familiarity and perceptions of engagement strategies. These limitations highlight the need for cautious interpretation of the results and suggest directions for future research to build on these findings. Furthermore, future research offers a valuable opportunity to explore the integration of active learning methods and competency-based education in CME. This focus aligns with the growing emphasis on competency-based work, as highlighted by a recent WHO publication, which underscores the need for healthcare professionals to meet defined skill and knowledge standards to address evolving healthcare challenges effectively (50). Investigating how active learning strategies can support competency development will be critical to ensuring that CME programs not only engage participants but also prepare them to deliver high-quality, patient-centered care in diverse and dynamic settings.

Conclusions

Active learning approaches are critical in enhancing engagement and improving CME outcomes. Techniques like simulation, role-playing, case-based learning, and problem-based learning are well-established for fostering practical and cognitive skills among healthcare professionals. Methods such as gamification, team-based learning, and flipped classroom are less known and used in medical education, thus requiring further implementation in educational programs to show their effectiveness in CME contexts.

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Riassunto

Conoscenze e percezione dei moderni approcci di apprendimento nell'Educazione Continua in Medicina: uno studio trasversale

Introduzione. L'Educazione Continua in Medicina (ECM) è essenziale per migliorare la performance professionale. I moderni metodi per l'ECM dovrebbero prioritizzare l'adattabilità e il coinvolgimento attraverso l'apprendimento interattivo ed esperienziale, permettendo di mantenere le conoscenze nel tempo, promuovendo l'applicazione delle competenze acquisite per affrontare le sfide sanitarie odierne. L'obiettivo di questo studio è valutare la conoscenza e l'importanza attribuita al coinvolgimento e alle moderne tecniche di apprendimento attivo nell'ECM da parte della popolazione italiana.

Metodi. Mediante uno studio pilota di tipo trasversale sono stati coinvolti studenti dell'Università di Modena e Reggio Emilia nel 2023. I dati sono stati raccolti attraverso un questionario composto da 17 domande per esploravano conoscenze e percezioni sull'ECM e sul coinvolgimento nell'educazione.

Risultati. Sono stati inclusi 43 partecipanti (età mediana di 25 anni, 72,1% donne). Il ruolo dell'ECM è riconosciuto dal 72,1% dei partecipanti, mentre il 53,5% conosceva i suoi benefici. Le risposte su scala *Likert* hanno mostrato un'alta percezione dell'importanza della ECM e del coinvolgimento (punteggi medi tra 3,79 e 4,40). Metodi attivi come la simulazione (68,3%) e il *role-playing* (65,9%) erano familiari al campione, mentre la ludicizzazione (36,6%) era molto meno conosciuta.

Conclusioni. Sebbene metodi come simulazione, *role-playing*, apprendimento basato sull'analisi di casi e il *problem-based learning* siano noti nella popolazione in studio per la loro forte evidenza di efficacia, approcci emergenti come la ludicizzazione e il *team-based learning* sono meno noti e richiedono maggiore diffusione nei programmi di educazione per mostrare i loro benefici.

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Supplementary material – Study questionnaire

Survey on the Importance of Continuous Education in the Healthcare Sector

1. Which gender do you identify with?
   – Female
   – Male
   – Non-binary
   – Not listed, please specify: …

2. What is your year of birth?
   (dropdown menu)

3. What is your employment status?
   – Student
   – Student and worker

4. If you selected "Student and worker" in the previous question, please specify your occupation:
   (free text)

5. What is the highest level of education you have attained?
   – High school diploma
   – Non-university tertiary diploma
   – Bachelor's degree
   – Master's degree
   – First-level university master's
   – Second-level university master's
   – PhD/postgraduate specialization
   – Not listed, please specify: …

6. Are you familiar with the definition of Continuing Medical Education?
   – Yes
   – No

7. To what extent do you believe that Continuing Medical Education impacts the knowledge of healthcare sector operators?
   (Likert scale; 1=low, 5=high)

8. Do you consider participation in Continuous Medical Education for healthcare personnel important?
   (Likert scale; 1=low, 5=high)

9. Are you aware of the objectives and benefits of Continuing Medical Education?
   – Yes
   – No

10. Which active approaches to increasing engagement have you heard of?
    (multiple choice)
    – Interest increase
    – Memorisation improvement
    – Exclusively technology-based
    – Practical skills development
    – Effective only for senior students
    – Passiveness decrease

11. How important do you think engagement is for health sector workers?
    (Likert scale; 1=low, 5=high)

12. Do you think that the correct use of social media and collaborative platforms can promote engagement?
(Likert scale; 1=low, 5=high)

13. Do you think digital technologies are useful for improving engagement in education?
– Yes
– No

14. Do you think innovative strategies are useful for actively engaging personnel in the healthcare sector?
– Yes
– No

15. Which active approaches are you familiar with?
(multiple choice)
– Simulation
– Gamification
– Role playing
– Case-Based analysis
– Team-Based learning
– Problem-Based learning
– Flipped classroom

16. Do you consider personalized learning useful in the healthcare sector?
– Yes
– No

17. If you answered “No” to the previous question, please briefly explain why:
(free text)