Enhancing English Language Proficiency and Communication Skills Using Digital Tools

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***Abstract*—Proficiency in English is essential in technical fields, where effective communication is critical for collaboration, problem-solving, and career advancement. This research evaluates digital tool effectiveness for improving English capabilities particularly in the areas of technical writing as well as presentations, professional dialogues and technical domain communication. The study explores the impact of writing assistants and interactive Augmented Reality (AR)/Virtual Reality (VR) simulations on technical English skills. Grammarly was used because of its grammar check function and impact on creativity and originality, while AR/VR simulations were utilized for their interactive learning function. There were two experimental approaches with mixed research designs. The first experiment consisted of 50 software engineering students, involving experimental and control groups, one supported with Grammarly in writing. The second experiment consisted of 20 students who attempted their speaking ability using conventional practices and AR/VR support. The qualitative data were collected from standardized grading rubrics (grammar accuracy, syntax, vocabulary, fluency), while the quantitative data came from student questionary and instructor observations. There was a 78% increase in grammatical correctness in Grammarly users, with notable improvements in syntactic quality and vocabulary. AR/VR participants showed a 43.8% improvement in fluency and a 55.7% boost in confidence. Students found the AR/VR approach more engaging due to its interactive nature. The results suggest that digital tools are helpful towards improving technical writing and verbal communication while simultaneously facilitating career readiness. However, more studies need to be conducted in order to assess their impact on writing creativity and originality. This research highlights the strategic importance of digital tools in the academic setting for developing English fluency and communication in technical fields.**

***Keywords*—English proficiency, digital tools, English for specific purposes, technical communication skills, language acquisition, vocabulary development**

I. Introduction

The implementation of digital tools within English language education research for technical fields stands as a main field of study in recent years. Numerous studies demonstrate that digital tools strongly improve technical writing ability and language proficiency in English. This review presents major studies that reveal both historical research patterns in this field while describing open research questions needing attention in the future.

A. Evolution of Digital Tools in English Language Education

Digital technologies used for English language learning have developed substantially throughout the years. Early research focused primarily on multimedia resources and their effectiveness in engaging students with diverse learning styles. According to Chun [1], multimedia resources are really effective in engaging students with diverse learning styles and providing an additional opportunity for memory retention [1]. Studying interactive and immersive learning environments became a next step toward developing language learning methods suitable for technical education.

As digital technologies advanced, new media in digital modes of learning address some deficiencies by interactivities such as virtual labs and role-playing simulations that reproduce the professional context for learning [2]. Educational tools have served as interactive platforms that let students simulate technical communication tasks in professional environments thus uniting theoretical education with professional practice [3].

B. Focus on Learner Autonomy and Personalized Learning in English

The growing focus on learner autonomy, particularly through digital tools, has been an important trend in educational research. Digital resources encourage autonomous learning, enabling learners to practice at their own pace and review difficult concepts as needed [4]. Besides, digital tools are flexible, meaning the instructor can easily adapt the content to the needs of learners with regard to, say, industry-specific terminology or technical writing skills [5].

Online forums and collaborative tools build an atmosphere of contact and peer interaction that will help in improving both languages and interpersonal skills [6]. Real-time feedback mechanisms within the platform ensure the process of constant improvement, which corresponds to the contemporary educational paradigm [7]. Digital tools like grammar checkers (e.g., Grammarly) support the development of technical writing skills by providing real-time feedback and opportunities for practice. The ability to use digital tools provides extra support in acquiring English technical writing skills, especially in respect to the structuring of complicated ideas and using norms related to a particular industry [8].

C. Enhancing English Communication Skills for Professional Contexts

In addition to improving technical language skills, digital tools have been shown to enhance English communication skills that are essential in professional contexts. For example, virtual exchange programs provide learners with opportunities to communicate with native speakers and get experience in cross-cultural communication [9].

The role of digital tools in technical education extends beyond language acquisition into the realm of imparting comprehensive communication skills, vital to professional

life. Academic institutions worldwide, therefore, already embrace a number of these tools for better equipping learners to respond to the emerging needs of a international working class [10]. Virtual simulation as a place to practice technical presentation is used, and exposure to different styles and conventions of communication is done through multimedia contents [11]. These initiatives are particularly relevant as the workforce becomes more globalized, where effective communication across cultures is essential.

D. The Role of Critical Thinking and Self-Regulation

An emerging area of interest is the role of digital tools in fostering critical thinking, self-regulation, and other higher-order cognitive skills that are essential in English language learning. Research indicates that technology-enhanced learning promotes self-regulation by encouraging learners to manage their learning pace, reflect on their progress, and make adjustments as needed [12]. Additionally, technology-enhanced learning also fosters critical thinking, as learners engage in problem-solving activities and decision-making processes in virtual environments [13].

More importantly, cloud-based collaborative writing platforms have gained recognition for their ability to support collaborative learning and mirror the practices found in today's technical workplaces. These platforms not only improve writing skills but also promote collaboration and teamwork, which are critical for success in professional settings [14].

E. Cross-Cultural Competence and Global Collaboration

Cross-cultural competence, one of the most important aspects of technical communication, can be achieved through the use of technology-enabled digital exchange programs and international collaboration projects [15]. These projects are very relevant for the development of a holistic skillset required for working in multi-lingual and multi-cultural work environments [16]. Besides, the presented paper reports on the role of technology, which can seriously improve the English language and communication skills in technical fields due to their great significance for technical writing, oral presentations, and professional communication [17].

A range of digital tools is analyzed with further consideration of its effective use; therefore, practical recommendations on its use are given in both educational and professional directions [18]. Academic institutions worldwide, already embrace a number of these tools for better equipping learners to respond to the emerging needs of a international working class [10]. The intersection between technology and education is increasingly explored in the literature, emphasizing the need for new directions in language acquisition in technical fields [19].

F. Future Directions and Implications

Despite the great advancements realized in the integration of digital tools into the learning curriculum for the English language, many weaknesses remain. Ongoing research is necessary on the persisting impact of the tools on technical communication and the acquisition of skills in the work-place. Future research should include examination into the effectiveness of new technologies, including artificial intelligence and augmented reality, in language learning and technical communication [19]. Moreover, it is necessary to carry out more research to realize the most appropriate frameworks for integrating digital tools into learning programs in a way that caters to the different needs of the learners and different industries [18].

The present article connects theoretical constructs with their applications in practice, showing that the modern era using digital tools has the capability to redefine views about both technical training and career development [20].

This literature supports the idea that digital tools play a critical role in enhancing English language and communication skills, especially in technical fields. These tools provide learners with personalized, interactive, and engaging learning experiences that improve technical writing, critical thinking, and cross-cultural communication [21]. While much progress has been made, future research should focus on evaluating the effectiveness of newer technologies and refining pedagogical strategies to fully integrate digital tools into educational and professional contexts [20].

Integrating digital tools such as Grammarly and VR/AR-based methods in the syllabus has significant career benefits for software engineering students. The resources enhance English language proficiency and technical documentation writing, which are vital for generating professional documentation and effective communication among global teams. Grammarly improves grammar, syntax, and vocabulary, and VR/AR simulations offer practical, real-life scenarios to practice English communication. They also foster critical thinking, autonomous behavior and teamwork, customs much preferred in software engineering. These digital tools even prepare students with what it takes to excel in an international technology-based workforce.

The evolution of digital technologies has influenced both education and professional development, offering unrivaled opportunities for improvement in English language proficiency and for the communication skills, necessary for the technical disciplines [22]. The arrival of digital has affected considerations in the pedagogical purchase on language acquisition within an educational framework. One emphasis has been placed upon aspects of learner autonomy, given the relative ease with which resources can now be accessed [23]. As English solidifies its role as a global lingua franca, incorporation of digital tools digital tools into educational frameworks means that learners will get the resources to fill gaps between both linguistic and technical vocabularies in ensuring the possibility of communication in diversified contexts [24].

While traditional language-learning methods are often insufficient to address the specific demands of technical writing, such as limited focus on technical vocabulary and lack of exposure to practical situations, digital tools help overcome these challenges [25, 26]. Digital tools, especially in the form of various educational applications, virtual simulations, and multimedia, have gradually become indispensable tools to improve linguistic competence. Students using interactive technologies experience adaptive learning which boosts their skills in grammar and vocabulary development and technical writing abilities [27]. The integration of game elements, such as badges and progress tracking, are designed to make learners get actively engaged in educational materials [28]. On the other hand, digital platforms provide considerable technical vocabulary with

contextual realizations, hence supporting linking of theoretical frameworks with practical applications [29]. The incorporation of virtual reality and other interactive methods has proven effective in creating language environments for active communication exercises, as highlighted by Slaouti and Motteram [30].

When we evaluate the findings listed so far, we can argue that there is not enough research on Developing English Language Proficiency and Communication Skills Using Digital Tools. There is a serious gap in the field, especially using new digital technologies, new studies are seen as a necessity, and current and original research results are needed using scientific research systematics.

This study aims to explore the effectiveness of digital tools, particularly Grammarly and VR/AR-assisted methods, in enhancing technical writing and English proficiency. Addressing these gaps is significant because it provides learners with the necessary skills for global communication, cross-cultural competence, and effective participation in the international workforce [15].

II. Materials and Methods

A. Research Model

This study employs a dual-experiment, mixed-methods approach in researching technology's contribution to supporting technical writing and developing English language skills. Additionally, qualitative research method was applied to determine the students' opinions.

B. Section 1: Enhancing English with Grammarly

1) Research design

This study employed a quasi-experimental design to assess Grammarly's impact on technical writing competency. While students were assigned to experimental and control groups, randomization was limited, aligning with quasi-experimental methodology. The independent variable was the use of Grammarly, while the dependent variable was writing proficiency. Since quasi-experiments do not have full control over variables, external influences such as prior writing skills were considered when interpreting results.

2) Participants

Students Participants:

This experiment was conducted with 50 undergraduate software engineering students of the University Metropolitan Tirana. These students were divided into two groups:

- Experimental Group (n = 25): The group in which students were asked to prepare, revise, and enhance the technical writing assignment using Grammarly.

Students of the experimental group used Grammarly while writing and revising their assignments. The instant feedback about grammar, syntax, vocabulary, and clarity was given to them. Students applied Grammarly's suggestions to improve their writing by correcting linguistic and technical errors. Students were requested to read the feedback given by the tool and apply them while writing their document.

- Control Group (n = 25): The group of students who did the same but traditionally, without the help of any digital tool.

On the other hand, the control group students conducted the work manually by their knowledge in English and technical writing. Students within this group did not use Grammarly or any other digital tool to interact with the work. Some of the alternatives used were self-editing or browsing through reference materials available to identify grammar and syntax errors.

The above division enabled a comparative analysis of the impact of Grammarly on technical writing proficiency.

C. Section 2: Enhancing English with AR/VR simulations

1) Research design

The experiment was designed based on a within-subjects design, where all participants experienced both the traditional and the VR/AR-assisted method, which made a direct comparison between the two methods possible.

The within-subjects design's impact on the study's validity has been minimized by using a counterbalanced design. Participants were divided into two groups: one that began with the AR/VR approach and the other that began with the traditional approach. In this manner, the possible influences in learning and consequences in performance with respect to the order of the approaches were also controlled. The participants were given explicit instructions prior to each session to approach each method with an open mind.

2) Participants

This experiment was conducted with 20 undergraduate software engineering students at the University Metropolitan Tirana, all with an intermediate to advanced level of English. To reduce individual performance variation, the same set of students participated in the experiments for both the traditional and the VR/AR-assisted sessions.

D. Data Collection

The final documents received were graded using a standardized rubric by three different instructors who had experience in teaching technical writing. To ensure inter-rater reliability, Cohen's Kappa was applied to measure consistency across graders.

The grading rubric included:

- Grammar Accuracy: Grammatical errors per 100 words.
- Syntax Quality: The nature or clarity of sentence structure, provided on a scale from 1 to 10.
- Vocabulary Appropriateness: The accuracy of the technical vocabulary, provided on a scale from 1 to 10.
- Overall Writing Proficiency: The general writing proficiency and organization provided on a scale from 1 to 10.

The raters also conducted qualitative assessments of coherence, cohesion, and audience awareness since these are fundamental elements of technical writing. Although instructors did not assign numerical scores they evaluated the students' success in organizing their thoughts while linking their arguments along with their ability to address their writing to the target audience.

Instructors received formal training to ensure uniform grading standards and mitigate biases based on individual instructional backgrounds. The data collection tools and environments used in the study were evaluated for validity and reliability by consulting field experts with at least a doctorate degree in three (3) English language teaching and three (3) instructive technology fields. The experts confirmed

that the measurement tools and environments were adequately created. To further validate the rubric's reliability, a pilot test was conducted before the main study. Permissions were obtained from the necessary authorities for the tools used in the research.

1) Procedure

As evaluators, three professors of English participated and scored the students for grammar, fluency, vocabulary, and contextual understanding for both methods.

To ensure consistency, participants received standardized training in the use of devices with the VR/AR tools before the experiment was conducted. Training involved the functions of the device, interaction methods, and troubleshooting methods for minimizing variability due to inexperience with technology.

Effective use of AR/VR tools needs appropriate hardware (VR headsets, AR devices), immersive language learning software, and a controlled environment for effective participation of the participants. These aspects have been clarified in this study so that participants were provided with required hardware, including Oculus Quest 2 for VR and AR devices for AR overlays to facilitate improved simulations. A controlled environment was also provided with fewer outside distractions for optimal engagement of the students.

2) Traditional method

- The students attended a Q&A session conducted by the professors.
- Each student answered general questions regarding professional or personal background or some professional scenarios hypothetically, such as "Describe your ideal job".
- No interactive elements or follow-up prompts were given.
- The time of the session was 15 minutes per student with the purpose to practice the English language and spontaneous speaking.

The performance of Grammarly as a digital tool in developing technical writing skills is analyzed in the first experiment. The second experiment compares traditional language learning methods with VR/AR-assisted approaches to assess their effectiveness in developing English language proficiency and speaking confidence. Each experiment was conducted once with students who had already passed the university's language defense exam, ensuring they had a minimum level of English proficiency.

- Preparation Time: Both groups were given two hours to complete the writing task. This timeframe provided enough opportunity for students to prepare, write, review and then submit their assignments.
- Writing Task: Students of both groups were requested to write a System Design Document (SDD) for a software system. The description of the system's modules, functional and non-functional requirements, and design specifications were required in the document. The word count was standardized to 500–700 words to ensure a fair and consistent comparison of writing samples.

3) VR/AR-assisted method

- Students used VR headsets and AR overlays to obtain real simulations.
- Scenarios set up to mimic real-life professional and academic situations. Simulation time was set at 30 minutes per student, which consisted of the following activities:

4) Virtual job interviews

- Students answered situational and behavioral questions asked by a virtual interviewer.
- AR feedback overlays in the simulation highlighted grammatical errors, pronunciation corrections, and suggestions to improve vocabulary.

5) Virtual environments for technical presentation

- The participants chose and then presented a technical topic to a virtual audience while receiving AR guided coaching about how to structure the content as well as improvement on presentation skills.

6) Virtual environment for group discussion

- The participants held virtual roundtable discussions where participants defended their viewpoints on technical or ethical topics, for example, "The impact of AI on Society."

7) Professional role-playing scenarios

- Activities like solving a problem in a virtual office environment or a team project created a need to employ spontaneous technical and conversational English.

The study considered for students' prior experience with interactive learning technologies by using a questionnaire that examined both prior experience with AR/VR technology and personal learning preferences. The information was taken into account to determine the influence of these dimensions on students' interaction with the AR/VR approach.

Additionally, cognitive load was assessed with a simple measure of subjective mental effort during tasks so that the impact of cognitive demands on students' performance was controlled.

E. Consideration of Ethical Issue

This research adhered to the ethics of research with human participants. All the students were fully informed about the purpose and activities of the research, and informed consent was obtained from all participants. To ensure data confidentiality, all personal identifiers were removed. The research was conducted under the supervision of the relevant ethics committee at University Metropolitan Tirana, abiding by the ethics.

F. Data Analysis

As students engaged in the VR/AR simulations, English professors observed and scored their performance in real time using a structured rubric. The rubric focused on:

- Grammar and Vocabulary:

Measured accuracy, variety, and appropriateness of language use.

- Fluency:

Assessed the smoothness and coherence of spoken English.

- Contextual Appropriateness:

Evaluated the relevance of responses within simulated scenarios.

- Confidence and Engagement:

Rated students' comfort level and interaction with virtual elements and professors.

The same parameters were considered in the traditional method based on Q&A session, but without real-time feedback or any metrics of engagement.

- Scores for each criterion (1–10 scale) were noted for both methods. Average scores across grammar, fluency, vocabulary, and engagement were calculated and compared.
- Student Feedback: Students underwent surveys about their experience. They rated the easiness, improvement perceived, and engagement. The validity study of the questions posed to the students was conducted by taking the opinions of three academicians with at least a doctorate degree in English education and three academicians with at least a doctorate degree in instructional technology.

Instructor Observations:

- Evaluators documented specific improvements observed in VR/AR sessions, such as reduced hesitation or increased use of complex vocabulary.

Student feedback:

- Students provided reflections on their experience, rating the ease of use, perceived improvement, and engagement. This data was used to analyze how these factors impacted engagement and the effectiveness of the AR/VR method.

III. Results

Within the scope of this research, language proficiency is described as the degree of accuracy and fluency in the use of the English language. On the other hand, communication skills are termed as the capability to communicate technical information effectively in both written and oral forms in workplaces.

While technical writing requires good language skills, communication skills are also required to convey complex ideas at the workplace. Grammarly improves language skills, while AR/VR simulations improve communication skills by providing practice in real scenarios. Both are required: language skills form the foundation, while communication skills form the medium of conveying technical information efficiently.

A. Section 1: Enhancing English with Grammarly

This section outlines the findings of the effectiveness of Grammarly in the technical writing prowess of students. The two groups are those that write using Grammarly and those who write without the intervention of any digital tool. The rating was by three professors with vast knowledge in technical writing, and their average was obtained from all their ratings.

1) Grammar accuracy

- Experimental Group

The participants who used Grammarly had 1.8 grammatical errors for every 100 words. Assuming a document may have 500 to 700 words, this translates to 9–13 errors. The consensus for such a drastic reduction can be attributed to the instant error detection capability of Grammarly and suggested corrections.

- Control Group

The control group, comprising participants who did not use Grammarly, had an average of 8.2 grammatical errors for every 100 words. Therefore, for a similar number of words, it would be 41–57 grammatical errors. It was expected that students who did not use Grammarly might allow several errors to pass or fail to detect them during a manual review.

In this case, there was a 78% improvement in grammar accuracy as depicted by the experimental group over that of the control group, showing huge benefits attributed to the use of Grammarly.

The use of Grammarly significantly enhances the accuracy of students' grammar, therefore a wonderful tool in improving the English language ability in technical writing.

2) Syntax quality

- Experimental Group

The Grammarly-supported students had an average syntax quality score of 9.1/10. Rich feedback on sentence restructuring that was needed for clarity and fluency, as suggested by Grammarly, immensely helped in improving the syntax of the students.

- Control Group

In the control group, the syntax quality was 6.3/10 as students found it very hard to maintain clarity and the structural flow of sentences without any support of a digital tool.

The experimental group showed a 44% improvement in syntax quality over the traditional group, hence proving the efficiency of Grammarly tool in structural improvement at the sentence level.

Grammarly enhances the syntax quality, helping the students to construct their sentences as clear and well-structured, which is of great significance in technical writing.

3) Vocabulary appropriateness

- Experimental Group

For vocabulary appropriateness, the Grammarly-supported students scored an average of 9.3 out of 10. Grammarly's suggestions on contextual vocabulary helped them choose more appropriate terms for stating technical things, and therefore, made their writing clear and precise.

- Control Group

The appropriateness of vocabulary scored 7.5 out of 10 in the control group because of frequent mistakes in using technical terms and lack of a digital tool to give them suggestions.

The appropriateness in the use of vocabulary in the experimental group increased by 24%, showing how Grammarly has supported proper technical expressions.

Grammarly enables the students to use the appropriate technical words and improves the students' technical writing overall.

4) Overall writing proficiency

- Experimental Group

This group reached 9.2 out of 10 in its general writing proficiency due to good organization, clarity, and few errors.

- Control Group

The control group scored an average of 6.5 out of 10 due to generally poor overall results of more mistakes and weaker organization.

The overall writing proficiency increased by 41%, showing the big role that Grammarly has played in enhancing their writing.

These results provide the potential of digital tools to enhance writing performance, especially in technical disciplines where precision and clarity are very important.

Grammarly significantly enhances the general writing ability, which is essential for technical students.

A summary of the findings is given in detail in Table 1 below.

Table 1. Summary table of the results

Assessment Parameter	Experimental Group (Grammarly)	Control Group (Traditional)	Improvement (%)
Grammar Accuracy	1.8 errors per 100 words	8.2 errors per 100 words	78%
Syntax Quality (Scale 1–10)	9.1	6.3	44%
Vocabulary Appropriateness (Scale 1–10)	9.3	7.5	24%
Overall Writing Proficiency (Scale 1–10)	9.2	6.5	41%

The findings indicate that Grammarly greatly enhances writing ability, particularly in grammar, syntax, and vocabulary. The group that utilized Grammarly performed better than the control group in writing ability. Some students, however, overused the tool, which can inhibit their acquisition of independent editing skills. Although Grammarly is good for correcting errors, students also need to acquire self-editing skills for long-term writing development.

While Grammarly makes considerable enhancements in writing precision, students must develop independent editing capabilities to complement the use of the tool.

B. Section 2: Enhancing English with AR/VR simulations

Two main concepts of this study were investigated by asking students about their relationship with AR/VR-assisted learning methods and traditional learning methods, and how these methods impacted their English language skills and overall learning experience.

The qualitative analysis indicated that there was a significant enhancement of the students' English language skills when traditional methods were compared to VR/AR-assisted methods. Table 2 summarizes data provided by the professors during sessions and displays the average scores obtained under both instructional methods, along with percentage increases across critical evaluation criteria.

Table 2. Mean scores across evaluation criteria

Criterion	Traditional Method	VR/AR-Assisted Method	Percentage Increase (%)
Grammar and Vocabulary	6.8	9.0	32.4%
Fluency	6.4	9.2	43.8%
Contextual Appropriateness	6.9	9.4	36.2%
Confidence and Engagement	6.1	9.5	55.7%

The most significant improvement was observed in confidence and engagement, where students reported a remarkable 55.7% increase accorded with the VR/AR-assisted method, which reflects the interactive and immersive nature of the two technologies. By placing students in real-life, simulated environments where they can practice the use of language without fear of judgment, VR/AR induces a feeling of accomplishment and agency. This allows learners to build their self-confidence in English use, especially in real-life situations. In addition, the interactive and immersive nature of VR/AR tools keeps the students interested, resulting in increased participation and a higher level of engagement in the learning process.

AR/VR simulations are a more interactive and confidence-building platform to learn from, which can prove to be particularly helpful for developing language skills in actual situations.

Fluency also exhibited a substantial rise, improving by 43.8%, indicating that VR/AR methods provide a more effective learning environment compared to traditional techniques.

1) Survey results

A survey was conducted to capture students' perceptions of their experiences with both learning methods, where 20 students from the Software Engineering department at the University Metropolitan Tirana were interviewed, 13 of them (65%) were female and 7 (35%) were male.

They were asked about their opinion on: "How would you evaluate your improvement in grammar usage after participating in the AR/VR-assisted sessions?" The results are shown in Fig. 1, below. The percentage of survey participants who rated this improvement as very significant is around 40% (8 students), while those who considered it significant make up 45% (9 students). The remaining 15% (3 students) evaluated the improvement as moderate. This means that all participants noticed at least some level of improvement in their grammar usage, with the majority finding the AR/VR-assisted sessions highly effective in addressing this aspect of language learning.

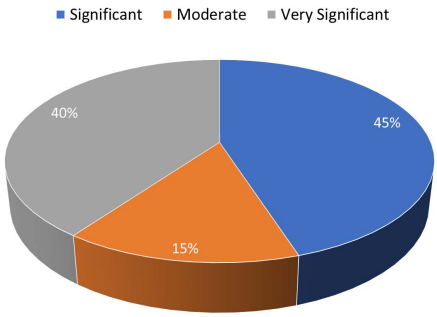

Fig. 1. Improvement in grammar usage through AR/VR-assisted sessions.

The previous question is followed by: "To what extent were the traditional sessions effective in enhancing your technical vocabulary in English?" The results are shown in Fig. 2, below. In response, 70% (14 students) of participants described the traditional sessions as minimally effective, while 15% (3 students) rated them as moderately effective, 10% (2 students) as effective, and 5% (1 student) as not effective. The results show that most students find traditional methods ineffective for building technical English vocabulary and prefer more interactive, immersive approaches like AR/VR.

Another question investigated: "To what degree did you experience an improvement in your fluency in English after utilizing AR/VR tools?" The results are summarized in

Fig. 3, below. Among the participants, 45% (9 students) experienced substantial improvement, another 45% (9 students) reported considerable improvement, and 10% (2 students) noted moderate improvement. None of the students reported minimal or no improvement, emphasizing the strong positive impact of AR/VR tools on their English fluency.

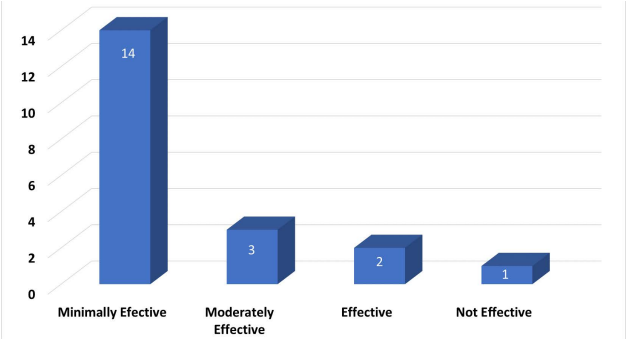

Fig. 2. Effectiveness of traditional methods in enhancing technical vocabulary.

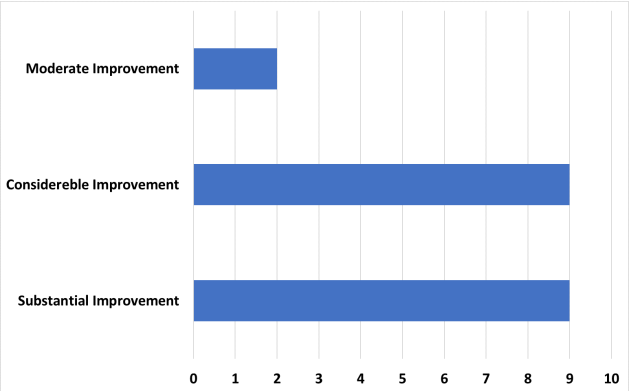

Fig. 3. Fluency improvement through AR/VR tools.

Students were also asked: "How much did the AR/VR activities contribute to building your confidence when speaking English in professional scenarios?" The results are shown in Fig. 4, below. Among the participants, 40% (8 students) stated that AR/VR activities greatly contributed, 45% (9 students) reported significant contribution, and 15% (3 students) indicated moderate contribution. These responses underlined the great potential of AR/VR tools in improving the confidence of students in professional communicative situations, particularly in their ability to speak English in a professional setting.

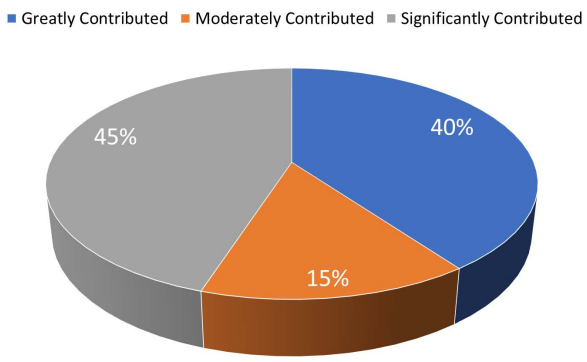

Fig. 4. Contribution of AR/VR exercises to confidence in professional English communication.

In terms of professional communication skills, students were asked: "How effective were the simulated scenarios in the AR/VR sessions in enhancing your professional communication skills in English?" The results are presented in Fig. 5, below. Among the participants, 40% (8 students) found the simulated scenarios highly effective, another 40% (8 students) considered them effective, while 10% (2 students) rated them as moderately effective, and another 10% (2 students) described them as minimally effective. This indicates that the majority of students found the AR/VR simulations to be highly beneficial in developing professional communication skills in English, further supporting the efficacy of AR/VR in improving real-world language application.

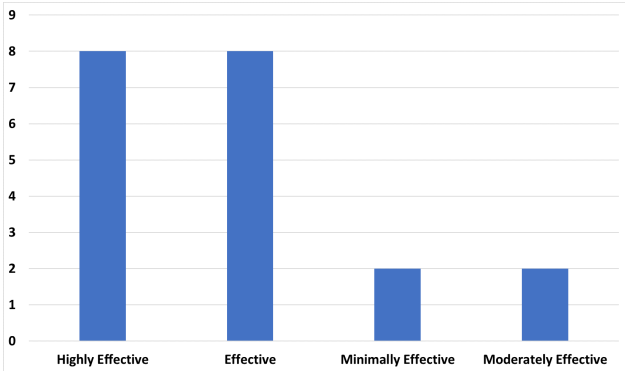

Fig. 5. Effectiveness of AR/VR scenarios in enhancing professional communication skills.

When asked: "How would you assess the traditional method's impact on your ability to speak spontaneously in English?" the results, shown in Fig. 6, reveal that 55% (11 students) viewed the traditional methods as slightly impactful, 25% (5 students) as not impactful, 10% (2 students) as moderately impactful, while 5% (1 student) found them impactful and another 5% (1 student) very impactful. These findings show that traditional methods have limited impact on students' ability to speak English spontaneously, especially compared to interactive AR/VR approaches.

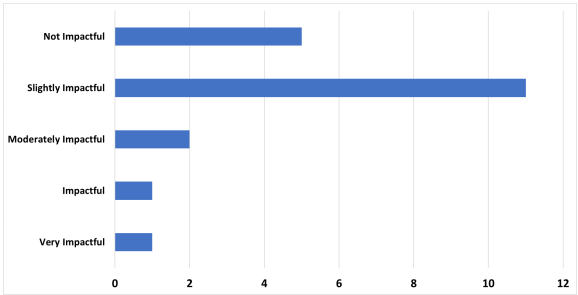

Fig. 6. Impact of traditional methods on speaking spontaneously in English.

Students were further asked: "How much do you agree that the real-time corrections and feedback during the AR/VR sessions were delivered clearly and were easy to apply?" The results are summarized in Fig. 7, below. Among the participants, 60% (12 students) strongly agreed, 25% (5 students) agreed, and 15% (3 students) were neutral. This shows that a majority of students perceived the immediate feedback in the sessions of AR/VR to be clearly provided and thus easily implementable, adding to the overall effectiveness of their learning experience.

Another key question asked was: "Do you believe the AR/VR-assisted method was more effective than the traditional method in identifying and improving mistakes in your English?" The results in Fig. 8 indicate that 40% (8

students) strongly agreed, 45% (9 students) agreed and 15% (3 students) were neutral. None of the participants disagreed, indicating that students prefer AR/VR methods to traditional ones, especially for their interactive and personalized way of correcting mistakes.

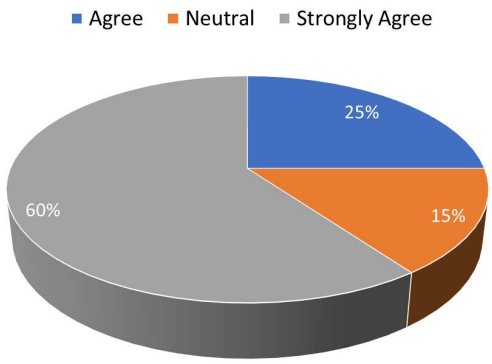

Fig. 7. Clarity and applicability of feedback in AR/VR sessions.

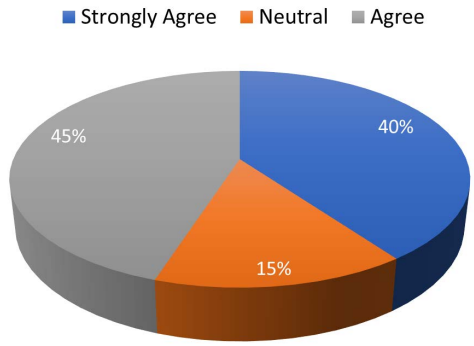

Fig. 8. Effectiveness of AR/VR-assisted methods over traditional methods.

Students were asked: "Which feature of the AR/VR-assisted sessions did you find most valuable in improving your English skills?" The results, displayed in Fig. 9, indicate that 60% (12 students) valued all features equally, 15% (3 students) highlighted adaptability to individual learning needs, another 15% (3 students) emphasized realistic and immersive simulated scenarios, while 5% (1 student) noted enhanced engagement and 5% (1 student) appreciated the instant feedback on performance. This shows that students found AR/VR-assisted learning helpful in different ways, with the different elements contributing to their language development.

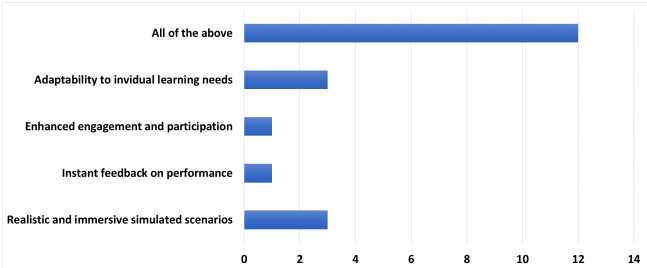

Fig. 9. Most valuable features of AR/VR-assisted sessions.

These responses were concluded with the question: "Would you prefer AR/VR-assisted methods over traditional methods for further improvement of your English skills?" Fig. 10, below, reveals that 45% (9 students) strongly preferred AR/VR methods, 35% (7 students) preferred them, 15% (3 students) were neutral, and 5% (1 student) slightly preferred traditional methods. These findings highlight that the majority of students prefer AR/VR methods, which shows that this technology could be important for the future of language learning.

AR/VR-enabled classes prove to be very effective in improving the use of grammar by students, which could result in better writing outcomes.

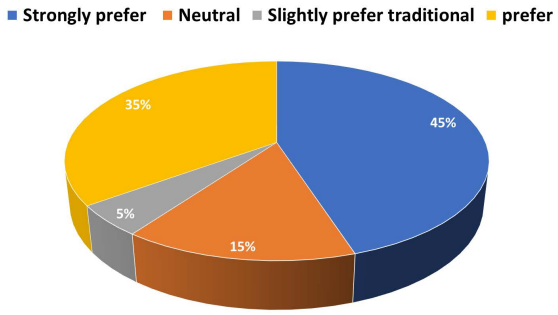

Fig. 10. Preference for AR/VR-assisted methods over traditional methods.

2) *Instructor observations*

Besides the survey and quantitative data, observations by instructors were also considered. Instructors observed, through AR/VR sessions, significant development in students' confidence levels, particularly in spontaneous speech contexts. Students manifested reduced hesitation, greater ease to utilize difficult technical vocabulary, and participative engagement in conversation. The observation validates the student feedback on the empowering role of AR/VR technologies in stimulating active engagement along with building communication competencies.

Instructor observations are consistent with the survey findings, reinforcing the opinion that AR/VR technology effectively enhances communication skills and confidence in a work environment.

IV. Discussion

A. The Role of Digital Tools in Enhancing English Proficiency

The proficiency in the English language is considered the bedrock for acquiring technical expertise in important areas that require good communication among work teams for effective problem-solving to realize career development. Digital tools transform language learning by employing adaptive and interactive techniques suitable for the training of technical English. From platforms that offer multi-media resources, language learning applications to virtual training simulations, learners have opportunities to work on their technical vocabulary, grammar, and contextual understanding [31]. For example, virtual training simulations place learners into real-life work environments where they have to engage in making technical presentations and participating in industry-based deliberations. Apart from enhancing learner participation, such digital training tools ensure that learners will be ready to use their technical English in various real-life settings.

Moreover, AR/VR simulations offer interactive learning experiences that simulate real-world industry situations and enable students to practice communication in a risk-free but realistic context. However, one of the significant challenges is ensuring that students can implement these skills within the unscripted real-world settings of the workplace. Future research needs to examine how AR/VR closes the gap

between the simulated and real-world professional communication beyond the rubric assessment. To maximize their effectiveness, institutions must integrate post-simulation assessments and real-time performance measurements to monitor students' capacity to apply their language skills outside controlled environments.

Real-life feedback is another signature of digital tools that enables learners to realize errors committed and how to rectify them for preciseness and clarity in communication. Digital tools are important in improving the learning of technical writing skills. Equipped with grammatical checks, suggestions for improving vocabulary and contextual analysis, technology helps the learners to present their ideas logically, observe the standards of professionalism and communicate the technical details with ease [32]. Future advancements in AI-based writing assistants can further improve these features by offering discipline-specific writing standards-based personalized feedback to ensure that students learn professional documentation skills relevant to their field. Such advancements could include AI-driven tools that recognize field-specific terminologies and provide context-aware suggestions for clarity, ensuring technical professionals adhere to industry-specific writing norms.

Before the implementation of English for Specific Purposes (ESP) and digital tool interventions, all participating students were required to pass a university-administered English proficiency test aligned with international standards such as Common European Framework of Reference for Languages (CEFR) and International English Language Testing System (IELTS) Academic. Their scores ranged from B1 to C1 levels, confirming an intermediate to advanced level of general English competence. This baseline ensured that the observed improvements in communication and technical writing could be attributed to ESP-specific instruction and tool-assisted learning, not general English fluency alone.

Though technical writing demands language competence from the grammatical, vocabulary, and syntactical perspectives, communication skills need to be developed as well. Language competence would mean competence in grammar, vocabulary, and syntax, needed to form correct and meaningful sentences. Communication skills, however, involve linguistic accuracy and the skills to convey ideas effectively, persuasively, and appropriately in professional and technical contexts. A person can be language proficient but unable to express complex thoughts properly in a business environment. Both online tools such as Grammarly and AR/VR simulations are advantageous to both sides by streamlining technical terms, sentence composition, and general fluency as well as enabling students to gain confidence in presenting, participating in discussion, and tailoring their vocabulary to various business settings. So while language skill provides the base, communication skill guarantees that technical knowledge is effectively communicated and received in practical situations.

Besides, technology incorporates elements such as semantics, syntax, and lexicology to make the learning relevant to technical applications. To enhance effectiveness still further, the inclusion of automatic linguistic analysis software can allow students to adapt their communication style to different technical and professional settings, more closely matching real-world industry requirements.

Nevertheless, despite the advantages of AR/VR and AI-enhanced tools in simulating technical communication environments, a key limitation lies in their inability to fully capture the unpredictability, spontaneity, and socio-emotional complexity of real-world professional exchanges. While simulations can approximate workplace conditions, they remain controlled environments. Hence, learners may demonstrate high performance in structured virtual settings but still struggle when faced with authentic communicative stressors in dynamic industries. Addressing this limitation requires future studies to explore hybrid approaches that blend immersive technologies with authentic, real-time collaboration experiences, as well as longitudinal follow-ups to assess skill transferability over time.

B. Addressing Issues in Language Learning for Technical Purposes

The conventional methods of language learning were not sufficient to meet the demands of technical communication and technical writing. Many approaches lack attention to the specialist use of terminologies and flexibility for learner-centered instruction. Digital tools make the process more engaging while shifting toward learner-oriented environments that adjust according to each learner's needs and the standards of the particular industry.

Collaborative platforms and interactive exercises encourage learners to engage with peers, promoting teamwork and communication skills, which are essential in both written and verbal technical communication in professional environments. Such platforms allow realistic role-playing and project-based learning involving others by using technical English. In order to be effective in the long term, institutions will need to incorporate digital language tools into systematic learning modules with independent study and instructor-led study. In this way, instructional integrity is maintained while leveraging technology to improve individualized skill development.

Practical applications of these tools include digital whiteboarding platforms such as Miro or Jamboard, which allow students to co-author technical process maps and workflow diagrams, encouraging the use of precise domain-specific terminology. Meanwhile, virtual conferencing spaces like Gather.town or Mozilla Hubs enable immersive, real-time meetings where students simulate industry roles—such as project manager or cybersecurity analyst—communicating through structured tasks like threat response simulations or code walkthroughs. These activities replicate not just linguistic content, but communicative pressure and decision-making processes found in actual professional environments, increasing the authenticity and effectiveness of ESP instruction.

Most such tools support individual learning at a flexible pace, allowing learners to revisit areas that require more practice. It assures both linguistic correctness and professional communicative confidence [33]. With the advancing digital technologies, incorporating AI-based adaptive learning solutions can further personalize it by examining students' strengths and weaknesses, recommending precise exercises, and delivering instant feedback based on industry standards. Furthermore,

sustainable integration of these tools requires structured frameworks that ensure their alignment with existing curricula. Institutions should implement a hybrid approach that maintains educational integrity while optimizing digital tools for both instructor-led and self-paced learning models.

The integration of Augmented Reality (AR) simulations and Virtual Reality (VR) in educational contexts has been a flourishing research area, especially in relation to the development of linguistic skills in students. These immersive technologies offer dynamic environments where students can practice and apply linguistic skills in realistic contexts. For example, AR/VR environments can simulate real world scenarios that require communication, thus promoting the critical use of language among students [34]. This not only strengthens vocabulary and grammar, but also improves conversation skills through interactive commitment.

In addition, the application of these digital tools is crucial in education and vocational training, where the mastery of language is often linked to professional success. Gokbulut and Durnali [35] emphasize that virtual reality applications in professional skills training allow students to create digital materials, promoting not only language skills but also technological fluidity. The ability to navigate these digital environments and communicate effectively within them prepares students for the complexities of modern workplaces.

Sustainability in education is another vital aspect when considering the long -term implications of AR/VR in technical education. Lee and Hwang [36] argue that improved educational environments can lead to sustainable pedagogical practices that promote preparation for teachers and student participation. By integrating virtual reality technologies that are linked to broader metaverias, educators can facilitate lessons that not only promote intrinsic learning but also encourage collaborative interaction between students. This improves their linguistic skills while guaranteeing that they understand the broader involvement of their learning.

In addition, as Tang [37] identifies, immersive technologies in language education can promote critical thinking and self -directed learning. This is significant to achieve sustainability in education, since students learn to work in virtual teams, sharpening their communication skills and problem solving skills. This collaboration imitates real world interactions, preparing students even more for their future careers.

Finally, Negi [38] highlights the potential of these technologies to instigate a change in sustainability behavior, particularly in disciplines related to green energy. By incorporating AR/VR experiences that emphasize environmental issues together with linguistic skills, educators can motivate students to participate significantly with both areas of content.

The study shows that Grammarly plays a significant role in grammar, syntax, and vocabulary in technical writing. However, excessive reliance on the tool can hinder the ability of students to develop independent editing skills. While Grammarly is useful for immediate feedback, it should be a supplement to traditional approaches, and students should be encouraged to learn corrections to achieve long-term writing improvement.

The tool's algorithmic nature may inadvertently constrain learners' linguistic creativity. By prioritizing syntactic correctness and standardized expression, Grammarly can lead students to conform to rigid structures, thereby reducing their willingness to experiment with stylistic variation or nuanced phrasing. This may result in technically correct yet stylistically flat writing. Educators must therefore strike a balance—using Grammarly as a diagnostic aid while also fostering environments that reward originality and rhetorical agility. Future research should further investigate how intelligent writing tools influence learners' ability to develop an individual academic or professional voice, especially in contexts that demand persuasive or innovative communication.

C. Technical Education and Professional Development

Digital pedagogies in technical education bridge the gap between formal knowledge and its professional application in real-life situations. On the one hand, these techniques provide access not only to specific terminology of various branches but also engage learners in various practical communicative activities in order to be ready to face linguistic challenges within world industries. For instance, students engage in online forums of discussions, virtual group projects, and technical presentations in which they use domain-related terminology in a collaborative setting.

On the other hand, computer-based tools encourage the expansion of critical thinking, adaptability, and problem-solving capacities that are crucial for survival in the fast-evolving technical sectors. According to Prensky [39], technology-based language training enhances the relevance of teaching programs, ensuring that learners are ready to confront real-world communication challenges. However, institutions must establish long-term strategies for sustaining these digital tools. Funding partnerships with industry leaders and integrating open-source digital learning resources can help ensure ongoing access without compromising instructional quality. For sustainable integration, institutions should adopt hybrid models that blend digital tools with hands-on industry experiences, ensuring that students develop both theoretical and applied language proficiency. Additionally, students' progress can be monitored by feedback from interactive sites where they interact with peers and teachers, for example, through peer-reviewed assignments or discussion forums. These are interactions designed to assess their ability for proper usage of language in real-life situations.

Technology promotes cultural competence and cooperation since the students are able to interact with other countries' attitudes through electronic means of communication. This builds linguistic skills as well as prepares the students to work effectively within many cultures. Emerging technologies such as multilingual AI chatbots and cross-cultural communications simulations can further be employed to strengthen learners' ability to utilize their language skills for global collaboration so that they are well equipped for global careers.

Additionally, technical writing is a crucial aspect of engineering and software-based language learning. Incorporation of System Design Document (SDD) writing activities in virtual learning platforms can expose students significantly to professional documentation standards. Artificial intelligence-based programs can assist in

structuring SDDs, thereby promoting clarity, coherence, and adherence to industry standards. Also, incorporation of peer-review processes in virtual platforms can increase the skills of students in evaluating and improving technical documentation, thereby promoting real-world communication skills required in technical workplaces. However, using SDDs on a writing task also has potential drawbacks, such as the requirement of a technology knowledge base in advance, which may not be optimal for all students. Future studies would have to explore other documentation tasks that are industry-relevant and could be tailored to fit students with different technical skills.

According to the study's findings, integrating Virtual Reality (VR) and Augmented Reality (AR) simulations into educational settings has emerged as a growing field of study, particularly in relation to students' language development. With the help of these immersive technologies, students can practice and apply language skills in authentic settings in dynamic surroundings. AR/VR environments, for instance, might mimic real-world situations that call for communication, promoting students' critical use of language [34]. This increases speaking abilities through direct involvement in addition to strengthening grammar and vocabulary.

Furthermore, as proficiency in a language is frequently linked to success in the workplace, the use of these digital tools is essential in education and vocational training. According to Gokbulut and Durnali [35], the use of virtual reality in professional skills training enables students to produce digital content and fosters both technological flexibility and language proficiency. Students are more prepared for the intricacies of the contemporary job when they are able to communicate and traverse these digital spaces.

When thinking about the long-term effects of AR/VR in technical education, sustainability in education is still another crucial issue. According to Lee and Hwang [36], better learning settings can result in long-lasting pedagogical approaches that foster readiness for both teacher and student participation. Teachers can create classes that promote both intrinsic learning and student collaboration by incorporating VR technology that are connected to larger metadata.

The implications of these findings are significant: they suggest that carefully integrated digital language tools and simulation-based instruction can bridge the gap between theoretical language knowledge and professional communicative performance. Students exposed to these interventions demonstrated greater accuracy, contextual awareness, and confidence in both writing and verbal technical exchanges. This points to a meaningful shift in ESP pedagogy—one that aligns language instruction more closely with 21st-century workplace demands. Moreover, the positive outcomes support the argument for revising traditional ESP curricula to incorporate digital literacy, collaborative communication strategies, and task-based learning models that prepare students for cross-disciplinary and cross-cultural professional realities.

In addition to enhancing their language proficiency, this guarantees that students comprehend the wider scope of their education. Additionally, immersive technologies in language instruction can encourage critical thinking and self-directed learning, as Tang [37] has noted. Students gain experience working in virtual teams, which improves their communication and problem-solving abilities, which is crucial for maintaining sustainability in education. This partnership helps students become ready for their future occupations by simulating real-world encounters.

V. Conclusion

The integration of the digital tool in enhancing English proficiency, especially regarding technical fields where effective communication becomes the most important factor, has dramatically changed. These tools try to solve such shortcomings of the traditional approach with a dynamic, interactive, and adaptive learning environment needed for the very special demands of technical communication. Virtual simulations, real-time feedback mechanisms, and personalized learning platforms enable learners to refine their grammar, build technical vocabulary, and develop practical communication skills so critical for job success.

Digital tools bridge the gap between academic learning and the workplace in industry and thus provide the learner with both linguistic and technical competencies in international industries. Some of these digital tools, like Grammarly or VR/AR simulations, help in enhancing writing in technical English by promoting fluency and encouraging activity in realistic, professional scenarios. Beyond that, they promote autonomous learning, self-regulation, and critical thinking-invaluable qualities in highly competitive and developing technical areas.

Despite some disadvantages, the benefits arising from the integration of digital tools, far outweigh the drawbacks. These digital tools not only help improve the processes of English language acquisition but also promote cross-cultural competence and collaboration among learners in view of working within diverse and multicultural working environments.

In conclusion, the integration of digital tools into technical education, provides the path toward modern methods and modes of teaching and practicing the skills of the English language and communication. Educational institutions will be able to adequately prepare learners for the challenges they will face in a globalized and interlinked professional world. However, with all this advancement, future research should take into account evaluating the long-term effectiveness of future technologies, such as AI and AR, in technical writing and business language acquisition. More studies are also needed to develop systematic models for integrating digital devices into study courses that address the diverse needs of learners and industries. This study or a similar one can be applied by researchers in different cultures by using a pretest/posttest design.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Sonila Daiu designed the research and headed the exploration of English competency in technical disciplines with reference to communication effectiveness and professional growth. She wrote the manuscript and analyzed the influence of English competency on technical writing and

presentations. Krisalda Mihali was also involved in the exploration of how digital tools are utilized, if they are beneficial to improve English language proficiency, and how technical language issues might be troubleshooted. She contributed to the development and administration of the digital tools aspect of the study and rewriting and editing of the manuscript. Both authors shared an equal contribution to the final manuscript and approved it for publication. All authors had approved the final version.

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