Web-Based Vs. Mixed Mode Instruction Utilizing E-Learning via LMS: A Comparative Study

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***Abstract*—The current study compares the effectiveness of enhancing English language skills through Web-Based Instruction (WBI), Mixed-Mode Instruction (MMI), and Communicative Language Teaching (CLT) approach of medical students. The investigation was conducted with the participation of 90 students affiliated with the Medical Institute. The subjects were randomly assigned to three distinct groups. The group assigned as the control received instruction utilizing the communicative language teaching pedagogy and engaged in exercises centered on tasks requiring mastery of the English language. The group designated as the WBI experimental group underwent a comprehensive training program utilizing the Learning Management System (LMS) model. The MMI experimental group in the study was provided with education via a blended learning approach, which incorporates both online and face-to-face instruction. The students subsequently underwent an assessment that evaluated their proficiency in comprehensive English language skills through the posttest of English as a Foreign Language (TOEFL). The study's findings revealed that the cohort that took part in the blended learning approach exhibited significantly superior outcomes compared to the remaining groups (WBI & CLT) regarding the enhancement of their comprehensive English language skills. The outcomes of this study bear significant educational implications for those involved in medical education, such as individuals responsible for creating curricula, designing training programs for aspiring medical students, producing educational materials, and other professionals working in this field.**

***Keywords*—blended module, English skills, Learning Management System (LMS), mixed-mode, web-based**

I. Introduction

In the new millennium, with the rapid advancements and transformations in science and technology, there is an increasing need for English as a global language in various professions, including medical students [1]. Improving English is necessary for doctors to effectively communicate with patients with different L1s (native language) backgrounds. The process of English language teaching in various nations has unique challenges. In English language instruction, educators occasionally overlook the importance of meticulously choosing appropriate methods to facilitate an enriching and productive learning environment. This oversight may substantially impact the development of learners' second language proficiency. As such, instructors may prioritize the judicious selection of effective pedagogical techniques in their teaching practices.

Electronic learning, also known as e-learning, has revolutionized teaching and learning practices across the globe. Therefore, higher education institutions are adapting their strategies to incorporate e-learning technologies that facilitate accomplishing their pedagogical goals. E-learning refers to the intentional utilization of electronic devices via the internet for educational purposes [1–3]. This approach enhances the learning experience, encourages collaboration, and fosters a more dynamic and interactive learning environment. However, most higher education institutions should use technology to maximize the learning outcomes of the learners. (i.e., web-based and mixed-mode instruction). Therefore, this study explores the importance of the balanced utilization of internet-based and mixed-mode instruction in the progress of comprehensive English expertise growth among medical students.

This research investigates the impact of Web-Based Instruction (WBI), also known as Online Learning (OL), and Mixed-Mode Instruction (MMI), commonly referred to as Blended Learning (BL), on the English language skills of medical students. The study subjects, who are currently enrolled in medical college, possess Hindi as their primary language while also being proficient in English as a secondary language. Investigating the efficacy of blended and online learning approaches is essential to ascertain the optimal utilization of training time for developing general English proficiency among future medical professionals. Based on the results of this investigation, it could be imperative to modify the educational curricula designed for upcoming medical practitioners. The research inquiry was presented with a higher degree of specificity:

Which approach of pedagogy between MMI and WBI is effective for medical students to achieve mutual intelligible English language skills?

The proposition of any conjectures is presently deemed premature owing to its dependence on evaluating medical students' perspectives on English language instruction across diverse nations, their first language, and the teachers' approach towards utilizing technology to impart second language skills in medical colleges.

II. Literature

A. Web-Based Instruction

Learning Management Systems (LMS) are web-based instructional tools that enhance electronic learning programs by integrating traditional classroom instruction with online

teaching methods, providing a comprehensive and practical learning experience. Learning management systems, such as Moodle or Blackboard, are used in higher education to support course curricula using facilities including web-based technologies [4, 5]. Online learning management systems facilitate communication and collaboration among students and instructors, enable access to a range of resources, and seamlessly integrate learning and administrative processes. LMS technology provides faculty with strong online tools to enhance their teaching, and students may utilize them to connect with instructors, peers, and information [6, 7]. Such technologies in different educational settings can create the future generation of a workplace. Learning management systems present a viable opportunity for higher education institutions to reduce costs, particularly those that operate under tight financial constraints [8].

Learning management systems can improve distance learning and conventional teaching approaches at different institutions [9, 10]. The critical problem at hand is the appropriate use of these technologies and the exchange of information through LMSs, which may lead to the successful completion of the course [11].

The efficacious adoption of the LMS can be impacted by various factors, including the stance of instructors and students, the technological infrastructure for information dissemination, and the backing of the establishment [12]. Instructors play a crucial part in determining if a learning management system is effective, successful, or ineffective [13]. In addition, studies have shown that the behavioral intention of teachers to utilize LMS in their classrooms is significantly associated with factors such as self-efficacy, the complexity of the technology, and subjective norms [14, 15].

The Learning Management System (LMS) is a tool utilized to facilitate e-learning via various networks such as the internet, extranet, and intranet to manage the processing, storage, and distribution of learning materials. Its purpose is to support the administration of teaching and learning, as well as communication between teachers and students. Furthermore, these technological advancements enable learners to schedule their educational speed and tailor their education in accordance with their unique requirements. Additionally, LMS facilitates educators in furnishing educational resources, monitoring pupils, and granting pupils usage of electronic learning aids.

Web-based instruction offers accessibility and flexibility, enabling learners to access various educational resources from any place, thus expanding learning opportunities [16]. This approach is often less economical than traditional classrooms as it increases the need for physical materials and travel [17]. However, challenges encompass the digital divide, restricted access for learners without sufficient technological resources, and the lack of individual interaction and mentorship opportunities discovered in face-to-face learning environments [18]. Moreover, online learning demands a substantial measure of self-motivation and determination, which might present challenges for specific students [19, 20].

B. Mixed-Mode Instruction

Moskal *et al*. [21] stated that mixed-mode instruction involves a Blended Learning (BL) process that connects the past and present by influencing higher education policy and strategy. BL in educational technology pertains to integrating traditional face-to-face and online-based instruction to enrich the learning process. Moreover, different strategies and techniques enables learners to grasp nuances of English language [22–24]. In higher education, the question of how to combine traditional classroom learning with virtual learning is not a recent one [25, 26]. According to previous research, the four most significant problems associated with blended learning are as follows: implementing a flexible learning environment, generating interaction among students, assisting students in their learning process, and creating a conducive atmosphere for learning that can yield desired results [24]. Blended learning has been the focus of certain studies which have brought to light its advantageous features, including the enhancement of pedagogy [27, 28] and profitability [26–29] as well as enhanced flexibility for students [30]. This flexibility allows learners to control temporal, spatial, the way, and speed of learning [31]. Additionally, learners no longer need to be in the same academic environments because of this approach since they may participate in the process from anywhere in the world [32]. The blended learning strategy has been acknowledged as a feasible technique to facilitate and encourage interaction amongst learners [24] since it brings together individuals on a single platform and allows them to communicate with one another, both verbally and non-verbally, during different stages of the course. Achieving success in blended learning is contingent upon the learners' ability to exhibit flexibility, self-governance, and self-moderation [33]. Porter *et al*. conducted a study and found that when comparing online courses to face-to-face courses, students performed slightly better in the former. Additionally, the need for integrated courses in higher education is on the rise [34].

Incorporating media-rich technology with traditional teaching practices, blended learning is a pedagogical method representing a contemporary instruction approach [34]. The methodology employed in this approach facilitates students to employ various learning mediums beyond the traditional classroom lectures, tutorials, and practical's. In light of the benefits associated with the incorporation of verbal, visual, and aural modes of learning, educational institutions are progressively amalgamating e-learning resources with traditional didactic lectures, especially in the context of health professions education. The advantages of this approach encompass a heightened level of motivation in the area of self-regulatory learning, expanded opportunities for student-teacher engagement, both within and beyond the confines of the classroom, and a notable improvement in long-term knowledge retention that ultimately facilitates more effective cognitive learning [35–39].

Mixed-mode instruction, an educational strategy that combines traditional classroom experiences with online learning, provides a harmonious blend of structured face-to-face interaction and the flexibility of online resources [26]. This mode enhances student engagement by offering diverse instructional methods that cater to various learning styles and preferences [40]. It allows for the personal connection and immediate feedback found in traditional

classrooms, while also leveraging the accessibility and resource variety of online learning [41]. Nonetheless, the successful implementation of mixed-mode instruction necessitates careful planning and allocation of resources, as seamlessly integrating both modes can be challenging [42]. Furthermore, this approach may impose additional demands on instructors and learners to effectively adapt to both online and in-person learning environments [43].

C. English Language Skills for Medical Students

It is imperative for medical students who aspire to work in a hospital or any other healthcare institution to possess a skilled command of the English language, as an inability to do so may hinder their ability to excel in their chosen field. According to Allan *et al*. [44], a low level of command over English language skills might result in confusion caused by a combination of misconceptions and poor communication, which in turn can bring forth possible threats to patient safety [45, 46]. It is of utmost importance that medical practitioners have adequate English language communication skills, as it is valuable for both patients and healthcare providers. Clinical and social situations require doctors to possess specialized English language skills [47–49]. A practical English language curriculum is necessary for the education of doctors to enhance their communication skills as healthcare professionals [50–52]. This requires doctors to choose their English language skills, which may mean giving up long-held cultural beliefs [53]. The aforementioned abilities in communication encompass cultural proficiency, which denotes the capability to partake in casual conversations with both physicians and patients [54, 55], along with socio-cultural traits such as inside jokes, sarcasm, and indirect expressions [56–58]. Therefore, this problem demands expertise in both pragmatics and content. The medical curriculum should integrate language instruction to create pragmatic competence and a strong knowledge of English language technical norms [59, 60]. There is a lack of empirical evidence supporting the effectiveness of English language instruction programs for medical students [61, 62]. The outcomes of previous studies suggest that medical professionals require English language education, and it is crucial to select an appropriate instructional model for teaching English to medical students [63].

Web-based and mixed-mode instructions offer significant advantages in enhancing English proficiency. Web-based instruction provides an extensive range of resources and tools for language acquisition, including interactive exercises, multimedia content, and access to global communities for practical language use, thus facilitating continuous and self-paced learning [64, 65]. On the other hand, mixed-mode instruction, which combines online resources with traditional classroom methods, presents a more comprehensive approach. It integrates the flexibility and diversity of online learning with the structured, interactive, and feedback-oriented environment of face-to-face instruction, which has been proven effective for language acquisition [42, 43, 64–66]. This blended approach not only caters to different learning styles but also provides a more comprehensive language learning experience by merging theoretical knowledge with practical application [26].

III. Method

A. Research Design

This survey employed a tripartite research design, encompassing two experimental groups and one control group. The experimental groups were exposed to interventions through distinct teaching models, namely web-based instruction and mixed-mode instructions. Conversely, the control group underwent a communicative language teaching approach. The data collection process was meticulously executed at two insignificant stages: the pretest phase, which occurred after the commencement of the experiment, and the posttest phase, which took place before the completion of the treatments. This methodological framework was devised to facilitate a comprehensive evaluation of the impact that each teaching model had on the participants.

B. Participants

This research included 90 medical students from the Hind Institute of Medical Science in Sitapur, India. The study sample consisted of three cohorts, each comprising 30 participants randomly assigned, with an equal representation of 15 male and 15 female medical students in each group. The sample population consisted of participants aged 22 to 24 years. Prior to the experiment, none of the participants had lived abroad in an English-speaking nation, and their native language was Hindi. Participants attended every seven-week training session (e.g., four sessions per week). The acquisition of ethical permission was undertaken in order to include the participants within the experiment, and in turn, each individual provided informed consent to participate.

C. Procedure

The training program commenced with a preliminary evaluation of general English skills. This preliminary assessment was carried out for two primary reasons. Firstly, it was performed to ensure that the three groups participating in the experiment had an equivalent level of English language proficiency prior to the onset of the training program. Secondly, it was done to gauge the fundamental level of English language skills at the outset of the training course. The Longman's TOEFL English proficiency examination incorporated a range of modules aimed at evaluating the participants' general English skills: (1) Listening skill: included 30 items, (2) Reading skill: included 30 items, (3) Written skill: included 40 items, after a pretest, the three groups' training began. The role researcher was to facilitate the experiment efficiently among the groups and document it for further analysis.

D. Training Students on Communicative Language Teaching

The instruction employed a communicative language teaching approach for training the English language to the control group. Interaction is the main focus of Communicative Language Instruction (CLT). The learners in CLT contexts communicate with one another and the instructor to practice the target language. For example,

students might practice different types of questions by being asked to discover personal facts about their peers. This encourages meaningful dialogue among the students. The Communicative Language Teaching (CLT) approach is a prominent method for instructing general English within the context of English as a Second Language (ESL) teaching. This particular approach is typically implemented within a diverse range of academic settings.

E. Training Students on Learning Management System

The first experimental group, which was an online group (OL group), was given the same training as the other three groups on the three different aspects of the English language that the Moodle (Open Source Learning Platform) training model covered. Moodle is advantageous due to its open-source availability, adaptable customization, and a flourishing community for assistance. Nonetheless, it could present possible drawbacks such as a more challenging learning process for novices, occasional upkeep difficulties, and constraints in scalability for exceedingly large establishments. Medical students used actual resources. Students have a forum to debate topics and exchange ideas. Before the experiment began, the instructor described Moodle concerns to the first experimental group. The instructor provided guidance on applying the Moodle by directing the learners on how to access materials online and seeking customized training sessions by contacting the instructor online. The online group was tasked with completing various general English activities and exercises online to ensure their capability to effectively utilize the Moodle model during the training program [67].

F. Training Students on Blended Learning

The instructor taught the second experimental group (BL group) for English skills using flex blended learning. The flex blended learning approach offers students personalized learning experiences through a combination of online and in-person instruction, but successful implementation requires addressing challenges such as technology issues, teacher training, and potential social isolation. The instructor spent forty-five minutes at each educational session working with the blended learning group on various aspects of the English language. The instructor met with each student one-on-one to discuss and clarify the concerns. The students carried out the activities and assignments assigned to them online. If they had questions or needed assistance, the instructor was there to assist them online. The class was held in a smart classroom, in which all of the students and the instructor could communicate with one another and the instructor via their own laptops. The instructional curriculum was supervised and executed by the same instructor who collaborated with each of the distinct groups.

The posttest of general English competence was given to each and every student as the last step of the training program. The pretest and posttest utilized in the study were standard Longman assessments designed to evaluate an individual's level of proficiency in the English language. This prevented students from recalling the pretest material. As per test norms, the pretest and posttest were equally challenging. To ensure uniformity, the pretest and posttest were administered in class.

Throughout the training session, students were subjected to a formative assessment to evaluate their progress while pinpointing any areas of concern. The fundamental concept of formative assessment involves monitoring student learning and providing continuous feedback to improve pedagogical strategies and learning outcomes. To be more specific, formative assessment enables students to gain insight into their strengths and weaknesses, allowing them to concentrate on areas that need improvement. Additionally, instructors are able to discover areas in which students are having difficulty and promptly address these issues. Because the questions on the pretest and posttest consisted of multiple-choice scenarios, the evaluation was conducted objectively using the response sheet. The scores on both the pretest and the posttest were between 0 and 100 on a scale from 0 to 100.

In our investigation, researcher executed necessary procedures for gathering data to ensure the credibility of our discoveries. Researchers strictly abided by standardized guidelines, resulting in a significant reduction in variation, thereby guaranteeing consistent data collection across diverse settings and conditions. The data collectors underwent comprehensive training, which reinforced their adherence to these guidelines in a consistent manner. Additionally, the study meticulously calibrated measuring instruments, a crucial step in attaining accuracy and dependability in the data we amassed. These coordinated endeavours collectively enhanced the dependability and integrity of the outcomes of our investigation, emphasizing our dedication to research standards of the highest calibre.

IV. Results

The participants were given a preliminary test of their English language skills to determine whether they comprised a cohesive and uniform group. The results of the TOEFL tests taken by the participants are shown in Table 1.

Table 1. The results of the TOEFL proficiency assessments

	BL Group	**OL Group**	**CLT Group**
Mean	30.67	32.83	31.63
SD	1.36	0.86	1.35

The tabulated information presumably incorporates pre-test and post-test results for language proficiency within each learning cohort. Furthermore, it conceivably encompasses statistical metrics such as averages, standard deviations, and p-values to exhibit the salience of the noted disparities.

In the examination of pretest scores for three distinct cohorts, the Shapiro-Wilk normality test was executed. The outcomes for the initial experimental group, encompassing 30 participants, revealed a W statistic of 0.107, alongside a *p*-value of 0.19, thereby indicating that the data adhered to a normal distribution. The subsequent experimental group's examination yielded a W statistic of 0.89 and a *p*-value of 0.31, thereby similarly signifying normal distribution. Likewise, the results of the control group demonstrated a W statistic of 0.97 with a p-value of 0.21, which is in line with a normal distribution. These findings imply that the pretest

scores for all three groups demonstrate conformity to a normal distribution.

Furthermore, in the preliminary assessment, the performance of the BL and control groups was lower than that of the OL groups. Unrelated samples were subjected to one-way ANOVA (Analysis of Variance). The obtained test statistic F (2, 57) = 0.804, with a corresponding *p*-value of 0.451, revealed that the influence of group is not statistically meaningful. Thus, the null hypothesis of no significant differences between the groups cannot be rejected at the chosen level of significance. This shows that the English language skills of the three groups did not vary at the start of the program (Table 2). Therefore, it was believed that the three groups began the program with equivalent levels of English language proficiency. All 90 students' pre- and posttest results were statistically analyzed for the correlation, which was r = 0.382 (p = 0.001). Repeated Measures One-Way Analysis of Variance (RM-ANOVA) was carried out due to the high correlation, in order to establish the statistical significance of the discrepancies of scores after intervention among three groups, following participant matching based on their pretest scores due to high correlation. The statistical analysis, specifically the RM-ANOVA revealed a notable primary impact of the group, as evidenced by the results of F (2, 57) =3.471, p = 0.045, η^2_p = .199.

Table 2. The assessment of general English proficiency determined by analyzing performance in the pretest, the posttest, and the difference between the two assessments

	BL Group			OL Group			CLT Group		
	Pretest	Posttest	Gain	Pretest	Posttest	Gain	Pretest	Posttest	Gain
Mean	30.67	39.83	9.17	32.83	34.20	1.37	31.63	32.37	0.73
SD	1.36	1.25	0.11	0.86	1.32	0.46	1.35	1.45	0.10

The outcomes of the posttest administered to the control group exhibited similarity to the scores they obtained before the intervention. The control group scores after the intervention displayed a rise of 0.73 points, whereas the online group's post-intervention score exhibited an increase of 1.73 points. The group that participated in blended learning achieved a score of 30.67, representing a 9.17 improvement in comparison to the pretest level. The RM-ANOVA outcomes indicated that the group's influence on the posttest results was statistically notable, as evidenced by the values of F (2, 57) =20.474, p = 0.001, η^2_p = 0.414. Additionally, the connection between the groups (experimental and control groups) and tests (pretest and posttest) was significant, with F (2, 57) =10.894, p = 0.001, η^2_p = 0.338 (refer to Fig. 1). All the groups with different learning models showed variance of score pre and post intervention. Medical students learnt English skill better through BL model than OL and CLT.

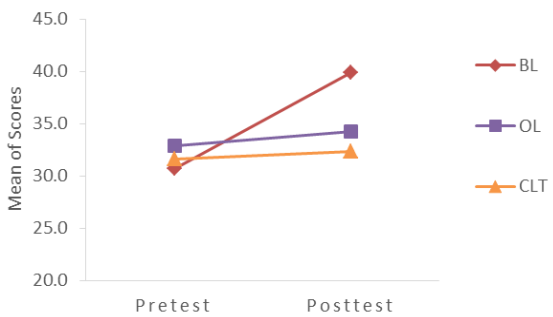

Fig. 1. The connection between the groups (experimental and control groups) and tests (pre-test and post-test).

V. Discussions

As per the study's findings, it can be inferred that both blended learning (mixed-mode instruction) and online learning (web-based instruction) have a constructive impact on the English language proficiency of students. In terms of general English skills taught over a similar duration, blended learning outperforms online instruction in both quality and quantity. This study's findings align with the outcomes of other recent studies on BL and LMS [68–71]. These studies have noted the beneficial impacts of online and blended learning on students' academic advancement in comprehending diverse issues.

Educational tools can make learners active participants in blended learning [33, 72]. Multimedia, such as network-integrated learning, allows language practice and repetition. English as a second language is based on a regular curriculum of teaching, the student cannot click on words and repeat them numerous times using software to acquire the right pronunciation [73]. Blended learning is superior to conventional ways of teaching English language skills because it stresses multiple skills such as positive interdependence, personal responsibility, group processing, social skills, and interaction [33]. The realm of higher education is presently exploring strategies to integrate next-generation educational technology into its instructional processes while remaining economically efficient [74]. With the proliferation of technology in educational settings, it is now considered a critical infrastructure component, comparable to lighting and heating, and a fundamental operational cost [74].

Blended learning benefits include flexibility, freedom from time constraints, educational efficacy, and cost-efficiency [26, 75]. Blended learning is perfect for increasing student autonomy and self-direction, which are common issues in education [76]. Blended learning promotes lifelong learning and student autonomy [76, 77]. In the classroom, the instructors need to give considerable thought to the pedagogical consequences and come up with innovative strategies for teaching.

The present study placed significant importance on interplay in the process of acquiring knowledge, various constituents involved in the learning procedure, and the milieu in which learning takes place. In earlier research, the focus was placed on the interplay between educational elements, with each individual element being analyzed independently. There are several educational contexts in which using online learning technologies to teach might be

challenging since providing students appropriate and correct feedback can be difficult. Learning done online has shown, on a number of occasions, incapacity to deliver an accurate and automated diagnosis of a number of educational issues [78–82].

VI. Conclusion

This research aimed to evaluate the impact that online learning (web-based instruction) and blended learning (mixed-mode instruction) have on the development of English language skills among medical students. The findings indicated that students' general English skills improved significantly due to their participation in blended learning. In addition, the findings demonstrated that blended learning is superior to online learning in enhancing medical students' general English skills. In educational contexts where instructors are constrained by curricular time limitations, it is recommended that priority be given to blended learning approaches and the practice of English language skills. This is a judicious educational choice that can help to maximize the use of available resources and ensure that learners receive high-quality instruction. Instructors can leverage blended learning to create a more engaging and interactive learning environment that enables students to develop their language skills more effectively. However, it is imperative to note that the ineffectiveness of online learning in comparison to blended learning in enhancing English language proficiency does not necessarily imply that it should be completely disregarded. The findings indicated that effective management of learning contributed to the growth of students' skills of English language. In addition, many instructors have not been provided with training on how to effectively integrate technology into their teaching practices, which means that they cannot make the most of the opportunities presented by online learning.

The current research has pedagogical implications that might be used to medical students in medical institutions (at least in India) to educate the future generation of medical students better. The findings might have repercussions for those responsible for designing educational curricula, creating educational programs for aspiring medical students, developing educational materials for educators, and for anyone else engaged in the education of medical professionals. It has been proposed that research be conducted on the efficacy of blended learning and online learning in the classroom instruction of other disciplines. Given that the students who participated in this study were medical students, it is possible that the research may be expanded to examine the same concerns in other types of students.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Dr. Sohaib supervised the whole research development and took the lead in writing the manuscript. Dr. Sohaib and Mr. Mohammad Usama developed the theoretical formalism and wrote the manuscript with support from Dr. Ansa Hameed, Ms. Sana Iliyas, and Dr. Farhan. All authors provided critical feedback and helped shape the research, analysis, and manuscript.

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