DOI: https://doi.org/10.4038/seajme.v19i2.688

Review Article

Learning and Teaching in Clinical Education

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Abstract

Introduction: Clinical learning is a crucial component in training students to acquire essential skills. Although multifaceted approaches to clinical learning and teaching exist, there is little evidence of their effectiveness in student learning, as clinical training is challenged by environmental, patient-related, student-related, and teacher-related factors. However, there is a gap in knowledge about how students perceive their learning experiences and how teachers assess the adequacy of training.

Methods: The objective is to review various clinical learning and teaching methods, their impacts, perceptions, and challenges among learners and teachers. The PubMed database was searched from 2014 to 2024 using MeSH terms. The study included interventional, observational, review, and theoretical articles. The review identified 30 articles relevant to this study.

Results: Students achieve learning outcomes through various learning and teaching methods. Traditional bedside teaching is still considered the most essential teaching method, but its use is decreasing. Students prefer innovative learning and teaching methods, and these methods must be integrated with existing methods to achieve better learning outcomes. Perceptions and challenges vary depending on the learning condition. Students want to have good role modelling. Teachers prefer more time to give students feedback.

Conclusion: Nowadays, students study in a technologically advanced era, and there are more creative, student-centered teaching methods to meet patients' needs better. Therefore, clinical teaching must incorporate various techniques to facilitate effective learning of clinical skills during the training period.

Keywords: Clinical learning and teaching methods, Learning outcomes, Perceptions and challenges

Introduction

Learning clinical skills and knowledge is an essential component of medical training. This happens through various learning and teaching methods.

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Health professional education can occur across multiple settings, including classrooms, hospitals, communities, and clinical settings (Burgess *et al.,* 2020). Clinical learning is a transition into medical practice before they experience it as physicians (Blitz *et al.,* 2019). This time is crucial in a medical student's professional life, as it is when they gain experience in the clinical environment, making them more efficient physicians in the future. Traditionally, clinical learning happens at the bedside. Bedside teaching refers to teaching in the presence of a patient, primarily in a hospital setting (Salam *et al.,* 2011). To become an effective healthcare professional, it is essential to have key learning outcomes, including clinical knowledge, clinical reasoning, physical examination skills, professional skills,

and interpersonal skills. There are various other learning-teaching methods to achieve the outcomes, which are widely practised and adopted in medical education.

Methods

The objective is to study the various clinical learning and teaching methods, their impacts, perceptions, and challenges, among medical students and teachers. The PubMed database was searched from 2014 to 2024 using following MeSH terms since PubMed database was reliable and freely available. The search terms were (Clinical teaching Perception) AND “Education, Medical, Undergraduate/ methods"[Mesh] OR "Education, Medical, Undergraduate/trends"[Mesh]) AND (bedside learning) AND "Education, Medical, Undergraduate" [Mesh] AND (case-based learning) AND "Education, Medical, Undergraduate" [Mesh] AND (Simulation-based learning) AND "Education, Medical, Undergraduate" [Mesh] (Peer role-play) AND "Education, Medical, Undergraduate"[Mesh].

Inclusion criteria: 1. Articles fulfilling search terms 2. Articles in the English language 3. Medical Education Articles

Exclusion criteria: 1. Articles with only the abstract 2. Articles other than the English language 3. Duplicates 4. Articles on other health professions In addition, Articles were selected further on the PubMed databases with the search terms: ‘Undergraduate Medical Education’ Teaching and Learning Methods in Clinical Education’, The relevant articles were obtained as described in Figure 1.

Results

The review identified articles relevant to our study from 2014 to 2024 (n=30). We reviewed relevant articles on clinical learning and teaching methods, examining their impact on learning and perceptions, as well as the challenges they pose. The identified articles were 9 interventional, 13 observational, 6 review and 2 theoretical articles.

The traditional method of learning at the Bedside and its perception and challenges

Bedside teaching (BST) is a necessary clinical teaching method. It is an essential modality in teaching various skills needed by medical students, but it is in decline. The famous physician Sir William Osler (1849–1919) said, ‘To study the phenomena of disease without books is to sail an uncharted sea, whilst to study books without patients is not to go to sea at all’, and ‘Medicine is learned by the bedside and not in the classroom’; his statement is valid even after a century (Peters & ten Cate, 2014).

Bedside teaching is a standard for medical education. Students interact with actual patients to get history taking, physical examination, communication, and interpersonal skills. At the bedside, the student gets opportunities to elicit symptoms and signs directly from the patients, under the teachers’ guidance. Among the many advantages of bedside teaching are the enforcement of spiral and active learning, creative thinking, empathy, and emphasis on social aspects of patient care (Ratnani *et al.,* 2020). Clinical skill training, including practical abilities required for patient care, is considered an essential aspect of medical education. Students should be given sufficient background knowledge before working with actual patients in a learner-centred environment with more opportunities to develop clinical skills (Suliman *et al.,* 2016). Over time, it has evolved to adapt to technological advancements and the growing student population (Baker *et al.,* 2015).

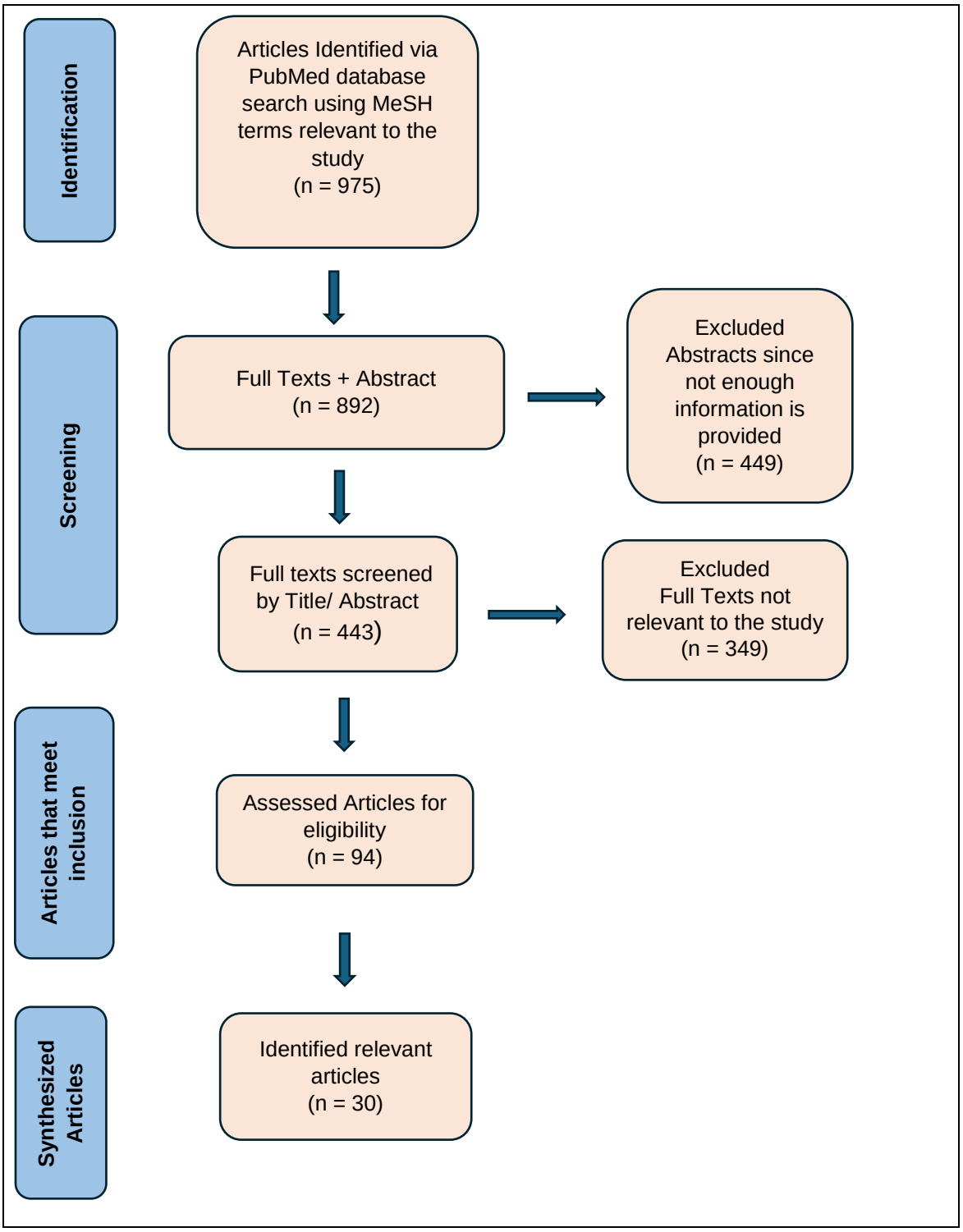

Figure 1: Illustration of Literature Review Search Process

Most of the time, students were unprepared for bedside teaching, and the hospital environment was didactic, focusing on everyday hospital routines (Ramani *et al.,* 2019) and patient-centred care. A more structured approach to bedside teaching has been introduced to overcome these challenges. In a study conducted in Germany, bedside teaching sessions were video recorded (Blaschke *et al.,* 2022). The results showed that the traditional teaching method had been modified to accommodate the new process. The current advances in teaching methods can make it more versatile with a

structured framework for bedside teaching. Primarily, regarding location, an appropriate room must be provided for discussing the case and theoretical aspects, so that teaching does not have to take place in the corridor or around patients in the ward. Second, to maximise time spent on patient clinical examinations, students should practice on simulators before performing on actual patients, rather than practising on a patient for the first time. This can save time, increase confidence, and reduce patient discomfort (Gharaibeh *et al.,* 2017). This article demonstrates how modern education can be effectively combined with traditional bedside teaching to enhance its efficiency.

In the UK, undergraduate surgical education faced challenges in delivering structured education and learning. A study conducted at a UK medical school by Baker et al. divided students into two groups: one followed conventional bedside teaching, and the other was exposed to a newly designed method. The results showed that the blended approach has improved student understanding and engagement. Therefore, a new blended approach was introduced, involving the blend of case-based discussions, online material, and traditional bedside teaching. Consequently, we conclude that innovations must be combined with existing methods to achieve better learning outcomes. At the University of Glasgow, UK, case-based learning was more effective when conducted in small-group discussions than in a tutor-led format. The students appreciated it well, and they reported that they learnt more. This model improved student engagement, enthusiasm, and knowledge (Sartania *et al.,* 2022).

Teachers play a crucial role in a student's life. Another critical aspect of clinical learning is role modelling (Burgess *et al.,* 2015). This behaviour starts from an early age in students' lives. Teachers strive to bring out the best in students while guiding them. Burgess and colleagues (2015) conducted a qualitative study in Australia to explore medical students' perceptions of their bedside clinical tutors as role models. The results showed that the students identified positive and negative features. The positive findings were related to Clinical characteristics, Teaching skills, and Personal Qualities. One student commented, "They need to be passionate about what they are teaching. The ones that stick in my head are the ones that enjoy their field and want to teach us everything about it. Cruess and Steinert (2015 argue that role modelling is among the most potent influences on professional identity formation. Students learn not only from formal instruction by a clinical teacher but also from observing how clinicians interact with patients, colleagues, and the healthcare staff.

Students' learning experience at the bedside has decreased during clinical clerkship due to a shift in teaching away from the bedside (Blaschke *et al.,* 2022). A UK study examining medical students' perceptions of bedside teaching found that students preferred a more structured approach to clinical placement and BST during the early clinical years. In contrast, they wanted to engage in good supervision and feedback during the later years of clinical learning. It is further stated that the students valued the opportunity to observe the teacher, demonstrate the clinical skills of a patient, and to ask questions. Students observed clinical teachers acting as role models at the bedside, revealing professionalism and communication skills during patient encounters. Opportunistic teaching was valued by fourth- and fifth-year medical students, as it helps them adapt to the workplace in the future (Edwards & Quinton, 2024).

Medical students' perception

An exploratory study conducted in three medical schools in Sri Lanka describes the experiences of recent graduates during their final year of clinical training, aiming to understand their learning and teaching experiences. The study reveals that due to the increased workload in medical school, clinical teachers often lack sufficient time for clinical teaching, role modelling, and patient care. When role modelling was considered, the students described their teachers as rude and arrogant. They were symbolic role models; even though they think they are role models,

they do not demonstrate positive professional characteristics. At the same time, some students' feedback was positive about medical teachers who served as accurate role models, possessed compassionate and caring personalities, and were effective teachers who invested significant time with students, treating them as professionals. The study among medical students reveals the positive and negative experiences of students and shows that physicians need to be assigned teaching responsibilities so they can organise teaching sessions with predetermined learning objectives. Therefore, teaching sessions should transition from traditional learning methods to more interactive teaching strategies. This study further stated that the students responded that the clinicians did not have time to teach them (Jayasuriya-Illesinghe *et al.,* 2016).

Medical teachers' perception

Medical teachers' perceptions of teaching are essential in determining learning and teaching methods. We explored studies on this aspect. A survey by Lan et al. in Australia revealed that nearly all clinicians enjoyed teaching students and were confident in their teaching abilities. Many clinicians regarded teaching as a work commitment and were confident in their ability to teach students. However, medical student teaching was perceived as undervalued, and most felt their roles as teachers were under-recognised. In addition, most respondents indicated that they had insufficient time to get to know students and provide feedback, an essential part of the learning and teaching process. Therefore, a mismatch appears to exist between the expectations of university medical schools, hospitals, and clinical teachers (Lan *et al.,* 2022). Teachers admit that clinical teaching must go beyond teaching just theory, and they emphasise experiential learning. Case-based discussions and simulations suggest that students learn best through active participation and exposure to real patients. This alignment with adult learning theory demonstrates a strength in perception, as teachers value approaches that foster critical thinking and professional identity formation (Knowles *et al.,* 2015).

Other Methods and their impact on learning and teaching

It is essential that clinical teaching incorporate a range of methods beyond traditional ones to achieve learning outcomes that foster critical and independent thinking, thereby developing a sense of ownership in the learning process. A cross-sectional survey was conducted at an Innovation in Medical Education centre in Pakistan to determine medical students' perception of learning simulated clinical skill sessions as part of the undergraduate curriculum. The results showed that the students expressed confidence and were satisfied with the knowledge and clinical skills they gained. Students further stated that it increased their understanding of the subject (Mirza *et al.,* 2021).

Apart from gaining confidence, students' communication and teamwork skills also improved. A study by Banerjee et al. (2016) in the USA further stated that students preferred an innovative curriculum that includes teamwork skills, which can be implemented in any medical school with a simulation program. The Medical schools in Thailand have incorporated Simulation-based learning into their curriculum. SBL encounters challenges such as shortages of faculty and simulators, inadequate time and space, insufficient space, faculty training, and limited financial support. Although the administrators' attitude was positive, students' expectations have yet to be met (Boonmak *et al.,* 2022). Despite the various advantages of SBL, the lack of facilities appears to be the reason it is not widely practised in developing countries. Simulation-based learning was found to be suitable when there was a limitation for clinical clerkship due to unforeseen circumstances like the COVID-19 pandemic. In Sri Lanka simulation-based learning is not practised widely due to the higher cost; however, low-fidelity simulators were found to be as effective. A study done on simulation-based learning in Sri Lanka also suggests the low-cost simulators can be incorporated to gain the

benefits of simulation-based learning (Kodikara *et al.,* 2020).

Case-based learning is a widely used and interactive teaching method in medical education. Case-based discussion (CBD) was developed to address gaps in bedside teaching, where learning is primarily opportunistic. In CBD, learning evolves around pre-selected typical cases from an existing collection through small-group discussions. More medical schools worldwide have incorporated CBDs in their curricula during and after the COVID-19 pandemic. CBL integrated basic biomedical knowledge into clinical sciences. Gartmeier et al. (2019) conducted a study in Germany using video-based CBseminar sessions from the disciplines of medicine and surgery. Following the sessions, students were asked questions based on type, openness, and cognitive level. CBL is a method that provides students with a high degree of freedom to think critically, reflect, and engage in the learning process (Osborne *et al.,* 2022).

During the coronavirus pandemic, all medical schools in Germany transitioned to virtual learning and teaching, including virtual patient cases. A virtual patient is an interactive computer simulation used in health care education to train students in clinical decision-making and management skills. Seventeen faculties across the country participated in a survey to assess the efficacy of this method; the results showed that it is highly effective and can be continued even after the COVID-19 pandemic to enhance clinical reasoning and decision-making skills. The virtual patients covered a comprehensive range of cases, including the systems to be covered in the curriculum (Jennebach *et al.,* 2022). McLean states that during CBL sessions, students learn to work in teams, lead meetings, and allocate tasks among teammates. It helps them identify knowledge gaps, learn to ask good questions, and understand how to gather and analyse the literature to answer them. CBL guides students in professionally focused inquiry, which can direct their lifelong learning journey (McLean, 2016).

Peer learning is an efficient learning method. Peer learning is the process by which students teach their peers and learn from one another. This is usually facilitated through learning and teaching activities, either in formal ways, such as incorporating into timetables, or informal ways in small groups, to improve students' knowledge and skills. Peer-assisted learning (PAL) has informally existed in ancient times but is nowadays implemented in the curricula of most medical schools; when medical students do peer teaching, they perceive that the teaching role improves their knowledge and understanding of the subject; they become very confident students and strengthen their capacity to get more job opportunities. It further says that Peer-assisted learning (PAL) is an extensive thought in modern medical education and offers many advantages that ensure it will not lose this place anytime soon (Herrmann-Werner *et al.,* 2017).

Peer role-playing is considered a very cost-effective method in medical education. It is a simulation-based learning method in which medical students take turns playing the roles of patients and physicians. It enhances students' communication skills, and when they receive feedback from their peers, it further improves their skills. A study by Boss et al. (2015) in Germany suggests that peer role-playing and training with standardised patients effectively enhance communication skills in the medical curriculum. This study demonstrated a significant cost-effectiveness advantage for peer roles compared with standardised patients. Another study showed that students prefer being taught by their peers, peer-teachers. They say that since peer-teachers can understand them better, they gain a better learning experience than with actual teachers (Suija *et al.,* 2020).

Clinical reasoning is a crucial aspect of every physician's practice. During their undergraduate training, medical students must be trained to develop clinical reasoning skills. Case presentations are considered a teaching format that summarises clinical reasoning. In a study by Fürstenberg et al. (2019) in Germany, students from medical schools with different undergraduate curricula and academic

progress participated to predict the quality of case summary statements as an indicator of undergraduate medical students' clinical reasoning. The study specified that medical knowledge and teamwork predicted the quality of case summary statements as an indicator of clinical reasoning. Many students report that various clinical teaching methods, such as bedside learning, case-based learning, problem based learning, and simulation, improve patient care and critical thinking abilities (Ramani & Leinster, 2008). Bedside teaching is appreciated because it allows students to interact directly with patients and observe teachers as role models, promoting clinical reasoning skills and professional behaviour (Wang *et al.,* 2019).

A mixed-method study was done in South Korea to investigate the use and perceptions of online clinical videos for medical students' clinical skills training. The study reveals that students have positive perceptions of OSCE (Objective Structured Clinical Examination) videos and can utilise them in various ways to support their learning. The study's findings suggest that e-learning can be a valuable mode for enhancing clinical education by meeting students' needs while supplementing traditional methods of learning clinical skills (Jang & Kim, 2014).

Traditionally, bedside teaching was the primary method of clinical training, enabling students to learn, practice, and master the complications of patient care. The famous physician Sir William Osler (1849–1919) said, ‘To study the phenomena of disease without books is to sail an uncharted sea, whilst to study books without patients is not to go to sea at all’, and: ‘The bedside learns medicine and not in the classroom’; his statement is valid even after a century (Peters & ten Cate, 2014). There is growing evidence that the traditional approach is being challenged, and teachers and students are using innovative methods to fill gaps in the development of clinical skills, especially technology-enhanced approaches such as simulation-based learning, e-learning, online case-based learning, and telemedicine. In addition, Artificial Intelligence (AI) is changing the healthcare system and reshaping medical education, teaching and learning. A scoping review from North America and Europe illustrates that AI has a significant role in teaching, assessment, and clinical reasoning in medical education and in augmenting traditional educational methods to introduce innovative approaches (Gordon *et al.,* 2024).

As stated, the review articles demonstrate how various learning and teaching methods can help students achieve different learning outcomes, as outlined in Table 1.

Discussion and Conclusion

Clinical learning is a vital component of medical student training. It is essential that clinical teaching incorporates a range of teaching methods to achieve learning outcomes, including clinical knowledge, clinical reasoning, physical examination skills, professional skills, communication, and interpersonal skills, thereby enabling healthcare professionals to become competent. Traditional bedside learning has a significant role in teaching clinical skills. However, it is facing challenges. Clinical learning and teaching methods must evolve to adapt to the changing environment, as physicians may treat patients under diverse circumstances in the future. Although clinical teaching extends beyond traditional bedside teaching, focusing on developing more effective, evidence-based, and student-centred approaches, it still faces challenges and gaps. As stated by Miller (1990), students often fail to apply the theoretical knowledge they have learned in basic science to clinical practice at the bedside, which compromises their ability to learn. Literature says that there needs to be more innovative teaching methods to better meet patients' needs. Therefore, medical education needs to focus on producing competent physicians to address advances in healthcare worldwide. Students often prefer being taught by teachers over active learning, which limits their ability to develop clinical skills and reasoning abilities. When they become passive learners, their motivation decreases in real circumstances (Ten Cate, 2005). The gaps in clinical teaching and learning are

numerous, including insufficient supervision, poor coordination between theory and practice, inadequate feedback, resource shortages, and student barriers. Addressing these gaps requires coordinated institutional support, structured feedback systems, faculty development, and integration of various teaching/learning methods with traditional bedside learning.

Table 1: Impact of learning and teaching methods on students' outcomes

Clinical learning and teaching Methods	Students' Learning Outcomes								
	Theoretical Knowledge	Physical examination skills	Communication skills	Critical thinking and reasoning skills	Teamwork	Role modelling	Confidence	Reflective learning	Innovative learning
Bedside teaching	*	*	*			*			
Simulation-based learning	*	*	*	*	*		*		
Case-based discussion	*			*	*				
Peer-assisted learning and role-play	*	*	*		*				
Clinical presentation and reasoning	*			*	*				
Transformative learning				*				*	
Telemedicine	*	*	*				*		
E-learning	*	*							
Artificial Intelligence				*					*

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