

The teaching of Medical English in the context influenced by Industry 4.0

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Abstract

In the last few years, the term such as ‘Industry 4.0’ has gained considerable momentum, and these are clearly worth paying attention to. The global economic and technology development currently is very rapid. One of the developments is the Revolution Industry 4.0. Each individual is required to be proficient in communication. In this case, the role of English competency is required. The article introduces a framework proposing an anticipatory method for instructing the English language to medical students. This framework is shaped by the recognition of the need to prepare medical students for the demands of Industry 4.0. In light of the rapidly evolving landscape of language education and its objectives, the teacher's judicious selection of appropriate instructional approaches becomes crucial. The paper provides both theoretical insights and practical recommendations for mastering English for Specific Purposes, aiming to enhance and refine students' skills and perspectives in alignment with the challenges posed by Industry 4.0.

Key words: English for Specific Purposes; Education 4.0; communication; language education, industry 4.0

DOI: 10.7176/JLLL/102-05

Publication date: May30th 2024

1. Introduction

Education 4.0 is characterized by the integration of technology into educational practices, aiming to equip graduates with the skills needed in a digitally-driven industry. This research investigates the impact of Education 4.0 on English language teaching, strategies to enhance English teachers' professionalism during the fourth industrial revolution, and innovative classroom approaches for Education 4.0. Employing a combination of the quantitative and qualitative research designs, the study relies on a survey-based approach with closed and open-ended questions for data collection. The findings suggest that the 4.0 industrial revolution can have both positive and negative effects on English language instruction. Positive impacts encompass increased flexibility in learning time and location, heightened student confidence and motivation, promotion of student independence, enhanced creativity, meaningful learning experiences, preparation of graduates for future endeavors, and opportunities for teachers to integrate technology into the learning process. On the downside, challenges include difficulties for unprepared teachers, reduced teacher-student interaction, high internet access demands, declining writing skills, and lack of focus. To strengthen professionalism, teachers should stay connected to developments, foster collaboration with students, enhance their own quality and competencies, and actively engage in professional development opportunities.

2. Literature review

2.1. Industry 4.0

Industry 4.0 denotes the evolutionary phase in the administration of manufacturing and chain production (Schwab, K. 2016). Alternatively, the fourth industrial revolution, or Industry 4.0, involves the incorporation of advanced machines, sophisticated tools, and advanced software, along with networked sensors, for planning, prediction, adjustment, and control of societal outcomes and business models. This integration marks a new stage in value chain organization, enabling comprehensive management throughout the entire product lifecycle (Mrugalska & Magdalena, 2017). Embracing Industry 4.0 is a strategic advantage for maintaining competitiveness across industries, fostering dynamic production flows, and achieving autonomous control for optimal value chain optimization.

Technology plays a pivotal role in driving both social and linguistic transformations. Graddol (1997) asserts that "technology is at the core of the globalization process, impacting education, work, and culture." Education 4.0 shapes the teaching and learning of English by leveraging the Internet and technology as primary learning sources and mediums (Puncreobutr, 2016). In the context of Education 4.0, educators are focused on cultivating students' skills and capabilities, with an emphasis on learner-centered approaches that encourage active student participation and enhance critical thinking in relation to the learning materials. Teachers utilize various platforms, such as Moodle, Quizlet, Bahasa, Canvas, Duolingo, and others (Rahimi & Yadollahi, 2011), to assign tasks and deliver content to students during the teaching process.

2.2. English language teaching

English teaching involves addressing the needs, experiences, and emotions of individuals, be they children, adolescents, or adults, and whether English is their first, second, foreign, or additional language (Brown, 2001). Essential for every teacher is the proficiency in teaching, which includes the capacity to engage students with diverse personalities, abilities, and aspirations. A crucial aspect of this proficiency is the teacher's capability to cater to the varied desires and requirements of their students.

It is pointed out that teaching is a dynamic interaction where the teacher imparts knowledge to the students, and the students, in turn, respond to this imparted knowledge. Reflecting on this definition, teaching emerges as an active and reciprocal process between educators and learners.

According to Nasution (2009), education serves as an effort to organize and regulate the learning environment. This definition implies that education functions to connect children with a structured learning setting. Johnson (2007) asserts that the teaching process should engage students in the search for meaning and enable them to comprehend the significance of the lessons they are being taught. From this perspective, teaching involves actively involving students in learning activities, facilitating their understanding of the presented material, and fostering the purpose of the learning experience.

English language instruction has evolved into a distinct professional and academic discipline over the past fifty years. A multitude of research endeavors focusing on teacher education and training have aimed to enhance the knowledge and skills of English, as well as foreign language, educators, enabling them to conduct impactful lessons in the classroom. In the rapidly globalized world of the second millennium, the importance of teaching English as a universal means of communication has grown even more pronounced compared to the significance it held half a century ago.

2.3. Industry 4.0 and English for specific purposes

In the context of teaching English for Specific Purposes (ESP) aligned with the demands of Industry 4.0, placing a strong focus on soft skills appears to be the most appropriate strategy. Given the evolving landscape of the new industrial revolution, English teachers must reassess their roles. The conventional role of being mere providers of information is outdated, given the easy accessibility of information in today's digital age. Teaching English grammar, technical vocabulary, and employing discrete point exercises in language classes have become obsolete due to the prevalence of extensive glossaries, online grammar explanations, and translation tools readily available to everyone. The traditional 'handout-based' teaching approach loses its relevance when abundant online resources of diverse types are accessible. The previous emphasis on traditional language skills and related subskills is now seen as a starting point, serving as a means to a higher objective.

Engaging in specific activities aimed at cultivating professional communicative competence can serve multiple objectives. These activities provide students with opportunities to develop critical thinking skills, express and defend opinions, engage in negotiations, think creatively, establish independent work routines, collaborate effectively, work in groups, reach consensus, enhance versatile capacities, and reduce resistance to change. Additionally, students can gain proficiency in information transfer, public speaking, and presenting professional information. These skills and competencies are increasingly crucial for future employees to thrive in a world increasingly influenced by the principles of Industry 4.0.

Numerous authors, including Chamorro-Premuzic (2010), recognize the importance of incorporating non-academic attributes, often referred to as generic or soft skills, in higher education. These skills encompass the ability to cooperate, communicate effectively, and solve problems. Unlike academic knowledge, which is subject-specific and formally assessed, soft skills are seen as a set of competencies that are independent of formal curricula, though they are often developed within such frameworks and are rarely explicitly assessed.

3. The study design and participation

The study adopted a survey-based methodology to investigate the multifaceted landscape of English language education in the realm of medical training, particularly in light of the impact of the Fourth Industrial Revolution. Employing a designed questionnaire comprising six thoughtfully crafted questions incorporating both closed and open-ended formats, the research aimed to capture students' perspectives, particularly as end-users, regarding the optimal approach for the English language courses to be conducted to better prepare them for real-life medical professional situations in the Industry 4.0. The questionnaire was structured to comprehensively explore both the positive and negative effects of the Fourth Industrial Revolution on medical English instruction.

The survey enlisted the active involvement of 102 undergraduate students enrolled in the Faculty of Medicine, University of Medicine and Pharmacy Ho at Chi Minh City. These participants were selected purposefully to represent a diverse cross-section of future medical professionals, each offering unique perspectives and experiences concerning English language education within the medical curriculum.

Participation in the survey was entirely voluntary, with students providing their responses anonymously to ensure confidentiality and foster candid feedback. Through their engagement in this research endeavor, the participants assumed a pivotal role in contributing invaluable insights that will inform the development of more effective English language training programs tailored to the evolving needs of aspiring medical professionals amidst the transformative forces of the Fourth Industrial Revolution.

4. Findings

The participants were purposefully selected to provide a diverse representation of future medical professionals, each offering unique perspectives and experiences regarding English language education within the medical curriculum in the Industry 4.0.

Both kinds of the first question aimed to assess students' awareness of the importance of the English language in the training of future doctors. For the open-ended first question *“How important are English language skills for your future career in medicine, especially with the changes brought by the Industry 4.0?”*, participants expressed a complete agreement regarding the critical importance of English language skills for their future careers in medicine, particularly in light of the transformative changes ushered in by Industry 4.0. They emphasized that proficiency in English is essential for effective communication, collaboration, and accessing the latest advancements and research in the medical field. And the results of the close-ended question also revealed that 100 students, constituting 98% of the respondents, affirmed that they consider English to be of paramount significance.

Question 1	1 Not important	2 Slightly important	3 Moderately important	4 Important	5 Very important
How important are English language skills for your future career in medicine, especially with the changes brought by the Industry 4.0?	0	0	1	1	98

Table 1. The percentage of the importance of the English language skills

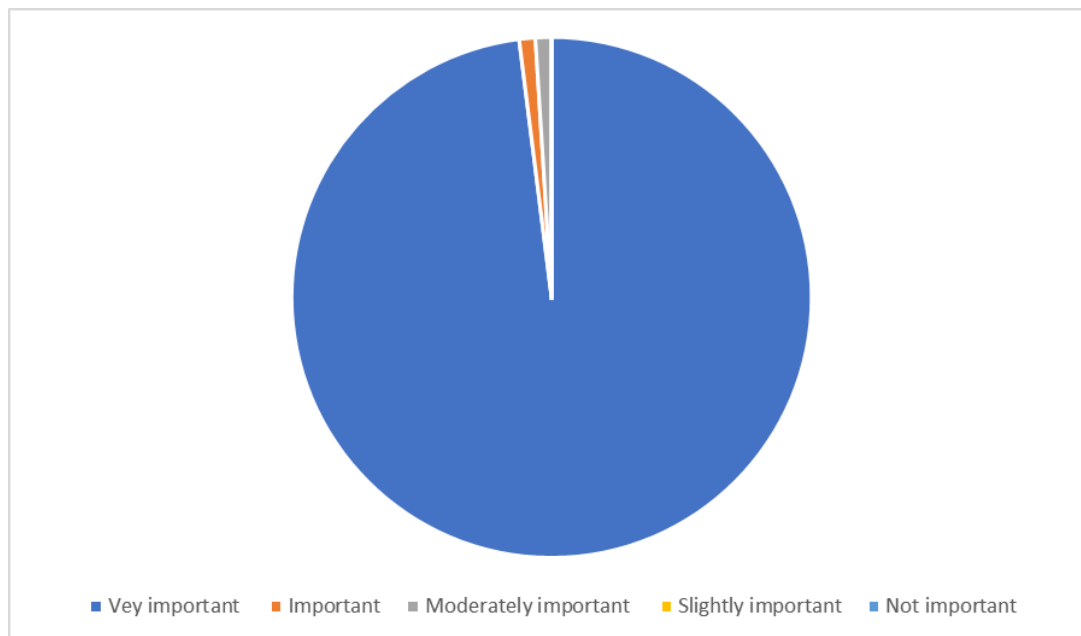


Chart 1. The percentage of the importance of the English language skills

The second question was structured to allow students to provide multiple responses, seeking to uncover the extent of their awareness regarding individual language learning priorities. Regarding the second question in the interview “*What are the most important things to learn in English to succeed in the medical field in the Industry 4.0?*”, respondents identified several key areas within English language learning considered crucial for success in the medical field amidst Industry 4.0. These included mastering medical terminology, developing effective communication skills with patients and colleagues, improving research and presentation abilities, and adapting to digital communication platforms and electronic medical records. Additionally, the question aimed to assist the instructor in formulating learning objectives for English classes that accommodate a diverse range of learning styles. A substantial majority of students (85%) emphasized the significance of speaking skills, emerging as the most frequently selected response. Following this, language functions were identified by 45% of participants, writing by 39%, vocabulary by 49%, reading by 79%, grammar by 35%, pronunciation by 60%, and listening by 36%.

Question 2	
What are the most important things to learn in English to succeed in the medical field in the Industry 4.0?	
Speaking skills	85
Language functions	45
Writing	39
Vocabulary	49
Reading	79
Grammar	35
Pronunciation	60
Listening	36

Table 2. The percentage of the most important things to learn in English

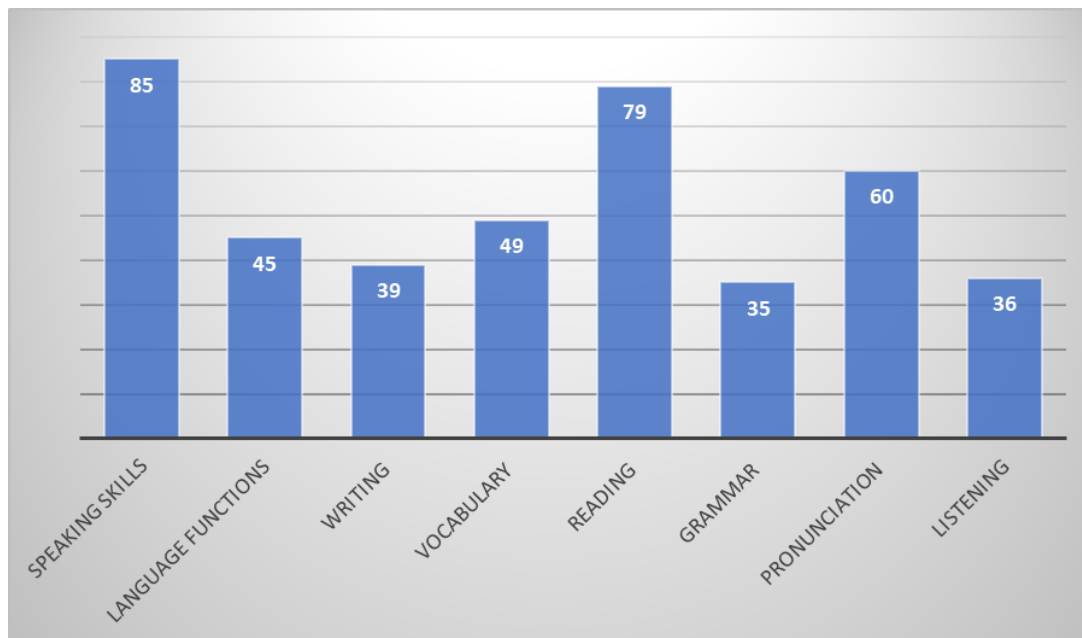


Chart 2. The percentage of the most important things to learn in English

Regarding question 3 “In what ways can having good English skills help future doctors grow in their careers during this technological age?”, participants highlighted various ways in which strong English language skills can contribute to the professional growth of future doctors in the technological age of Industry 4.0. They cited enhanced global networking opportunities, access to international research and collaboration, improved patient care through clear communication, and increased employability in multinational healthcare settings. These suggested contributions of having good English skills to the medical students’ future career are relevant to the results of the close-ended third question. The majority of responses underscored the importance of the English language in terms of communication, medical materials’ reference, on-going professional development and a sense of competence and confidence. 93% emphasized the indispensability of knowing a foreign language for doctors today, citing the need for English in communication with colleagues, experts, and patients. Additionally, 87% highlighted the prevalence of English in documentation for diagnosis, treatment, prevention as well as emphasizing its relevance in the international medical environment connected to hospitals. 84% pay attention to potential contribution to professional advancement and 78% focus on a sense of competence and confidence.

Question 3	
In what ways can having good English skills help future doctors grow in their careers during this technological age?	
Communication with colleagues, experts, and patients	93
Documentation for diagnosis, treatment, prevention	87
Professional advancement	84
Sense of competence and confidence	78

Table 3. The percentage of the contribution of good English skills to development of doctor career

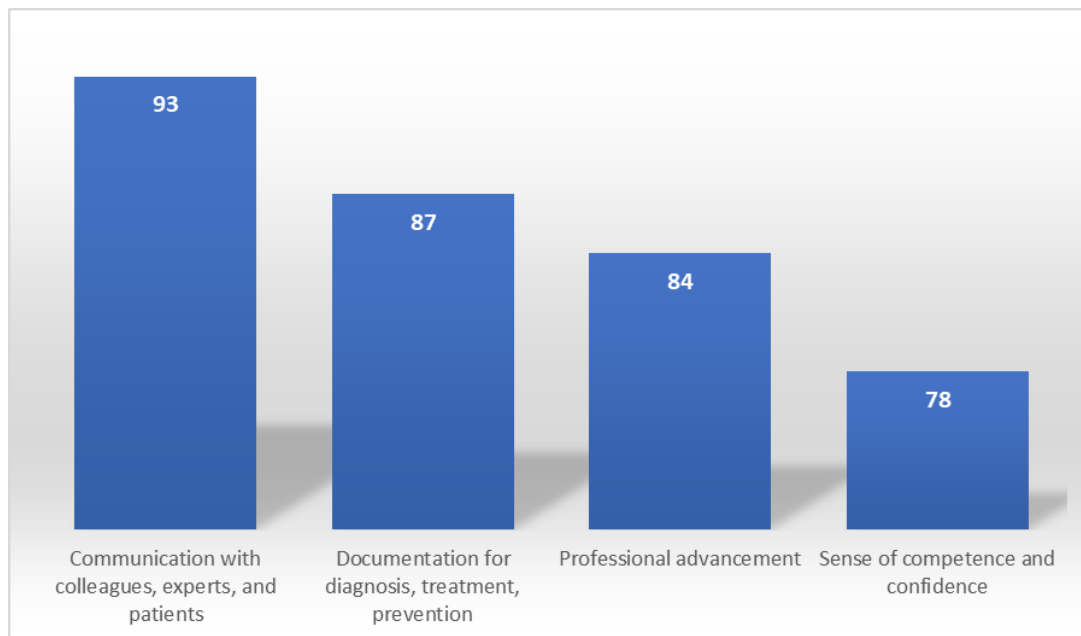


Chart 3. The percentage of the contribution of good English skills to development of doctor career

Both kinds of question 4 aimed to find out the elements that future doctors consider. The fourth open-ended question “What should be included in English language training for medical students to help them adapt to the challenges and opportunities of the Fourth Industrial Revolution?” suggested English language training tailored to medical students in the era of the Fourth Industrial Revolution encompass a multifaceted approach. This includes incorporating interactive multimedia resources, virtual patient simulations, real-time language practice through telemedicine platforms, and specialized modules focusing on digital literacy and communication etiquette in online healthcare environments. Most future doctors (91%) express a keen interest in specific medical terminology (91) , as well as developing strong language skills. However, 97% of participants’ primary focus lies in the practical application of technology in the clinical setting. In other words, the application of technology to English in real-world medical scenarios appears to be a key area of interest for aspiring medical professionals.

Question 4	
What should be included in English language training for medical students to help them adapt to the challenges and opportunities of the Fourth Industrial Revolution?	
Specific medical terminology	91
Strong language skills	91
Practical application of technology in clinical settings	97

Table 4. The percentage of English language training for medical students

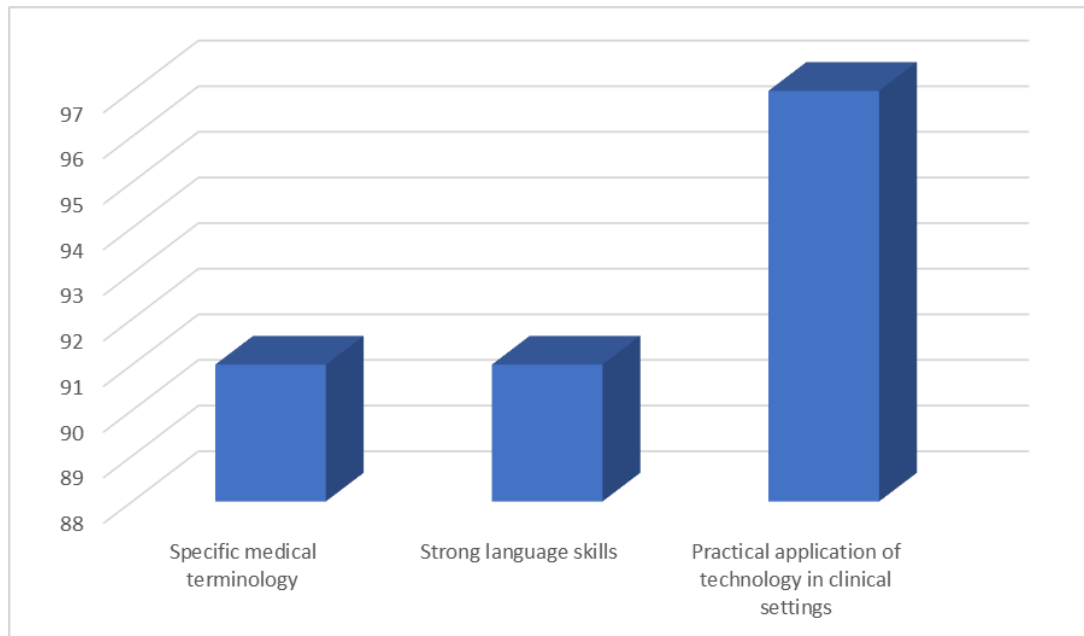


Chart 4. The percentage of English language training for medical students

In the interview for question 5 “How do you feel about learning medical terminology in English without the application of technology advancements today?”, views on learning medical terminology in English amidst technological advancements were mixed. While some participants acknowledged the importance of proficiency in English for accessing global medical literature and collaborating with international peers, others expressed concerns about the potential challenges of memorizing complex terminology in a second language, particularly in an increasingly digitalized medical landscape. In the same close-ended question, 81% future doctors commonly express boredom and dissatisfaction with the memorization of complex medical terminology and medical documentation. The formal and technical nature of these aspects, coupled with the great volume of reading required, tends to contribute to a sense of monotony and disinterest among medical professionals. 66% find formal and technical nature uninteresting. 54% find great volume of reading tiring.

Question 5	
How do you feel about learning medical terminology in English without the application of technology advancements today?	
Bored and Dissatisfied	81
Uninteresting Formal and Technical Nature	66
Tiring Great Volume of Reading	54

Table 5. The percentage of feelings about learning medical terminology in English without the application of technology advancements

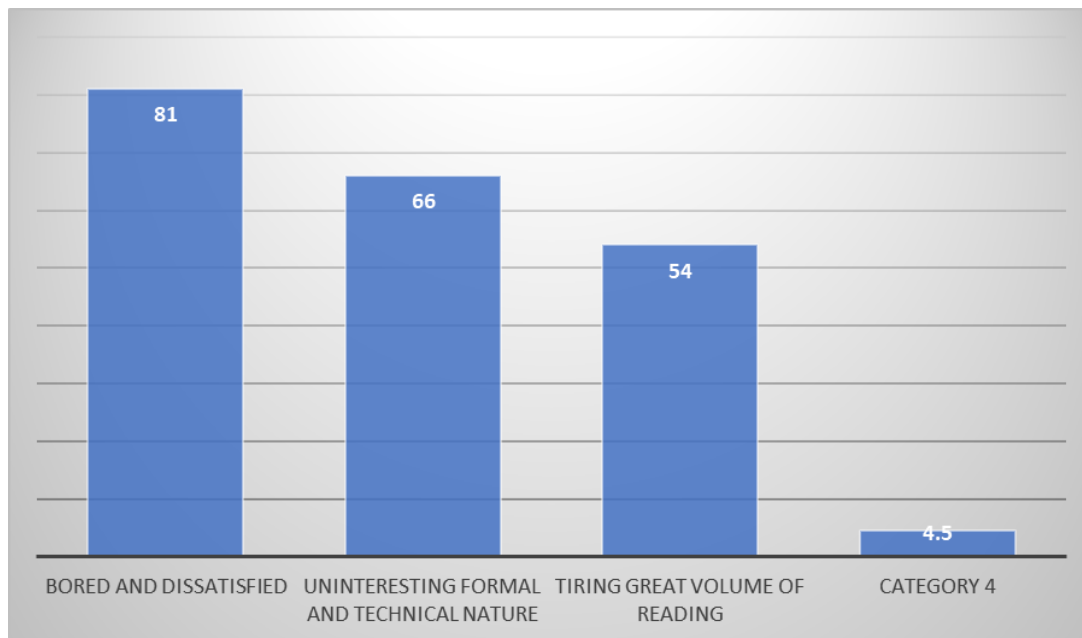


Chart 5. The percentage of feelings about learning medical terminology in English without the application of technology advancements

The final question, serving a similar purpose, received responses that reiterated the endorsed approach. For the interview “How could technology be used to improve English language teaching for medical students in the Industry 4.0? Please share your ideas on how technology could be beneficial in language instruction for medical professionals.”, ideas for leveraging technology to enhance English language teaching for medical students in the Industry 4.0 context were diverse and innovative. Suggestions included the development of interactive language learning apps tailored to medical terminology, virtual reality simulations for immersive language practice, AI-powered language tutors providing personalized feedback, and online collaboration platforms facilitating real-time communication and peer learning among medical students worldwide. Overall, participants emphasized the need for technology-enhanced language instruction to be interactive, engaging, and relevant to the specific needs and challenges of medical professionals in the digital age. These results are the same as those collected from the close-ended question. Among the 102 students surveyed, none advocated for the traditional method of teaching English. All respondents (100%) believe that the optimal approach for medical students is one that prioritizes the cultivation of personal and interpersonal skills. Additionally, a significant majority (87%) express agreement on the relevance of integrating technology in the classroom. More than half of the students (70%) emphasize the importance of teaching medical vocabulary, while a smaller portion (43%) deems a focus on grammatical accuracy as the appropriate approach.

Question 6	
How could technology be used to improve English language teaching for medical students in the Industry 4.0? Please share your ideas on how technology could be beneficial in language instruction for medical professionals.	
Improvement of personal and interpersonal skills	100
Relevance of integrating technology in the classroom	87
Teaching medical vocabulary	70
Focus on grammatical accuracy	43

Table 6. The percentage of application of technology to improve medical English teaching

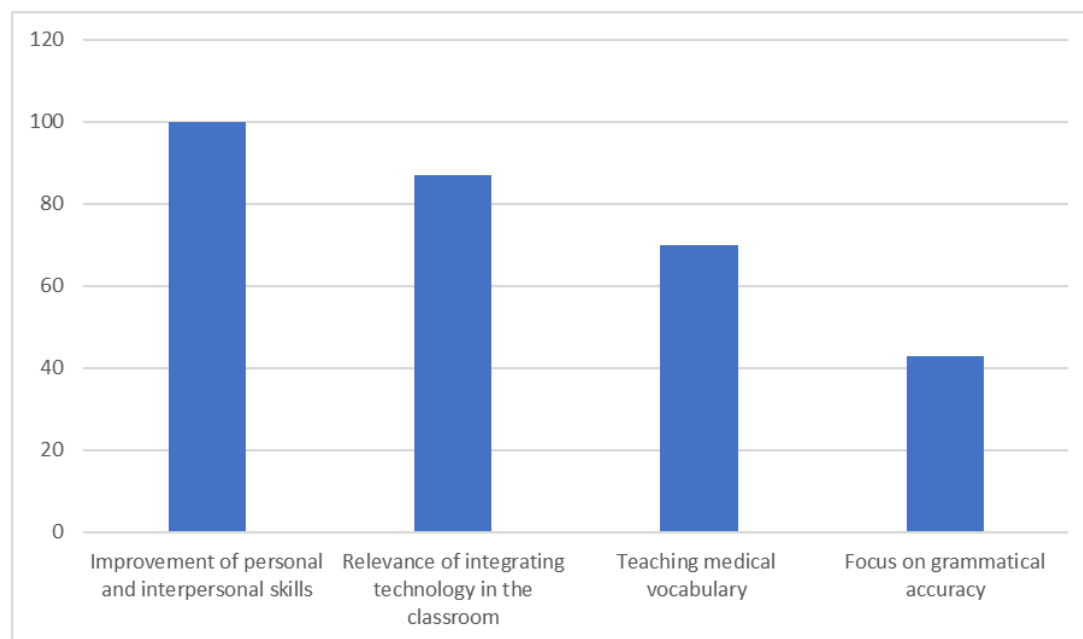


Chart 6. The percentage of application of technology to improve medical English teaching

5. Discussion

Fisk (2017) elucidates that the contemporary approach to education is strongly focused on elevating digital technology competencies at every educational level, with the goal of enhancing the integration of technology in teaching and fostering active learning.

Anealka & Hussin (2018) underscored /emphasized the importance of educators acquiring new digital skills and preparing themselves with digital tools to meet the evolving needs of future learners.

5.1. Strategies to improve medical literacy in college English teaching

The growing popularity of English usage has led to an increased demand for teachers to educate students in the language. While some teachers incorporate cutting-edge technology, the majority still adhere to traditional methods (Madhavaiah, Nagaraju & Peter, 2013). However, these traditional approaches have proven effective thus far. Yet, there are ample opportunities for students, particularly ESL learners aiming for more than just recreational language acquisition, to build confidence and expand their abilities. To keep up with English Language Teaching (ELT) advancements and boost confidence, students, especially ESL learners, must embrace multimedia technology. Introducing technology into English language classrooms has been recognized as a necessary step for enhancing teaching methods in schools. This adoption is rooted in pedagogical considerations (Rhema, 2010), with researchers emphasizing the pivotal role of teachers in successfully integrating technology into the English language classroom (Rhema & Miliszewska, 2010).

5.2. Changes in teaching concept

Teachers of English in medical colleges should elevate their understanding of medical literacy education, fostering and guiding medical students toward a robust foundation in humanistic care. It is imperative for medical students to not only excel in English grammar but also enhance their proficiency in medical literacy. Consequently, a shift in teaching approaches by English instructors is necessary, fostering improved critical thinking and language instruction. Within the context of medical literacy education, English teachers should possess not only proficient English skills but also a wealth of expertise in teaching medical literacy. A high level of moral cultivation is essential for English teachers, as it plays a vital role in reinforcing students' medical literacy and humanistic care. Establishing a harmonious teacher-student relationship in medical education sets an exemplary model for a humanistic spirit in teaching activities. By unlocking students' potential, educators enable the full expression of their innovative spirit and initiative, ultimately transforming their humanistic perspectives.

5.3. Training high quality teachers

Teachers serve as leaders and coordinators in the realm of educational activities. Consequently, medical English educators possessing a strong foundation in medical literacy play a pivotal role in ensuring effective English instruction and enhancing students' medical literacy. Continuous efforts should be made by medical colleges and universities to attract and integrate high-quality teaching professionals, thereby augmenting the overall teaching staff. Additionally, strategic planning for teachers' practical experiences is essential. Engaging foreign teachers for clinical guidance allows English instructors to adeptly apply medical English, thereby advancing their own medical literacy. Subsequently, these educators can seamlessly incorporate medical literacy into English teaching, fostering the proactive development of medical students' literacy. Through this process, there is a more rapid enhancement of teachers' professional competence.

5.4. Medical English teachers' application of digital tools

Numerous digital tools are readily accessible online for educators to explore and utilize. Technology and Mobile Learning (2016) recommend that teachers familiarize themselves with nine key digital tools. These include the ability to record and edit audio clips, generate annotated, interactive, and captivating video content, leverage social networking websites, employ blogs and wikis to establish collaborative spaces for students, utilize social bookmarking websites to share resources in the classroom, develop engaging presentations, craft digital portfolios, and design unconventional quizzes. Proficiency in these digital tools demonstrates how technology can be effectively integrated into the teaching and learning process, allowing educators to enhance their skills in alignment with the top 10 abilities identified for 2020.

Various studies explore the correlation between the 4th industrial revolution and education. Bernard Marr (2020) suggests a set of measures for schools to align with contemporary technological advancements. These include redefining the purpose of education, enhancing STEM education, fostering human potential, adopting lifelong learning models, revising education training, transforming schools into makerspaces, promoting international mindfulness, and making changes in higher education. Similarly, Brian E. Penprase (2018) emphasizes that the 4th industrial revolution will bring about profound changes in education, emphasizing the need for creative individuals who excel in collaborative work, interconnectivity, interdisciplinary approaches, and deep intercultural understanding. The evolving approach to education also highlights the importance of self-directed learning, ethical thinking, intercultural awareness, critical thinking, and empowering students to fulfill their potential, aligning with the demands of Industry 4.0. These emerging requirements necessitate significant curricular changes in schools to produce well-informed and well-trained specialists who can effectively apply their knowledge in the rapidly expanding technological world.

This study explores the potential of technology to enhance English language teaching for medical students in the Industry 4.0 context. Participants expressed a keen interest in leveraging technology, such as interactive language learning apps, virtual reality simulations, and AI-powered language tutors, to enhance learning experiences and prepare students for the challenges and opportunities presented by the Fourth Industrial Revolution. This recognition of the role of technology in language instruction reflects a forward-thinking approach to education, where innovative tools and methods are embraced to meet the evolving needs of learners in a digital age.

6. Conclusion

The results obtained from the questionnaire provide positive and valuable insights for the author's effort to align English language for medical students with the demands of Education 4.0. The feedback received was predominantly positive, with a few exceptions that offer valuable insights for future endeavors. The students' responses indicate their ability to objectively assess their learning preferences and priorities, and they recognize the advantages of the implemented changes in language learning for both personal and professional development. Therefore, the study can offer valuable insights into the challenges and opportunities faced in providing English language education to future medical professionals in adaptation to the transformative changes brought about by Industry 4.0.

Currently, there is an ongoing modernization of the medical model and ethical principles in the field of medicine, contributing to the continuous improvement of doctors' professional ethics. The study also emphasizes the importance of adapting English language education to meet the evolving needs of future medical professionals in the context of Industry 4.0. By recognizing the critical role of English proficiency, understanding diverse learning priorities, and leveraging technology to enhance learning experiences, educators can effectively prepare students to thrive in the dynamic and interconnected world of modern healthcare. Consequently, educational

institutions need to focus on nurturing the medical literacy of students, with a specific emphasis on computer-aided medical English instruction. In the realm of college English teaching, medical universities should intensify efforts in medical quality education, as it can subtly shape the moral values of medical students.

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