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EXPLORING THE ESSENCE OF WEB-BASED INTERACTIVE LEARNING TO ENHANCE HIGHER ORDER THINKING SKILLS IN NURSING STUDENTS: A FOCUS GROUP STUDY

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Abstrak

Penelitian ini bertujuan untuk mengeksplorasi esensi pembelajaran interaktif berbasis web untuk meningkatkan *Higher Order Thinking Skills (HOTS)-analysis, evaluate,* dan *create* pada mahasiswa keperawatan. Penelitian ini menerapkan pendekatan kualitatif berdasarkan dua wawancara kelompok terfokus pada 20 partisipan, termasuk mahasiswa keperawatan dan dosen dari program sarjana keperawatan dan program teknologi informasi di Universitas Advent Indonesia. Semua wawancara direkam, ditranskripsi kata demi kata dan dianalisis secara konten tematik menggunakan standar untuk mencapai konsensus tentang pengkodean tematik. Peneliti memeriksa, mengklasifikasikan, dan mengatur tema dan kategori. Analisis konten tematik menghasilkan tiga tema inti: Kesenjangan dalam metode pembelajaran saat ini; Manfaat potensial alat interaktif berbasis website; Tantangan yang dirasakan. Kategori yang disetujui adalah variabilitas dalam kecepatan belajar, keterlibatan dengan materi pengajaran, adaptasi dalam pendekatan pembelajaran, ketepatan waktu umpan balik, pembelajaran interaktif, keterbatasan sumber daya dan skalabilitas, peningkatan fleksibilitas, peningkatan keterlibatan melalui fitur interaktif, pengalaman belajar yang dipersonalisasi, peningkatan akses ke sumber daya, dukungan untuk pembelajaran kolaboratif, efisiensi dan skalabilitas, masalah teknis, kesenjangan digital, interaksi tatap muka yang berkurang, kesetaraan dan inklusivitas, potensi ketergantungan berlebihan pada teknologi, privasi dan keamanan. Studi ini menyoroti sifat multifaset dari esensi pembelajaran interaktif berbasis web untuk meningkatkan pemikiran tingkat tinggi mahasiswa keperawatan. Implikasinya dianggap berharga untuk meningkatkan keterampilan berpikir tingkat tinggi pada sumber daya pengajaran, pembelajaran, dan dukungan akademis.

Kata Kunci: Keterampilan berpikir Tingkat tinggi, Pendidikan keperawatan, Pembelajaran interaktif berbasis website

Abstract

Web-based interactive learning tools offer a promising solution to enhance HOTS in nursing education.However, web-based interactive learning should be taken into consideration in order to accommodate different student characteristics, integrate into existing curricula, and satisfy the demands of nursing students.This study aims to explore the essence of web-based interactive learning to enhance HOTS-analyzing, evaluating and creating in nursing students. This study implemented a qualitative approach based on two focus group interviews on a sample of 20 resource participants including nursing students and faculty members from bachelor nursing and information technology program at Universitas Advent Indonesia. All interviews were recorded, transcribed verbatim and analyzed for thematic contents using the standard to a consensus on thematic coding. A thematic content analysis yielded three core themes: Gaps in Current Learning Methods; Potential Benefits of Web-Based Interactive Tools; Perceived Challenges. Categories were consented as variability in learning paces, engagement with teaching material, adaptability in learning approaches, feedback timeliness, interactive learning, resource and scalability limitations, enhanced flexibility, increased engagement through interactive features, personalized learning experiences, improved access to resources, support for collaborative learning, efficiency and scalability, technical issues, digital divide, reduced face-to-face interaction, equity and inclusivity, potential over-reliance on technology, privacy and security. This study highlights the multifaceted nature of the essence of web-based interactive learning to enhance higher order thinking nursing students. Implications are seen as valuable for enhancing higher order thinking skills to teaching, learning and academic support resources.

***Keywords**: Higher-Order Thinking Skills (HOTS), Nursing education, Web-based interactive learning*

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Introduction

The goal of nursing education is to give students a broad range of skills that go beyond technical mastery to handle the changing and unpredictable demands of clinical practice (Tehran et al., 2021). While it's vital for nursing students to acquire technical skills like performing procedures and giving medication, it's just as critical for them to learn how to navigate complex and changing clinical contexts (Kavanagh & Sharpnack, 2021). Through immersive experiences, students are exposed to a variety of scenarios that test their flexibility and problem-solving skills, such as simulation laboratories and varied clinical assignments. Their ability to adapt to sudden changes and new patient requirements is ensured by these experiences, which also help them become more prepared to deal with the uncertainties that come with working in healthcare environments (Amoo & Enyan, 2022; Rantung & Tambunan, 2023). Reasonably, Higher Order Thinking Skills (HOTS)-analyzing, evaluating, creating are emphasized in nursing education. According to revised Bloom's Taxonomy, HOTS are the cognitive processes that require thinking at a more complex or higher level. It is an ability to think at cognitive level four to six on cognitive domain of Bloom's taxonomy, in which it teaches analytical, evaluative and creative thinking skills (Anderson et al, 2001). This can be taught and learned, and will be improved when educators use appropriate instructional methods and curriculum materials, active learning strategies, and student-to-student and student-to-instructor interactions (Vong & Kaewurai, 2017). These strategies improve nursing students' technical proficiency while equipping them to make wise decisions in circumstances that are changing quickly. Nursing students who practice HOTS are better able to assess complicated cases, foresee potential issues, and put appropriate interventions in place, all abilities that are critical for handling the unpredictability of patient care (Cheng et al., 2017; Guerrero et al., 2022).

Traditional nursing education techniques frequently place an emphasis on technical knowledge and memorization rather than encouraging HOTS (Vallee et al., 2020). Conventional methods frequently emphasize fact recall and memorization over critical thinking and in-depth comprehension. The development of complicated problem-solving abilities required for clinical practice is not possible with rudimentary knowledge alone (Voutilainen et al., 2017). While learning technical procedures and protocols is important, it may take precedence over the development of HOTS. Technical expertise does not always equate to critical thinking skills or the capacity to make sound clinical judgments (Khozaei et al., 2022). Similarly, students could not be completely engaged in interactive and reflective learning experiences via traditional teaching approaches. As a result, students' time to practice HOTS in real-world, scenario-based environments is limited (Tsimane & Downing, 2020).

Unquestionably, the growing interest in web-based learning resources in nursing education clearly indicates a trend toward the use of digital technologies to enhance teaching and learning (Meum et al., 2021). These technological advancements offer a multitude of flexible and interactive

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options to meet different learning needs and preferences. For instance, from the comfort of their own devices, students can access a multitude of resources, including lectures, assignments, and multimedia content, through online platforms like Learning Management Systems (LMS) and virtual classrooms (Gause et al., 2022; Alshammari & Alanazi, 2023). With the ability to interact with the information at their own pace and go over it again as needed, accessibility enables a more customized learning experience that promotes retention and deeper understanding (Ryan et al., 2022). Additionally, online learning resources encourage improved student-teacher cooperation and communication. Features like discussion boards, group projects, and real-time chat that reduce distance allow students and teachers to interact. This connectivity fosters a more inclusive learning environment where a range of viewpoints and ideas may be discussed and explored, in addition to improving peer-to-peer learning. Online collaboration fosters the growth of essential cooperation abilities and aids in the establishment of a student network of academic and professional contacts (Ansari & Khan, 2020).

Previous studies have shown that web-based interactive learning tools offer a promising solution to enhance HOTS in nursing education. These tools can provide immersive and flexible learning experiences, such as virtual simulations and interactive case studies, that closely mirror real-world scenarios (Basit & Korkmaz, 2020). Clinical simulations, case studies, and other interactive learning methods have been shown to support HOTS development. They provide supervised settings where students collaborate with peers, practice critical thinking, and get quick feedback (Park et al., 2020). Nevertheless, careful consideration of a number of aspects, such as curriculum design, faculty training, and student preparation, is necessary for the effective integration of web-based resources into nursing curricula (Atwa et al., 2024). Comprehending these variables and tackling the obstacles linked to online education might optimize the possible advantages of these resources in cultivating HOTS in nursing students (Tolarba, 2021).

Despite the potential advantages, little is known about how web-based interactive learning, particularly in Indonesia, is essential to improving HOTS-analyzing, evaluating, and creating in nursing education. However, to meet the needs of nursing students, integrate into existing curricula, and account for varying student characteristics in web-based interactive learning should be considered (Jeon et al., 2020). Therefore, the focus of this study is to explore the essence of web-based interactive learning to enhance HOTS-analyzing, evaluating and creating in nursing students.

Methods

A qualitative focus group research design was employed in this study. Focus groups were chosen with the intention of gathering information on the topic through in-person interactions between participants. While the subject of qualitative research may be considered diverse in nature, the present study utilizes methodological approaches that are consistent with efficient focus group processes. Focus groups provide a

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means of obtaining members' intimate personal perceptions and insights, which allows for the collection of comprehensive information. Acquiring information from the group as a whole yields high-quality outcomes and significant insights into topics that members may consider or consider in relation to specific difficulties. Hence, prior to the focus group discussion, questions were pretested to ascertain their validity, understandability, bias, and clarity in accordance with other research approaches, such as quantitative research (Polit & Beck, 2018).

The study included 2 focus groups with 1 focus group of nursing students (totaling 10 students) and 1 focus group with combination of faculty members from bachelor nursing program (totaling 7 faculty members) and bachelor Information Technology (IT) program (totaling 3 faculty members) at Universitas Advent Indonesia a private university located in Bandung, West Java Indonesia. The principal technique of gathering data was through focus group discussions. This approach allowed for the collection of rich, detailed information from multiple participants simultaneously, fostering a dynamic exchange of ideas and facilitating the exploration of complex topics through group interactions (Polit & Beck, 2018). Students were selected based on their current enrollment in the program in the academic year of 2024/2025 and their experience with web-based learning tools. Whilst, the faculty members were chosen for their involvement in teaching and their familiarity with web-based learning tools and medical surgical and IT courses. A total of 20 members in both group agreed to participate in the focus group interviews.

A semi-structured discussion guide was developed to steer the focus group conversations. The guide included open-ended questions designed to elicit detailed responses on the topics the need of the web-based interactive learning to enhance HOTS in Nursing Students. All discussions were done in Indonesian and each session lasted approximately 60-90 minutes. A qualified moderator led the discussions in accordance with the discussion guide, allowing for natural interaction and flow among participants. All focus group sessions were audio-taped with participants' consent. The recordings were transcribed verbatim to capture the exact wording and nuances of the discussions (Creswell & Creswell, 2018).

Data were analyzed using thematic analysis, a method suitable for identifying and interpreting patterns and themes within qualitative data. The analysis involved several steps, including familiarization, initial coding, theme development then review and refinement. In familiarization, researchers familiarized themselves with the data by reading and re-reading the transcripts. The step of initial coding was generated to identify significant features of the data relevant to the research questions. These codes were then grouped into themes that represented recurring patterns and insights across the focus groups. Ultimately, the themes were reviewed and refined to ensure they accurately reflected the data and addressed the research objectives (Creswell & Creswell, 2018).

To ensure the rigor of this qualitative study, several strategies were implemented

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throughout the research process. These strategies aimed to enhance the credibility, dependability, confirmability, and transferability of the findings. To validate the accuracy of the findings, member checking was conducted. Preliminary findings and interpretations were shared with a subset of participants to verify that their views were accurately represented and to gain further insights or clarification. In further, regular meetings and discussions among the research team were held to ensure consistency in data collection and analysis. This collaborative approach helped to address any discrepancies and maintain methodological rigor. This study underwent peer review by colleagues with expertise in qualitative research. Feedback from peer reviewers was used to refine the research design, analysis, and interpretations, enhancing the study's confirmability. In addition, detailed demographic information about participants was provided to offer insight into the diversity of perspectives and experiences represented in the study. This helps readers evaluate the relevance of the findings to different groups (Moser & Korstjens, 2018).

The Faculty of Nursing, Universitas Advent Indonesia Institutional Research Committee granted permission to perform this study with human subjects (KEPK Protocol Number: 391/KEPK-FIK.UNAI/EC/VI/24).

Results

Over 20 participants, who subsequently took part in two focus group discussion, a total of 10 nursing students from bachelor nursing program, 7 faculty members from bachelor nursing program and 3 faculty members from bachelor IT program.

Three major themes emerged from the data: Gaps in current learning methods, Potential benefits of web-based interactive tools, and Perceived challenges. 18 main categories were identified by the researchers. An organization of themes, categories and representative quotes are represented in Table 1. The results revealed important gaps in traditional teaching approaches, including the inability of in-person education to accommodate different learning styles and the absence of prompt feedback, which was acknowledged by IT faculty members. Nursing faculty members reported that typical classroom settings frequently fail to meet the needs of students with different learning pacing, leaving some students feeling either overwhelmed or under challenged. Additionally, nursing students and faculty members perceived that the static nature of traditional teaching materials may not engage students effectively or address the needs of those who benefit from interactive and dynamic content. This gap underscores the need for more adaptive and personalized learning approaches that can cater to individual differences and provide timely support.

The potential benefits of web-based interactive tools emerged as a strong theme, reflecting a broad recognition of their positive impact on education were expressed by faculty members of IT. These tools offer enhanced flexibility, allowing students to learn at their own pace and revisit materials as needed. Interactive features, such as simulations, gamified content, and adaptive learning platforms, can engage students more deeply and

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facilitate a more personalized learning experience as supported by faculty members of nursing programs. Additionally, all groups contributed to the web-based tools that enable better access to resources and support collaborative learning through virtual discussions and group projects. This potential for increased engagement, personalization, and accessibility illustrates the significant advantages that digital tools can bring to the educational process that may enhance HOTS-analyzing, evaluating and creating.

Despite the advantages, the data also revealed several perceived challenges associated with the implementation of web-based interactive tools as expressed by all groups. Technical issues, such as unreliable internet connections or software compatibility problems, can hinder the effectiveness of these tools. Concerns exist regarding the digital divide, which is the possibility that students from underprivileged families won't have access to the tools or technology they need. There is also apprehension about the potential for reduced face-to-face interaction, which can impact the development of interpersonal skills and the quality of student-teacher relationships. Addressing these challenges is crucial for ensuring that web-based tools are used effectively and equitably in educational settings.

Table 1. Themes, categories and representative quotes

Theme	Categories	Representative quotes
Gaps in current learning methods	Variability in learning paces	"*struggle to accommodate varying paces of learning"* (FIT 2)
		"The students' individual learning speeds were not always in line with the consistent pace of instruction" (FNP 4)
	Engagement with teaching material	"*traditional teaching materials may not effectively address interactive content*" (FNP 6)
		"lack of engagement in learning " (NS 3)
	Adaptability in learning approaches	"*the need for more adaptive and personalized learning approaches*" (NS 4)
		"*lack flexibility to adjust to individual differences*" (NS 8)
	Feedback timeliness	"*delay in feedback that traditional methods often entai*l" (FIT 1)
		"*timely feedback is crucial for addressing misunderstandings and guiding student effectively*" (FNP 2)
	Interactive learning	"*often fall short in providing interactive learning experiences*" (NS 7)

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		"*Opportunities for active learning and hands-on experience may be limited by lectures and textbook-based instruction*" (FNP 5)
	Resource and scalability limitations	"*Physical constraints of traditional classrooms, such as limited access do diverse resources*" (FIT 2)
	Enhanced flexibility	"*web-based interactive tools offer significant flexibility in learning*" (FIT 1) "*Students can engage with content at their own pace*" (FIT 3)
	Increased engagement through interactive features	"*simulation, gamified content, and adaptive learning platforms enhance student interactive learning*" (FNP 7) "*complex concepts more accessible and enjoyable to facilitate HOTS*" (FNP 3)
	Personalized learning experiences	"*web-based tools can tailor content to individual student needs to promote critical thinking*" (FIT 2) "*faculty may provide targeted support and feedback that addresses specific learning gaps and strengths*" (FNP 2)
Potential benefits of web-based interactive tools	Improved access to resources	"*digital platforms allow us to access up-to-date information*" (NS 3) "*diverse learning resources that might not be available in a traditional classroom setting*" (NS 10)
	Support for collaborative learning	"*enhancing collaborative learning such using virtual discussions, group projects as to enhance HOTS*" (FIT 1) "*online forums enable students to collaborate effectively with peers, regardless of location*" (FIT 3)
	Efficiency and scalability	"*tools enable educators to monitor student progress in real time"* (FNP 7) "*tools identify areas where students may need additional support and adjust instructional strategies to increase critical thinking*" (FIT 3)
Perceived challenges	Technical issues	"*internet connections which can disrupt access to web-based tools and impede the learning experience*" (NS 8) "*issues with compatibility between tools and users' devices or between several software platforms*" (NS 9)

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Digital divide	"*students from disadvantaged backgrounds may lack access to the necessary technology*" (FIT 2) "a*part from hardware, web-based platforms might not provide access to other resources and support materials*" (FIT 1)
Reduced face-to-face interaction	"*potential reduction in face-to-face interaction which is essential for developing interpersonal skills*" (FNP 3) "*The amount of direct engagement between students and teachers may be affected, potentially lowering the quality of the relationship*" (NS 5)
Equity and inclusivity	"*diverse learning environments and technological capabilities among students*" (FNP 8) "*educators and students require enough training and technical support in order to use web-based materials effectively*" (FIT 2)
Potential over-reliance on technology	"*risk that students might not develop essential skills needed for situation where technology is not available*" (FIT 1)
Privacy and security	"*crucial to safeguard students' private information and make sure that digital platforms*" (FIT 3) *"it is essential to maintain trust and safety in online learning environment*" (NS 8)

Discussion

The theme "Gaps in current learning methods" in nursing education reflects the limitations of traditional instructional approaches and highlights the need for more effective and responsive educational strategies. Traditional nursing education methods often employ a uniform pace for all students, which can create challenges for learners who either struggle to keep up or find themselves unchallenged (Blanie et al., 2020). This lack of accommodation for individual learning speeds can result in uneven educational outcomes. This gap is particularly critical because nursing practice requires a deep understanding of complex concepts and skills, which are crucial for providing safe and effective patient care (Egerod et al., 2021). Moreover, practical and clinical skills are essential where relying solely on static materials may not effectively engage students or prepare them for real-world scenarios (Leighton et al., 2021). Enhancing engagement requires integrating interactive elements such as simulations, case studies, and multimedia resources. These tools can make learning more dynamic and relevant, helping students better retain information and apply it in clinical settings (Sharma et al.,

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2022). In fact, students come from varied backgrounds and have different strengths and weaknesses. The rigidity of traditional methods can limit the ability to provide personalized support and address specific learning challenges (Tambunan & Sinaga, 2023). Traditional methods often involve delays in feedback, which can impede students' ability to correct mistakes and improve their understanding. This delay can be detrimental in clinical settings where timely and accurate decision-making is essential. In addition, traditional methods often lack opportunities for hands-on practice and active participation, which are vital for preparing students for real-world clinical environments (He et al., 2021). Incorporating interactive elements such as virtual simulations, role-playing exercises, and collaborative projects can enhance students' engagement and skills development. These methods not only make learning more engaging but also help students apply theoretical knowledge in practical scenarios, bridging the gap between classroom learning and clinical practice (Tambunan, 2024).

The “Potential benefits of web-based interactive tools" theme highlights the positive impacts that digital tools can have on education, particularly in nursing. Web-based tools, such as online modules and digital resources, allow students to engage with the material at their own pace, revisit content as needed, and manage their learning around other commitments (Wu et al., 2020). The flexibility is particularly beneficial in nursing education, where students often balance coursework with clinical practice (Park et al., 2020). In further, in nursing education, where practical skills and real-world scenarios are critical, these interactive elements offer dynamic and immersive learning experiences (Tolarba, 2021). Simulations can replicate complex clinical situations, allowing students to practice decision-making and problem-solving in a risk-free environment. Gamified content can make learning more enjoyable and motivate students to engage deeply with the material. By making learning interactive and enjoyable, these tools improve retention and application of knowledge, better preparing students for real-life nursing challenges (Cheng et al., 2020). In fact, one of the most significant benefits of web-based tools is their ability to provide personalized learning experiences. This personalization allows for targeted instruction and support, helping students overcome their unique challenges and build on their strengths. In addition, personalized learning is crucial for developing the critical thinking and clinical skills required for effective patient care (Harnanto et al., 2021). Web-based tools also provide access to up-to-date information, diverse learning materials, and supplementary resources that might not be available in a traditional setting. For nursing students, this means access to the latest research, clinical guidelines, and educational materials that support their learning and professional development. Improved access helps ensure that students have the resources they need to stay current and informed (Langrgard, 2021).

The theme "Perceived challenges” associated with the implementation of web-based interactive tools highlights several critical barriers that can impact the effectiveness and equity of digital learning solutions. Technical issues are among the most significant barriers to the effective implementation of web-based interactive

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tools. Unreliable internet connections can disrupt access to online resources and hinder students' ability to participate fully in digital learning activities (Tambunan & Sinaga, 2023). Timely and uninterrupted access to learning materials and simulations is crucial, these issues can have a considerable impact on student performance and learning outcomes. Software compatibility problems also pose a challenge, as discrepancies between different platforms or devices can prevent students from accessing or using digital tools effectively. For instance, if a learning platform is not compatible with all types of devices or operating systems, students may experience difficulties accessing content or participating in online activities (Tambunan, 2023). Addressing these technical issues requires robust IT support and the use of flexible, cross-platform tools that ensure consistent access for all students (Wallace, 2021). The digital divide remains a significant concern, particularly in educational contexts where access to technology can vary widely. Students from disadvantaged backgrounds may lack the necessary hardware, such as computers or tablets, or may have limited access to high-speed internet (Nuuyoma et al., 2023). This disparity can exacerbate educational inequalities, as students without adequate access are at a disadvantage compared to their peers. While practical experience and interaction with digital simulations are important, limited access to technology can hinder students' ability to engage with and benefit from web-based tools (Tambunan, 2023). Addressing this challenge involves implementing strategies to provide equitable access, such as offering loaner devices, subsidizing internet costs, or providing alternative learning resources that do not rely on high-tech solutions (Tambunan & Sinaga, 2023). Developing strong interpersonal skills and building effective student-teacher relationships are essential components of nursing training. Reduced in-person interactions can limit students' opportunities to practice communication skills, engage in hands-on learning, and receive personalized support from instructors (Khatatbeh et al., 2024). In addition, the diverse learning environments and technological capabilities among students can impact the equitable implementation of web-based tools. Students from different backgrounds may face varying levels of access to resources and support, which can affect their learning experience and outcomes. To address these equity concerns, it is crucial to provide comprehensive support and training for both students and educators. This includes ensuring that all students are equipped with the necessary technology, offering technical support to resolve issues, and providing training to help students and faculty effectively use digital tools (Molato & Sehularo, 2022).

The study revealed three main implication relevant to web-based interactive learning in nursing education: teaching, learning and academic support resources. Initially, these findings might help instructors employ instructional techniques that support and foster particular facets of student engagement. Second, these findings may guide students in web-based interactive learning processes to enhance their HOTS-analyzing, evaluating, and creating competencies learning. Third, these findings may lead institutions to build stronger academic support resources that favor student in equipping their HOTS-analyzing, evaluating, creating

through web-based interactive learning. Overall, it is imperative faculty advising be consistent with contemporary strategies for success as there are significant financial implications for students and institutions. Faculty encouragement of HOTS-analyzing, evaluating, creating behaviors, aspects of students engagement, and specific study strategies may empower students in interactive learning, consequently, advancing academic success.

The study has certain limitations. The findings might not be as applicable to different nursing education settings because of the limited sample size and the fact that most of the participants came from a single institution. The study lacked a quantitative assessment, which could have yielded important information to support the qualitative findings, on the effects of web-based interactive learning on HOTS, learning outcomes, satisfaction, or other quantifiable aspects of nursing education. Furthermore, because the study's primary focus was on the opinions and experiences of faculty and students, administrators and policymakers' points of view were left out. This restriction might have an impact on how thorough the study's findings are and how well-rounded the strategies are for incorporating web-based interactive learning to improve HOTS in nursing education.

In order to overcome these constraints, future research should quantify the effects of web-based interactive learning on different areas of nursing education using quantitative studies and by combining bigger and more diverse samples from several institutions. Additionally, including the viewpoints of other interested parties, such administrators and legislators, may also help to create a more thorough picture of how web-based interactive learning might improve HOTS in nursing education.

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Appendix A

4-item Qualitative Questionnaire

Questionnaire Items

QUESTION #1: What are the Higher Order Thinking Skills (HOTS) in education from the eyes of: IT faculty, nursing faculty members and nursing students in Bachelor Nursing Program?

QUESTION #2: How do current educational practices support the development of HOTS in nursing students?

QUESTION #3: What are the main challenges you encounter in fostering HOTS?

QUESTION #4: What features would you like to see in a web-based interactive learning tool to support HOTS - analyzing, evaluating and creating