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Ethics and Professionalism Challenges in Digital Learning Practices in Medical Faculty: An Evidence-Based Case Review

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***Abstract*— Implementation of Digital learning in medical education is challenging. Since Professionalism and Professional Identity is a core competency, implementing Digital technology including Virtual Reality (VR) and Artificial Intelligence (AI) can intervene development of Professionalism Identity. This Evidence Based Case Review aims to find the impact of implementations Digital Technology in medical students through various implementation in the medical curriculum. The research indicates that the developmental patterns of professionalism among students remain varied. While the use of VR and AI is perceived to achieve the desired educational impact, their implementation triggers significant ethical and professional concerns, such as data privacy, secondary skills achievements, and professional integrity. The integration of technology in medical education needs ethical considerations within the curriculum to ensure that technological advancements do not affect medical professionalism.**

Keywords— ***digital learning; profesionalism; ethics; virtual reality; artificial intelligence.***

I. INTRODUCTION

Digital learning technologies, particularly Virtual Reality (VR) and Artificial Intelligence (AI), are increasingly being integrated into medical education [1], [9]. These technologies are widely adopted to enhance learning experiences by providing interactive, flexible, and technology-driven instructional methods. VR enables immersive and simulation-based learning environments [1] , while AI supports personalized learning pathways, automated feedback, and data-driven evaluation of student performance [2], [10].

Although the primary objective of implementing VR and AI in medical education is to improve learning outcomes [1] , their integration may also influence the development of professionalism and professional identity among medical students [3], [4]. Professionalism and professional identity are essential competencies in medical education, encompassing ethical behavior, accountability, integrity, communication skills, empathy, and responsibility toward patients and society [4], [11]. Traditionally, these competencies are developed through direct clinical exposure, role modeling, and face-to-face interactions with patients, peers, and faculty members [6], [12].

Previous findings indicate that the use of VR and AI in medical education can yield positive educational effects, including improved engagement, enhanced clinical skills acquisition, and increased learning efficiency [1], [9]. However, these technological advancements also raise important concerns regarding ethics and professionalism [2], [5]. Several studies have highlighted issues related to data privacy, particularly in AI-based learning systems that collect and process learner data [2], [5]. In addition, concerns have been raised regarding secondary skill acquisition, such as communication skills, empathy, and professional demeanor, which may be less emphasized in digitally mediated learning environments [1].

Furthermore, the use of digital learning technologies may affect professional integrity. Reduced supervision, increased reliance on automated systems, and limited direct interaction with instructors may introduce challenges related to academic honesty, accountability, and independent professional judgment [6], [7]. These concerns emphasize the need to carefully examine how digital learning technologies influence professionalism beyond technical competence.

Understanding the impact of VR and AI on medical professionalism is crucial to ensure that technological innovations do not compromise core professional values [4], [8]. Without appropriate ethical frameworks and structured supervision, the integration of digital learning technologies may inadvertently undermine professionalism development [7], [8]. Therefore, it is essential to evaluate the influence of VR and AI on medical students' professionalism and professional identity, as well as to identify the ethical and professional challenges arising from their implementation.

Based on these considerations, this evidence-based case review is guided by the hypothesis that the integration of digital learning technologies, specifically VR and AI, in medical education influences the development of medical students' professionalism and may introduce ethical and professional challenges.

II. METHOD

This study employed an evidence-based case review (EBCR) approach to synthesize existing evidence related to the integration of digital learning technologies in medical education and their implications for medical professionalism and professional identity [3], [4]. The EBCR design was selected to allow a structured and systematic examination of previously published literature, focusing on both educational outcomes and ethical considerations associated with digital learning practices.

Study Variables

The primary variables examined in this review were the use of digital learning technologies—specifically Virtual Reality (VR) and Artificial Intelligence (AI)—and their influence on medical professionalism and professional identity development. Professionalism-related outcomes included ethical behavior, professional integrity, communication skills, empathy, and accountability, as reported in the reviewed literature [4], [11].

Data Sources and Sampling Strategy

Relevant literature and case reports were identified through structured searches in PubMed, Scopus, and Google Scholar databases. The search covered publications from January 2018 to December 2025 to capture recent developments in digital learning technologies in medical education.

The following keywords and Boolean operators were applied:

("medical education" AND "virtual reality") OR

("medical education" AND "artificial intelligence") AND

("professionalism" OR "professional identity" OR "ethics")

The initial search yielded 24 records. After removing duplicate articles (n = 3), 21 records remained for title and abstract screening. Following the screening process, 10 full-text articles were assessed for eligibility. Based on predefined inclusion criteria, 3 studies were included in the final Evidence-Based Case Review (EBCR) synthesis.

The sampling process involved the purposive selection of studies that explicitly discussed the application of VR and/or AI in medical education settings [1], [2]. Studies addressing professionalism, professional identity, or ethical challenges in the context of digital learning were considered eligible for inclusion [3], [5]. Articles unrelated to medical education or those that did not address professionalism- or ethics-related outcomes were excluded from the review.

Screening and Eligibility Criteria

A two-stage screening process was conducted to ensure the relevance and quality of the included studies. In the first stage, titles and abstracts were reviewed to identify articles relevant to digital learning technologies and medical professionalism. In the second stage, full-text articles were assessed to confirm eligibility based on predefined inclusion criteria, including relevance to VR or AI use in medical education and discussion of professionalism or ethical considerations.

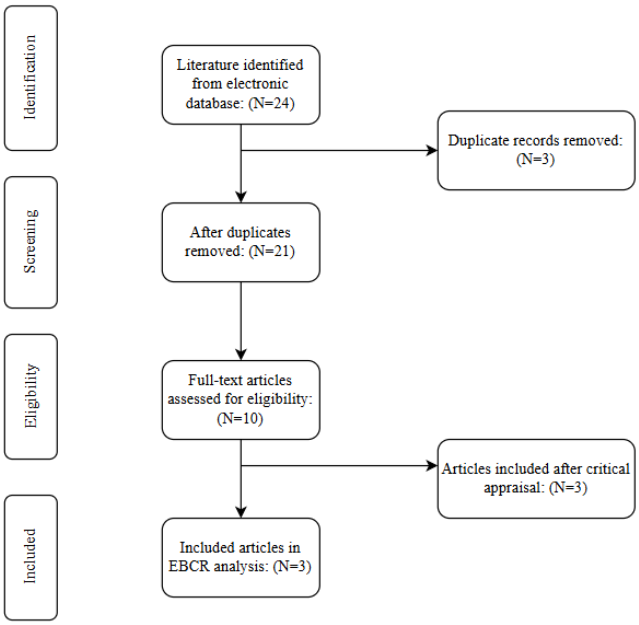

Figure 1. Literature Screening Process for Evidence-Based Case Review (EBCR). Data were collected by Denia P., Kayla A., and Risnandya P. through literature searching and screening of electronic databases.

Data Extraction and Synthesis

Data extraction was performed systematically to identify key information from each included study. Extracted data included study characteristics, educational context, type of digital technology applied, reported educational outcomes, and identified ethical or professionalism-related challenges. The extracted information was analyzed narratively to identify recurring themes and patterns related to the impact of digital learning on professionalism and professional identity.

Analytical Framework (PICO)

The PICO framework was applied to guide the review and maintain analytical consistency. The population of interest comprised medical students at various stages of undergraduate medical education. The intervention involved the use of digital learning technologies, specifically VR and AI. Traditional learning approaches or non-digital instructional methods were considered as comparators where applicable. The outcomes of interest included the development of medical professionalism and professional identity, as well as ethical implications arising from the use of digital learning technologies.

PICO

P (Population) : Medical Students

I (Intervention) : Digital Technologies (VR & AI)

C (Comparison) : Traditional Learningbor Non Digital Methods

O (Outcome) : Professionalism & Professional Identity Development : Ethical Implications

Ethical Considerations

As this study was based on a review of previously published literature, no direct involvement of human participants occurred. Therefore, ethical approval was not required. Nonetheless, ethical principles related to responsible reporting and accurate representation of existing evidence were maintained throughout the review process.

III. RESULTS AND DISCUSSION

The results of this evidence-based case review were derived from selected literature and case reports focusing on the use of VR and AI in medical education [1], [9], professionalism, and ethical considerations. The findings highlight several key patterns related to educational impact, professionalism development, and ethical challenges associated with digital learning technologies.

Educational Impact of VR and AI

Across the reviewed studies, VR and AI were reported to provide educational benefits in medical education. VR-based simulations enabled students to practice clinical procedures and decision-making in a controlled and risk-free environment [1]. This approach supported experiential learning and allowed repeated practice, which contributed to improved technical skills and learner confidence [1], [9]. AI-based systems facilitated adaptive learning and performance evaluation, enabling students to receive timely feedback and personalized learning experiences [2], [10].

Professionalism and Professional Identity Development

The findings indicate that the development of professionalism among medical students varies depending on how digital learning technologies are implemented. In some contexts [3], digital learning supported reflective learning and self-directed professionalism development, particularly when ethical guidance and faculty supervision were incorporated. However, variability in professionalism outcomes was consistently observed across studies.

Several reports suggested that exclusive reliance on digital learning environments may limit opportunities for developing interpersonal skills, professional communication, and empathy [1], [6]. Reduced direct interaction with patients and peers was associated with challenges in cultivating professional behaviors that are traditionally reinforced through clinical exposure and role modeling [6], [12].

Ethical and Professional Challenges

Ethical challenges emerged as a significant theme in the reviewed literature. Data privacy and confidentiality concerns were frequently reported, especially in AI-driven learning platforms that involve data collection and analytics [2], [5], [13]. Issues related to consent, data ownership, and transparency were identified as potential risks to professional ethics [2], [5], [13].

In addition, concerns regarding professional integrity were observed. Limited supervision in digital learning environments raised the risk of academic dishonesty and diminished accountability [6], [7]. Over-reliance on automated feedback systems was also noted to potentially reduce independent professional judgment and responsibility among learners [10].

Contextual Influences on Outcomes

The impact of digital learning on professionalism was strongly influenced by contextual factors, including curriculum design, institutional policies, and faculty involvement. Studies emphasized that digital learning technologies were more effective in supporting professionalism development when integrated with traditional clinical teaching, ethical frameworks, and structured supervision [8], [12], [14], [15].

Overall, the results demonstrate that while VR and AI offer educational advantages, their influence on professionalism and professional identity is complex and context-dependent. The findings underscore the importance of balancing digital innovation with ethical considerations and direct clinical engagement to support comprehensive medical professionalism development.

TABLE I. TABLE RESULTS

NO	Study	Study Characteristics	Intervention	Outcomes	Relevant Findings
1.	Farooq et al., 2025	Cross-sectional mixed-methods; n=108 medical students across curriculum stages;	PAS and PIQ questionnaires	Professionalism, professional identity, empathy, responsibility	Professionalism, empathy, and professional relationship scores were significantly higher in pre-clinical students compared to basic science

		UAE University			students ($p < 0.05$). No significant differences in professionalism or professional identity across later stages. PIQ showed low correlation with PAS and its subdomains, indicating professionalism and professional identity may develop independently
2.	Junga et al., 2024	Comparative observational study; 10th-semester students; VR vs actor-based simulation	VR dermatology simulation	Primary and secondary learning objectives, immersion	VR-based training effectively achieved primary learning objectives, but secondary learning objectives (basic clinical and hygiene behaviors) were better performed in actor-based simulations. Lower immersion levels in VR were associated with reduced performance of secondary skills, indicating immersion plays a key role in skills transfer
3.	Itani et al., 2025	Scoping review (PRISMA-ScR); 82 articles; 2018–2023	AI ethics in medical education	Ethical themes, focus areas	The most common ethical concerns were bias (74%), privacy (65%), transparency (44%), and informed consent (37%). Literature primarily focused on AI integration in medical education and AI ethical principles. Review articles dominated the field, indicating the topic remains largely exploratory. Strong need identified for standardized AI ethics curricula and longitudinal outcome studies

This evidence-based case review highlights that the integration of digital learning technologies, particularly Virtual Reality (VR) and Artificial Intelligence (AI), has a multifaceted impact on medical students' professionalism and professional identity development. While digital learning is widely adopted to enhance educational effectiveness and efficiency, its influence on professional values extends beyond technical competence and requires careful consideration.

The findings indicate that VR and AI contribute positively to learning experiences by improving engagement and facilitating the acquisition of clinical and procedural skills. Immersive VR environments allow students to repeatedly practice clinical scenarios in a controlled setting, which supports experiential learning and confidence building. Similarly, AI-driven learning systems provide adaptive feedback and performance evaluation, enabling personalized learning pathways. These educational advantages suggest that digital learning technologies are effective tools for supporting academic and technical development in medical education.

However, the impact of digital learning on medical professionalism appears to be variable and context-dependent. In learning environments where digital tools are complemented by ethical guidance, reflective activities, and faculty supervision, professionalism development is better supported. Such integration allows students to reflect on professional values, responsibilities, and ethical dilemmas alongside their technical training, thereby reinforcing professional identity formation.

Conversely, challenges arise when digital learning environments are implemented without sufficient interpersonal interaction or mentorship. Reduced direct engagement with patients, peers, and educators may limit opportunities for developing core professional attributes such as communication skills, empathy, and professional conduct. These interpersonal competencies are central to medical professionalism and are traditionally cultivated through role modeling and direct clinical exposure. The findings suggest that reliance on digital learning alone may not adequately support the development of these humanistic aspects.

Ethical considerations represent a prominent concern in the use of VR and AI within medical education. Data privacy and confidentiality issues are particularly salient in AI-based platforms that collect and analyze learner data. Unclear data governance, consent mechanisms, and algorithmic transparency may undermine ethical standards and professional accountability. Addressing these concerns is essential to maintain trust and integrity within educational settings.

In addition, issues related to professional integrity were identified, including risks associated with reduced supervision and increased dependence on automated systems. Digital learning environments may present challenges related to academic honesty and independent professional judgment. Excessive reliance on automated feedback could potentially diminish critical thinking and responsibility, which are fundamental components of professional practice.

Institutional and curricular factors play a critical role in shaping the outcomes of digital learning on professionalism. Evidence suggests that hybrid educational models—combining digital learning technologies with traditional clinical teaching, mentorship, and clear ethical frameworks—are more effective in fostering balanced professional development. Such approaches allow students to benefit from technological innovation while maintaining meaningful human interaction and ethical grounding.

Overall, this review underscores that digital learning technologies should be regarded as complementary tools rather than substitutes for conventional medical education practices. The successful development of medical professionalism in the digital era depends on thoughtful integration of technology with ethical education, supervision, and professional role modeling. Without these supporting elements, the potential benefits of digital learning may be achieved at the expense of essential professional values.

IV. CONCLUSIONS

The integration of digital learning technologies, particularly Virtual Reality (VR) and Artificial Intelligence (AI), offers considerable educational benefits in medical education [1], [9], including improved engagement and enhanced clinical learning experiences. However, this evidence-based case review highlights that the impact of digital learning on medical professionalism and professional identity development remains heterogeneous among students [3].

While VR and AI contribute positively to knowledge acquisition and skill training [1], [2], their implementation also introduces significant ethical and professionalism-related challenges. Key concerns identified include data privacy [2], [5], limitations in secondary skill acquisition such as communication and empathy [1], and issues related to professional integrity and accountability [6], [7]. These challenges indicate that technological advancement alone is insufficient to support the holistic development of future physicians.

Therefore, the integration of digital technology in medical education must be accompanied by structured ethical guidance, faculty supervision, and professional role modeling within the curriculum [8], [12], [14]. Ethical frameworks and reflective learning strategies are essential to ensure that digital learning environments support, rather than undermine, the development of medical professionalism [4], [11]. Further research is recommended to establish standardized ethical guidelines and best practices for the sustainable integration of digital technologies in medical education.

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