Improving English Vocabulary Through Quizizz in Practice Tests for Gamification and Google Forms with AutoProctor in Assessment tests for the Preclusion of Malpractice

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Abstract—Research on Vocabulary is prominent, and it helps learners find many diverse ways to learn vocabulary to a greater extent. However, the research on vocabulary in recent years gradually diminishes as students age and get to higher education. Many researchers recommended the effective use of digital tools to motivate students to participate actively in learning, and digital gamification made quite an impact by creating student interest in word learning. Therefore, this study primarily identified the need for improving the students' English vocabulary through blended learning by incorporating Quizizz for gamification during the students' practice tests, secondarily, the need for precluding students' malpractice through Google forms with AutoProctor during their assessment tests for their genuine vocabulary learning. This study was carried out based on quantitative research by collecting and analysing numerical data of the control and experimental groups and also through a closed-ended questionnaire using a Likert Scale. The findings demonstrated that this research culminated in a subtle difference in the two groups; the control and experimental groups that pursued the traditional and blended methods. The Pooled Standard Deviation statistically demonstrated that it had deviated from the control group's Standard Deviation by 0.286 and the experimental group's Standard Deviation by 0.2. This weighted average vindicated the study that the experimental group could perform better than the control group in the post-test.

Keywords—vocabulary, blended learning, Quizizz, Google forms, AutoProctor, higher education

1 Introduction

The sheer amplitude of the research so far on teaching and learning English Vocabulary is evidence of recognising the need for learning it in learning a language.

However, research on vocabulary, especially in the case of higher education, is different from the desperate need for learning vocabulary [1]. More research needs to be done on mobile applications to improve vocabulary [2]. However, all countless reasons, such as the lack of motivation among students, no knowledge of the significance of vocabulary acquisition, having no inquiring mind, and such, cannot be accorded as mere excuses by many administrators in educational institutions yet considered by the researchers concerned.

Although the research on vocabulary plays a significant role in all levels of education, it is indispensable to recognise that the research on vocabulary in higher education is in severe decline. This results in the inefficacy of the language of many students, particularly in engineering colleges surrounded by rural background*s*.

To a great extent, students' lack of intellectual interest in vocabulary acquisition is evident in traditional ways of teaching and learning in engineering colleges with rural backgrounds. However, a perspective of gamifying activities in and out of the classroom helped increase the learning momentum of the students in higher education [3]. The use of games in learning, especially in the early stages of the students' education, is widespread in helping them master various skills. Game-based learning provides the proper learning material and evaluates the whole process [4]. It could also ensure active learning by prompting them to develop inquiring and penetrating mindsets in great detail. Previous research regarding gamification has proven productive in enhancing students' active participation. Integrating digital technology with traditional teaching and learning has already reached upstairs in research. Blended learning has been a successful strategy in teaching and learning vocabulary, and it is gradually gaining momentum in higher education nowadays [5].

Contrary to face-to-face learning, a digital learning environment emerged through digital platforms, and the focus on integrating technology into the classrooms became indispensable during the COVID-19 pandemic. In recent years, there has been tremendous use of eLearning tools. Tzavara, A. et al. [6] incorporated a digital personal learning platform, 'e-me', in the context of using digital classrooms for the teachers to cope with the drastically changed situations during the pandemic. This 'e-me' platform was incorporated to focus on the learner-centred approach. The authors also highlighted the easy access to the digital 'e-me' platform in teaching and learning during and after the pandemic.

Many new technological platforms supporting digital learning contain vast data and information in various forms and formats. The authors have discovered the possibility of effortlessly evaluating the learning process with the help of game-based learning [7]. Implementing well-designed educational apps to improve learning outcomes has been recommended [8]. The post-COVID-19 era has been highly dependent on digital sources, which greatly enhance learning [9]. Deris & Shukor [2] demonstrated that the students accepted the mobile applications positively, and the ease of using them gave them a knack for vocabulary learning.

Through technology, teachers can explain abstract concepts, present complex objects and bring harmony between educators and students in the learning environment. Teachers can also create an exciting classroom environment and deliver the learning material to encourage students' interest and engagement in learning. This way, the

teachers can turn a boring class into an exciting one [10]. Technology-based teaching strengthens students' interest in word learning during practice tests in the classroom, but their seriousness during performance tests remains baseless. Especially when the students take their tests with their group members, they probably seek their peers' help to excel in their tests. This approach would not help them in terms of English vocabulary acquisition.

This way, the amplitude of research for improving English vocabulary had already been carried out using various digital platforms. However, gamifying learning was not new either. Unlike the research carried out so far, our research went beyond the mere integration of digital technology with the traditional way of teaching and learning to bring forth the students' authentic results. This study used 'Quizizz' in the practice tests for gamification to stimulate the students' learning and Google Forms with 'AutoProctor' in the assessment tests to preclude their malpractice for their genuine vocabulary learning. This study highlights the following contributions.

- Identifying the need for improving the English vocabulary of the students in the context of higher education
- Identifying the role of blended learning versus that of traditional learning
- Helping the students learn vocabulary through gamification on 'Quizizz.'
- Assessing the students' vocabulary on Google Forms with the integration of AutoProctor.
- Proctoring the students with AutoProctor during their assessment test-taking to prevent them from malpractice and help them genuinely acquire their English vocabulary.

This study also focuses on the following research questions concerning the severe decline in the acquisition of English vocabulary in the context of higher education.

1. Does the blend of Quizizz with traditional teaching and learning improve Engineering students' English vocabulary?
2. Does the use of Google Forms with the integration of 'AutoProctor' preclude the students' malpractice while taking assessment tests and help produce authentic results?

This research hypothesizes that the blend of Quizizz with traditional teaching and learning improves Engineering students' English vocabulary, and the use of Google Forms with the integration of 'AutoProctor' precludes the students' malpractice while taking assessment tests and helps produce authentic results.

1.1 Significance of the study

In the classroom or even outside the classroom, teaching English vocabulary to the students of the current generation holds rigorous methods and rapt concentration of the teachers not only in their teaching but also in ensuring their students' tangible takeaways as part of their vocabulary learning. Teachers and researchers have used numerous methods in teaching vocabulary and learning it, yet the process of teaching and learning

is ever-dynamic. Teaching and learning vocabulary could see a different dimension in the recent past, especially with the intervention of gamification into the limelight during the COVID-19 pandemic and its legacy even post-pandemic. With the intervention of gamification, teaching and learning vocabulary has been indubitably phenomenal of late. Proctoring the students during their test-taking remains a challenge for the teachers, particularly in the case of their students' malpractice.

Considering the desperate need to discover and incorporate a new method to help the students take away their acquisition of English vocabulary and retain it for a long time, this study addressed a couple of thrust areas. One is the act of teaching and learning English vocabulary through gamification using 'Quizizz.' The other is the integration of 'AutoProctor' with 'Google Forms' in assessing the vocabulary learned. This study used 'AutoProctor' with 'Google Forms' intending to have precluded the students from copying and cheating during their test-taking as part of their vocabulary assessment. This study incorporated the 'AutoProctor' using artificial intelligence to have proctored the students and thus rooted out the malpractice during their test-taking.

The significance of this study lies in the subtle difference between the control group and the experimental group in terms of their results after the use of blended learning. This study confined the control group to mere traditional learning only with an exemption of using 'Quizizz' in its pre-test and post-test along with the experimental group. It allowed the experimental group to practise their learning vocabulary on 'Quizizz' for the effect of gamification (which helps them relish learning). They took their assessment tests on Google Forms with AutoProctor (which prevents them from their malpractice due to its automated proctoring system monitored by artificial intelligence). Therefore, this study proved to be a catalyst for learners of the 21st century, particularly in learning their English vocabulary.

2 Background research

2.1 Gamification through Quizizz for learning English vocabulary

The literature review covers a good amount of background research on vocabulary learning and its improvement using the gamification of Quizizz and the significance of Google Forms in assessing the students' learning. It dispenses the role of MALL in enhancing vocabulary learning and precisely the act of integrating AutoProctor with Google Forms for the preclusion of malpractice of the students during their assessment test taking. This research aims to find a new method of improving engineering students' English vocabulary by gamifying their learning on Quizizz and assessing them on Google Forms, especially by proctoring them for authentic learning takeaways.

The sudden closure of the COVID-19 pandemic led to an unexpected shift to digital learning, and the emphasis was laid on digital tools for learning. Though many teachers and students had already used various digital tools in the classroom before the pandemic, the necessity of using these tools escalated during the pandemic. Many researchers acknowledge the significant role of digital tools and strongly recommend them to motivate students to participate more in learning procedures [11]. The data

produced in educational learning sessions is a real treasure of information that can help draw significant conclusions which are very difficult to produce without the utility of digital tools [7]. It is also essential that the student's motivation is linked with the judgment of their capabilities to learn. Students lack motivation due to the lack of control over their learning outcomes, especially when they are not given autonomy. Students with low intrinsic and extrinsic motivation tend to be diffident and exhibit inappropriate behaviours [12].

Games are vital in actively engaging the students in all learning activities. Games would also turn a teacher-centred classroom into a learner-centred one. One-size-fits-all lectures in the classroom can be transferred to the ones that can make the students self-directed and independent in their learning and its capacity through digital gamification [13]. Technology-based gamification is a strategy for creating student interest in word learning [1]. Digital Games have a significant impact on making students learn vocabulary. The digital games are easy-to-access activities that intrigued the participants' learning and helped them enhance their vocabulary joyfully [14]. A vast majority of 87% of university and college students in Hong Kong positively perceive gamification as an impetus for the effectiveness of learning in the classroom [15]. However, some countries incorporate new technologies with the concept of gamification in educational settings. However, the authors claimed that gamification applications must consistently meet the expected student learning results. Therefore they implemented adaptive gamification, which enhances traditional gamification approaches. These approaches increase learners' involvement by adapting various gaming elements based on the user's interest [16]. Katsaris, I., & Vidakis, N. [17] state that adaptive e-learning systems through various Learning Styles help learners to meet their learning needs the way they learn. With new technologies and smart tools, many platforms utilise adaptive e-learning.

Making the students' learning activities a game is possible through 'Quizizz.' It helped students of primary English as a Second Language in rural schools to have mastered their English vocabulary. Around 62% of the students agreed that 'Quizizz is an effective tool to help master English vocabulary [18], and these statistics supported the first research question of this study. Quizizz is a tool of educational technology and an emerging online learning platform. It also encourages learners' self-regulated learning and their interest through gamification. Pham, A. T. [19] proved that using Quizizz in an English Language Classroom satisfied 85% of the participants due to its efficiency and convenience. It is also evident that the students had positive attitudes towards using Quizizz in their English language classroom.

'Quizizz' provides the students with instant feedback; thus, it makes learning more interesting for them. The active engagement, participation, and ever-growing enthusiasm among students while they take their tests, are evident in Quizizz. 'Quizizz' breaks the monotony and makes the students cultivate an inquiring mind which helps them become curious about their learning and compete with their peers. Quizizz gets rid of the monotonous class atmosphere and the difficulty in remembering the words. It aids the students in their retention of vocabulary [20]. 'Quizizz' shows the correct answer with an explanation every time the student gets it wrong. It helps the students self-evaluate their performance promptly. Memes, music, and the waiting time for each

question in 'Quizizz' are additional thrilling and animated features to help students exit their suspended animation.

Learning English vocabulary is a challenge that can be confronted with using digital gamification. Remembering vocabulary for a long time is a mammoth task for learners. It can be learned and retained mostly by creating motivation and stimulating interest among students towards word learning, an essential gamification feature. It is possible through 'Quizizz' [21]. 'Quizizz' gamifies objective, open-ended, and true/false questions. This teacher- and learner-friendly educational technology tool is an easy-to-use and affordable tool. Students can learn vocabulary well when they collaborate with their peers in learning. Their strict collaboration and knack for competition help them learn and retain the vocabulary for future use. The principal feature of 'Quizizz' is to help the learners collaborate and compete with their fellow learners. Gamification in 'Quizizz' is one of the collaborative learning strategies, and it creates an environment where the students can discuss collaboratively. Though many other tools facilitate innovatively learning through gamification, the 'Quizizz' gamification tool stands out. It helps develop activities in a suitable environment and creates a forum for assessments where students can directly interact with the content of it [22]. All this literature review of the employment of 'Quizizz' in ELT so far supported the first research question of this study.

'Quizizz' can contribute motivation, provide scope for group interaction, give instant feedback, and thus save time. 'Quizizz' can be operated on a mobile or computer with internet connectivity. The revolutionary shift from CALL (Computer-Assisted Language Learning) to MALL (Mobile-Assisted Language Learning) in ELT is well endorsed using Quizizz. Because of the availability of mobile phones and the students' knack for using mobile phones, using 'Quizizz' in English language classrooms to improve vocabulary has been highly recommended [23]. MALL has been an ideal strategy for promoting vocabulary learning. MALL helps improve language competence in higher education in light of a paradigm shift. A meticulously constructed teaching and learning material in digital media through MALL can enhance vocabulary learning [24]. It is instrumental in knowing that MALL can serve better in collaborative learning through peer discussion and promote competitive spirit among the learners [25]. Sari, S., Arifani, Y., & Asmara, C. [26] proved that MALL with Quizizz improved the students' vocabulary among 11th-grade students in Indonesia. Between the effective use of CALL and MALL, MALL stood better in enhancing motivation and vocabulary acquisition as it was easily accessible to the students in the classroom. Katemba, C. V., &Sinuhaji, G. V. [27] proved that the method of ESA (Engage, Study, and Activate) through 'Quizizz' culminated in an effective outcome and suggested that the use of Quizizz could be done at all levels of academics from the primary to the tertiary level.

2.2 Google form as an assessment tool

Assessment is the backbone of the teaching and learning process for gauging a learner's academic ability. It is instrumental in ELT to assess the students regularly, as the language learning process is ever-growing in and out of the classroom. A good strategy of assessment greatly helps the teachers in the classroom to evaluate their

students' performances continuously. Teaching without assessing the student's learning does not always fructify and cannot produce great results. Many popular ways of assessments exist, but Google Forms proved to be an easy-to-use, learning-friendly, freely accessible assessment tool. Google Forms can easily be accessed with a link provided by the instructor. This assessment tool is versatile, which allows the teachers to receive various types of responses, such as multiple-choice, open-ended, close-ended, short answers, Long answers, and Grids, etc., from the learners [28].

Google Forms offer tremendous opportunities for learners to assess their vocabulary learning regularly. Rizal Rinaldi et al. proved that online assessment of students' vocabulary using Google Forms brought much better results than the traditional assessment. Using Google Forms to assess students' vocabulary plays a significant role and improves the students' activeness during the teaching and learning process. A future study to improve vocabulary using Google Forms should be conducted on large samples for better results [29]. This recommendation considerably backed up the second research question of this study. However, using AutoProctor with Google Forms to prevent the students from copying during their assessment test-taking has been a new thing in this study.

Any technical device or application cannot prevent students completely from copying their peers during assessments or performance tests. Undeniably, the teachers cannot proctor their students continuously at the same pace throughout the assessment because of the large number of students in the classroom. Most students seek their peers' discussion during the performance tests without being driven by their conscientiousness. They may switch tabs on their mobiles and search for information through Google or ask their peers for help. Though this is not a generalised statement, it is essential to consider at least a few learners' cases. At this juncture, we employed an 'AutoProctor' and added it to Google Forms for authentic results of the students in their assessment tests conducted intermittently.

2.3 AutoProctor

AutoProctor is an AI (Artificial Intelligence) powered remote proctoring software. It is also an automated test proctoring software that prevents students from malpractice during their tests online. It functions in the blend of Google Forms and Microsoft Forms. In our research, we used it in Google Forms. AutoProctor gets reports of suspicious behaviour of the students detected during the tests. AutoProctor can handle 1000s of users at once across multiple devices. It best monitors the environment of the test-takers to prevent their malpractice. It also generates a trust score of the test taker based on multiple tracked factors.

2.4 The process of integrating AutoProctor with Google forms

Google Forms, which are used for quizzes, surveys, etc., can be integrated with AutoProctor (Timer+Proctor) to prevent the test takers (students) from cheating during their test-taking. Adding a 'Timer+Proctor' to Google Forms is a walk in the park for any teacher to administer tests for his/her students. At the outset, the test giver must

create a Google Form in the Google Drive of his/her Gmail account. After creating a test on Google Forms, the teacher must go to the 'Add-ons,' available on the three dots, just beside Gmail Profile Icon in the created Google Form. In 'Add-ons,' 'Timer+Proctor' should be downloaded and installed as an extension to Google Forms. Once the Timer+Proctor is installed and integrated with Google Forms, it allows the user to set the Timer and Proctor according to the need of the user. In its basic version, Timer+Proctor gives 25 test attempts for only the Timer and 25 test attempts for both Timer and Proctor together. To be more precise, the 'Timer+Proctor' is to set the Timer for a test and monitor the test takers through its automated proctoring software service.

During the test taken by the students, the AutoProctor (Timer+Proctor) collects the students' responses by monitoring them as if a teacher were around them. At the same time, this AI-powered AutoProctor gathers all the violations of the students with evidence, such as 'Switching tabs, making noise, going offline intermittently, maintaining no proper demeanour, trying to discuss with friends, trying to indulge in malpractice, etc. As a result of the evidence of the test-taking or any violations, the AutoProctor releases each student's Trust Score.

Timer+Proctor first captures the student's face as he/she clicks the 'Start Test' and does not allow the student to take the test without capturing his/her face with a plain background. Any face apart from the test taker's or any other background other than plain will not be captured and does not allow the students to take the test. Even during the test, AutoProctor keeps capturing the face of the student intermittently for later reference. Both the camera and the microphone of the device concerned are accessed and taken under control by the AutoProctor to detect the face and noise of the student throughout the test and finally release the 'Trust score' of the student for the teacher to understand the authenticity in the results of the students during the test. The 'Timer +Proctor' allows the teachers to set a deadline for their students' test-taking and proctor them indirectly to obtain authentic results from the students, based on which the teachers concerned will be able to evaluate their students' actual performance. 'AutoProctor' is a user-friendly and affordable software. With just $5, one can get 1500 test attempts (Timer only) and 250 test attempts (both Timer+Proctor) in its paid version. It shows how cheap it is in its price and how expensive in its use.

In our research, we used AutoProctor with Google forms to obtain authentic results by preventing the test takers from malpractice during their assessment test-taking. These assessment tests were conducted on every two sessions of vocabulary taken from 'Word Power Made Easy.'

Concerning all the background research, our study was carried out identifying the need for improving the English vocabulary of Engineering students using 'Quizizz' in the practice tests to make the students' learning enjoyable and 'Google Forms' with AutoProctor in the assessment tests to prevent the students from copying their peers so that they took away genuine vocabulary learning. Unlike the previous research, this research employed Google Forms with AutoProctor to proctor the students during their assessment tests. It substantially improved the students' authenticity through Trust Scores during their tests. Apart from this, the use of 'Quizizz' in practice tests intrigued their participation as it gave them instant feedback and helped them to scale their ability on par with their peers. This research employed blended learning for the experimental

group and traditional learning for the control group. This research addressed a couple of thrust areas; Vocabulary Learning through gamification of Quizizz and the preclusion of students' malpractice through Google Forms with AutoProctor. It proved novel in its approach.

3   Methodology

3.1   Objectives

1. Employ 'Quizizz' in practice tests for gamification
2. Employ Google Forms with AutoProctor in assessment tests for the preclusion of malpractice
3. Extract the possible outcomes of the employment of 'Quizizz' and the integration of 'AutoProctor' with Google Forms in improving English vocabulary
4. Determine the significant difference between the control group and the experimental group

3.2   Participants

In our research, 63 female and 51 male students and 114 students of Computer Science Engineering from Sri Vasavi Engineering College were voluntary participants. These participants were between 18 and 20 years of age. The students participating in this research were studying their second-year 2nd semester in CSE. This research was conducted in their second-year course, ' Professional Communication Skills-II' at Sri Vasavi Engineering College, Tadepalligudem, West Godavari District, Andhra Pradesh, India. The participants were all from rural backgrounds.

3.3   Materials

As part of our research, Quizizz Software, Google Forms, AutoProctor (Timer+Proctor), computers provided by the institution Sri Vasavi Engineering College, and mobiles of the students (as an alternative) were taken as independent variables. In contrast, Word Power Made Easy, a book of vocabulary wherein 10 sessions (Sessions:16-25) from it, have been used as part of the teaching and learning course titled Professional Communication Skills-II of 2nd year CSE students at Sri Vasavi Engineering College taken as the dependent variable. 'Quizizz' was chosen to gamify the students' learning so that the students could find their learning enjoyable. The researchers created Google Forms to assess the students' vocabulary learning through the assessment tests. The AutoProctor is an AI (Artificial Intelligence) powered remote proctoring software purchased to prevent students from malpractice during their assessment test-taking. Several worksheets were used in the classroom as part of this research's teaching and learning process.

3.4 Procedure

The researchers conducted quantitative classroom research using a blended learning method to help engineering students from rural backgrounds improve their English vocabulary. The blended learning method combines traditional classroom and online learning [30], a successful strategy that has gained momentum in higher education of late [5]. Findings demonstrate that blended learning improved the students' vocabulary learning. Therefore, the students prefer blended learning to traditional classroom-based learning, as it allows them to work at their own pace [31]. In this study, the first research question was assumed to improve Engineering students' English vocabulary through the blend of Quizizz with traditional teaching and learning, and the second research question to preclude the students' malpractice while taking assessment tests and help produce authentic results by integrating Google Forms with 'AutoProctor.' Thus, blended learning proved suitable for this research as it backed up both research questions.However, the idea for the execution of this research ripened from our knowledge about the need for adequate research on enhancing students' English vocabulary in higher education. In our research, 114 students of Computer Science Engineering from Sri Vasavi Engineering College, Tadepalligudem, West Godavari District, Andhra Pradesh, India, have voluntarily participated. The students chosen for this research were aged between 18 and 20 years. All the students hailed from a rural background in and around Tadepalligudem.

At the outset of our research, we chose a random sample of 114 students to have participated in the research. All the students were given a questionnaire prepared using a Likert Scale for us to know their familiarity with educational technology. Fortunately, the group of 114 students was from Computer Science Engineering. Hence, most agreed that they were familiar with educational technology, but a few reported that they knew about 'Quizizz'. A few participants acknowledged their knowledge of 'Google Forms with AutoProctor.' It helped us to proceed with our research.

First, a pre-test was administered to all 114 students of Computer Science Engineering in a hall at Sri Vasavi Engineering College. This pre-test was given on 'Quizizz' under the supervision of the teacher-researchers. The pre-test, which comprised 30 questions on 30 low-frequency words, was conducted at the College on December 9, 2021, to determine the research groups. Our research uninterruptedly lasted for about 4 months, from December 4, 2021, to April 16, 2022, from knowing their familiarity with educational technology to their retention of vocabulary in the twilight of our research. In the pre-test, thirty questions on vocabulary were administered on 'Quizizz.' Based on the results obtained in the pre-test, the researchers divided the whole group of 114 students ($n=114$) into two groups: the control group with forty-five students ($n_1=45$) and the Experimental group with sixty-nine students ($n_2=69$). The control group trained using a traditional learning method, whereas the experimental group trained using a blended learning method. The control group took only paper-based tests both for their practice and assessment.

In contrast, the experimental group used the traditional learning method on par with the control group only in listening to the lectures on vocabulary. However, it pursued digital gamification in its practice tests and took the assessment tests on Google Forms

with AutoProctor. Thus, unlike the control group, the experimental group has trained using blended learning.

Precisely 10 sessions of English vocabulary from 'Word Power Made Easy' prescribed as part of the curriculum of Professional Communication Skills-II were considered for the research. All the sessions with ten discipline-specific words were taught using a regular lecture and chalk-and-talk method in the classroom. Following the traditional teaching method, the control group took the tests on worksheets provided, whereas the experimental group took all the practice tests on 'Quizizz' synchronously once every week. There were ten practice tests given to the experimental group. Each practice test was given once every week, but after every 2 weeks of two practice tests, there was an assessment test on those two sessions together, administered on Google form with AutoProctor. After every two practice tests, these five assessment tests ensured the students' authentic learning takeaways of vocabulary.

The experimental group took practice tests on 'Quizizz' using gamification, which made them actively participate in the tests and helped them compete and collaborate with all their peers. Each practice test comprised ten questions, and each assessment test consisted of twenty questions. All the practice tests and assessment tests were administered in the classroom synchronously. Finally, after uninterrupted training for about 4 months, a post-test was administered on April 16, 2022, for both groups to gauge the students' vocabulary learning.

This study was carried out based on quantitative research by collecting and analysing the numerical data of both the research groups, control group, and experimental group in their pre-test and post-test and also through a questionnaire of ten closed-ended questions using a Likert scale to know about the student's familiarity with the educational technology such as Quizizz, Google Forms, and AutoProctor. The statistical data obtained through the pre-test and the post-test stipulated the clarity and transparency of the research by giving the exact difference between the results of both the research groups; the control group and the experimental group.

4   Findings & discussion

Our research was conducted to improve Engineering students' English vocabulary using the blended method. Upon our knowledge about the scarcity of vocabulary research, particularly in higher education, as rightly pointed out by Stephanie Moody et al. in a work titled 'Vocabulary Instruction: A Critical Analysis of Theories, Research, and Practice'[1], we felt the necessity of conducting our research using the blended learning method. It is also evident that engineering students usually find an unfailing enthusiasm for digital learning. Though previous research has been conducted on blended learning and proved productive, research on improving English vocabulary in higher education has been significant. Therefore, our vocabulary research went beyond the research that has existed for many years and found significant results in improving English vocabulary using a blended method.

A ten-question questionnaire using a Likert scale given on a Google Form before the pre-test received the following responses about their familiarity with the educational

technology (Quizizz & Google forms with AutoProctor). Most students favoured using technology and were aware of 'Quizizz.' Only the integration of 'AutoProctor' with Google Forms has been a strange thing to many of the students. Many students also said they had yet to learn about 'AutoProctor,' which can prevent them from malpractice during their test-taking. The questionnaire with all the statistics can be found in Appendix.

4.1 Pre-test

A pre-test, conducted on December 9, 2021, was used to identify all 114 students with different abilities in English vocabulary learning. It was also used to divide all 114 students into two groups: the control group and the experimental group. In the pre-test that comprised thirty vocabulary questions, the researchers took twenty as a cut-off mark for group allocation. The students who got greater than or equal to 20 vocabulary questions right were taken as the control group, and those who got less than 20 were considered the experimental group. The results in the pre-test showed that forty-five students could get greater than or equal to 20 vocabulary questions right out of thirty vocabulary questions and hence were considered for the control group. In contrast, sixty-nine students failed to get twenty vocabulary questions right and were considered for the experimental group.

4.2 During training

As part of our research, as a whole, ten practice tests were given to the experimental group in every class (only one 2-hour class taken per week) after the traditional lectures of the researchers on vocabulary. This way, the students have taken all ten practice tests on ten vocabulary sessions with ten words each on 'Quizizz' as part of the coursework 'Professional Communication Skills-II.

Apart from 10 practice tests, 5 assessment tests were given to the experimental group every third week after every two practice tests every 2 consecutive weeks. As a whole, 5 assessment tests were administered on 'Google forms with AutoProctor.' Each assessment test comprised twenty vocabulary questions.

4.3 Post-test

Finally, after four months of training, a post-test was conducted for both groups on April 16, 2022. The post-test comprised thirty vocabulary questions taken from the ten sessions taught during the research. It was conducted on 'Quizizz' like the pre-test. The following results from the post-test demonstrate the progressive learning of the experimental group (n_2=69) in their English vocabulary. On the contrary, the control group (n_1=45) could not equate with the experimental group in the post-test. In the post-test, only seven students from the control group could get more than or equal to 20 vocabulary questions correct out of thirty vocabulary questions. Thirty-eight students got below 20 vocabulary questions correct after training using the traditional learning

method. It states that only 16% of the students could get over twenty vocabulary questions.

4.4 Control group's results in the post-test

The post-test produced the results of both groups, wherein the control group scored as mentioned below. 5 students could get 15 marks each, 5 students 12 marks, 6 students 10 marks, 5 students 14 marks, 10 students 9 marks, 5 students 6 marks, and 2 students 8 marks each. Among the other 7 students, 5 procured 20 marks each, and 2 got 22 marks each. Based on these results, the researchers calculated and identified the Mean (μ_1) of the control group as 12.11, variance (S_1^2) as 9.67, and its standard Deviation (S_1) in the post-test as 3.109. The statistical analysis of the control group results in the post-test can be found in the Appendix.

4.5 Experimental group's results in the post-test

The experimental group, which consisted of sixty-nine students, underwent the training using the blended method that brought forth the following results in the post-test. Sixty-six students from the experimental group could get more than or equal to 20 vocabulary questions correct, and only 3 members got below 20. It states that over 95% could get twenty vocabulary questions. The following results describe the experimental group's performance in the post-test.

10 students could get 22 marks each, 15 students 23 marks, 14 students 20 marks, 14 more students 25 marks, 10 students 26 marks, and 3 students 27 marks each. The other 2 students procured 18 marks each, and the remaining 1 got 14 marks.

Based on these results, the researchers identified the Mean (μ_2) of the experimental group as 22.98, variance (S_2^2) as 6.90, and standard Deviation (S_2) as 2.626. The statistical analysis of the experimental group results in the post-test can be found in the Appendix.

The post-test was conducted similarly to the pre-test on 'Quizizz' with thirty vocabulary questions which included vocabulary from all ten sessions with a minimum of 3 words from each session on average. The results indicate that the experimental group performed substantially better than the control group in the post-test.

4.6 Pooled standard deviation

The researchers marked the control group as n_1 and the experimental group as n_2. The researchers also marked the Standard Deviation of the control group as s_1 and the Experimental group as s_2. Based on the Standard Deviation of both the groups, they calculated the Pooled Standard Deviation (Weighted average of Standard Deviations from both the groups) to identify each group's independent enhancement of the English vocabulary and the subtle difference between both the groups' vocabulary learning. The statistical analysis of the Pooled Standard Deviation (Weighted average of Standard Deviations from both the groups) can be found in the Appendix. The Pooled Standard Deviation turned out to be 2.826 between both groups. However, this Pooled Standard

Deviation suggested that it had deviated from the control group's standard Deviation (s_1) by 0.286 and from the experimental group's standard Deviation (s_2) by 0.2, as in Table 1.

Table 1 below describes the difference between the Group's Standard Deviation and Pooled Standard Deviation through the post-test results.

Table 1. A statistical representation of the results

Research Group	Mean (Average)	Variance	Standard Deviation	Pooled Standard Deviation	Difference between Group's Standard Deviation and Pooled Standard Deviation
Control group	12.11	9.67	3.109	2.826	0.286
Experimental group	22.98	6.90	2.626		0.2

These reports describe that the experimental group considerably less deviates from Pooled Standard Deviation than the control group in the post-test results. The results ascertained that the experimental group had outperformed the control group in the post-test and suggested that incorporating the blend of 'Quizizz' with traditional teaching and learning (blended learning) for the experimental group yielded promising results, meeting the first research question of this study. Integrating AutoProctor with 'Google Forms' helped the researchers proctor the participants and prevent them from malpractice during their assessment test-taking, supporting the second research question of this study. This way, the research is novel about bringing authentic results with the employment of 'AutoProctor', which precluded the students' malpractice. Thus, it contributes substantially to the teaching and learning fraternity in teaching and learning English vocabulary to a great extent.

5 Conclusion

For any language to be communicated, one needs to improve one's vocabulary, which is the currency of communication. Vocabulary is no exception in the English language too. However, English, being treated as the second language in the classroom in India, can be mastered by significantly learning vocabulary [32]. SaniagoDakhi, S., & Fitria, T. N. [33] proved that vocabulary was discovered to be more functional as a base for communication and social reality. It was also found to be a morale booster and an academic ability predictor. It is well known that many students in today's classroom fumble for words to express themselves due to the need for sufficient vocabulary in the cache of their language.

However, the research on inventing vocabulary learning strategies, especially for students in higher education, needs to improve. Therefore, teaching vocabulary in higher education needs to be addressed. Vocabulary can be improved through student collaboration in the classroom [34]. Researchers in the recent past have not recommended mere traditional methods of teaching and learning vocabulary in the classroom. Djiwandono, P. I. reported that a blended learning experience greatly

impacted the students' vocabulary learning, as it encouraged interactivity and collaboration among students [30].Technology and the equally ever-growing interest of the students of Bachelor of Technology in digital gamification have brought about a drastic paradigm shift in implementing an avalanche of methods to teach vocabulary effortlessly. In our research, the blended method of teaching and learning immensely helped the students to improve their English vocabulary. Integrating digital technology with traditional teaching methods fructified and the use of 'Quizizz' in practice tests for gamifying vocabulary learning and the integration of 'Google Forms with AutoProctor' for authentic learning takeaways paid off.

In recent times, the use of Google Forms in assessing English vocabulary has been evident in the research. However, the use of 'Timer+Proctor' that monitored the experimental group made the research more effective. The efficacy of 'Quizizz' in helping improve the Engineering students' English vocabulary was evaluated and, as a result, proved productive. The viability of 'Google Forms with AutoProctor in assessment tests was examined, and using both Quizizz and Google Forms with AutoProctor brought a significant difference between traditional and blended learning.

After four months of training, in the post-test, the control group's Mean (μ_1) was calculated as 12.11, its Variance (S_1^2) as 9.67, and its Standard Deviation (S_1) was 3.109. In contrast, the experimental group's Mean (μ_2) was calculated as 22.98, its Variance (S_2^2) as 6.90, and its Standard Deviation (S_2) was 2.626. The Pooled Standard Deviation (S_{pooled}) (Weighted average of Standard Deviations from both the groups) was identified as 2.826. The difference between Pooled Standard Deviation and Each Group's Standard Deviation in the post-test specified the subtle difference between the control and experimental groups regarding their performance in the post-test. Pooled Standard Deviation (S_{pooled}) demonstrated that it had deviated from the control group's Standard Deviation (s_1) by 0.286 and from the experimental group's Standard Deviation (s_2) by 0.2. This statistical analysis justified that the experimental group performed slightly better than the control group in the post-test after a four-month blended training using quantitative research. Therefore, this research contributes to new knowledge in improving English vocabulary by gamifying the students' learning in their practice tests and precluding them from malpractice during their assessment tests for genuine vocabulary improvement. The results of this study assert that a future study using 'Quizizz' with traditional teaching and learning for digital gamification and Google Forms with AutoProctor for the preclusion of students' malpractice is highly recommended.

Gamification in our research played a vital role in the progression of vocabulary learning of the students and their retention of it as well as keeping the students active in the classroom during their learning. In this research, 'Quizizz' was instrumental in gamifying the English vocabulary during the practice sessions. The use of Quizizz intrigued the participants' engagement in learning and brought about unfailing enthusiasm among the participants of this research. Using Google Forms with the integration of 'AutoProctor' in the assessment tests proctored the students and precluded them from copying their fellow test takers for their genuine learning. Thus, this study answered a couple of research questions mentioned at the outset. Eventually, this

research proved fruitful in the classroom by the researchers because of the digital gamification incorporated and the blended method exercised.

5.1   Limitations of the study

As this research was limited to 10 Word Power Made Easy sessions, as mentioned in the procedure, the vocabulary practised and assessed in this research might not have ensured the participants an enormous amount of lexical repertoire. This research has been limited to four months of training and a cross-sectional study. A longitudinal study requires multiplying the observations over time for better results.

5.2   Prospects for future research

The results in the post-test of this study augur well for future research on a large scale for a longitudinal study using this method. This research proposes the blended learning method for vocabulary learning and the use of 'Quizizz' for gamifying the learning and the use of 'Google Forms with AutoProctor' for the preclusion of malpractice during test taking for tangible learning takeaways.

6   Acknowledgment

7   References

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9 Appendix

9.1 The statistical analysis of the control group results in the post-test

Mean $= \frac{Sum\ of\ all\ the\ observations}{Total\ number\ of\ observations.}$

$\mu_1 = $ (15+15+15+15+15+12+12+12+12+12+10+10+10+10+10+10+14+14+14+14+14 +9+9+9+9+9+9+9+9+9+9+6+6+6+6+6+8+8+20+20+20+20+20+22+22) / 45

$= \frac{545}{45}$

$= 12.11$

$S_1^2 = \sum_{i=1}^n \frac{(x_i - \mu_1)^2}{n-1}$

Variance (S_1^2) $= ((15\text{-}12.11)^2 + (15\text{-}12.11)^2 + (15\text{-}12.11)^{2\ +} + (15\text{-}12.11)^2 + (15\text{-}12.11)^2 +(12\text{-}12.11)^2 + (12\text{-}12.11)^2 + (12\text{-}12.11)^2 + (12\text{-}12.11)^2 + (12\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (10\text{-}12.11)^2 + (14\text{-}12.11)^2 + (14\text{-}12.11)^2 + (14\text{-}12.11)^2 + (14\text{-}12.11)^2 + (14\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (9\text{-}12.11)^2 + (6\text{-}12.11)^2 + (6\text{-}12.11)^2 + (6\text{-}12.11)^2 + (6\text{-}12.11)^2 + (6\text{-}12.11)^2 + (8\text{-}12.11)^2 + (8\text{-}12.11)^2$)/ (45-1)

$= ((2.89)^2 + (2.89)^2 + (2.89)^2 + (2.89)^2 + (2.89)^2 + (-0.11)^2 + (-0.11)^2 + (-0.11)^2 + (-0.11)^2 + (-0.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (-2.11)^2 + (2.11)^2 + (2.11)^2 + (2.11)^2 + (2.11)^2 + (2.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-3.11)^2 + (-6.11)^2 + (-6.11)^2 + (-6.11)^2 + (-6.11)^2 + (-6.11)^2 + (-4.11)^2 + (-4.11)^2$) / 44

$= ((8.35) + (8.35) + (8.35) + (8.35) + (8.35) + (0.01) + (0.01) + (0.01) +(0.01) +(0.01) + (4.45) + (4.45) + (4.45) + (4.45) +(4.45) +(4.45) +(4.45) +(4.45) +(4.45) +(4.45) + (4.45) + (4.45) +(4.45) +(4.45) +(4.45) + (9.67) + (9.67) +(9.67) +(9.67) +(9.67) +(9.67) +(9.67) +(9.67) +(9.67) +(9.67) + (37.33) + (37.33) + (37.33) +(37.33) +(37.33) + (16.89) + (16.89)) / 44$

$= \frac{425.68}{44}$

$S_1^2 = 9.67$

$\mathbf{S_1} = \sqrt{S_1^2} = \sqrt{9.67} = 3.109$

$S_1 = 3.109$

9.2 The statistical analysis of the experimental group results in the post-test

Mean $= \frac{Sum\ of\ all\ the\ observations}{Total\ number\ of\ observations.}$

$\mu_2 = $ (22+22+22+22+22+22+22+22+22+22+23+23+23+23+23+23+23+23+23+23+23 +23+23+23+23+20+20+20+20+20+20+20+20+20+20+20+20+20+20+25+25+25+25 +25+25+25+25+25+25+25+25+25+26+26+26+26+26+26+26+26+26+26+27+27 +27+18+18+14) / 69

$= \frac{1586}{69}$

$= 22.98$

Variance (S_2^2) $=\sum_{i=1}^{n}\frac{(x_i-\mu_2)^2}{n-1}$

$= ((22\text{-}22.98)^2+ (22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 +(22\text{-}22.98)^2 + (23\text{-}22.98)^2 + (23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 +(23\text{-}22.98)^2 + (20\text{-}22.98)^2+(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 +(20\text{-}22.98)^2 + (25\text{-}22.98)^2 + (25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 (25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 +(25\text{-}22.98)^2 + (26\text{-}22.98)^2 + (26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 +(26\text{-}22.98)^2 + (27\text{-}22.98)^2 + (27\text{-}22.98)^2 +(27\text{-}22.98)^2 + (18\text{-}22.98)^2 + (18\text{-}22.98)^2 + (14\text{-}22.98)^2) / (69\text{-}1)$

$= ((\text{-}0.98)^2 + (\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 +(\text{-}0.98)^2 + (0.02)^2 +(0.02)^2 + (0.02)^2 + (0.02)^2 + (0.02)^2 +(0.02)^2 + (0.02)^2 + (0.02)^2 + (0.02)^2 +(0.02)^2 + (0.02)^2 +(0.02)^2 +(0.02)^2 +(0.02)^2 + (\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 +(\text{-}2.98)^2 + (2.02)^2 + (2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 +(2.02)^2 + (3.02)^2 + (3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 +(3.02)^2 + (4.02)^2 + (4.02)^2 +(4.02)^2 + (\text{-}4.98)^2 +(\text{-}4.98)^2 + (\text{-}8.98)) / 68$

$= ((0.96) +(0.96) +(0.96) +(0.96) +(0.96) +(0.96) +(0.96) +(0.96) +(0.96) +(0.96) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (0.0004) + (8.88) +(8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (8.88) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (4.08) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (9.12) + (16.16) + (16.16) + (16.16) + (24.80) + (24.80) + (80.64)) / 68$

$= \dfrac{469.846}{68}$

$S_2^2 = 6.90$

$S_2 = \sqrt{S_2^2} = \sqrt{6.90} = 2.626$

$S_2 = 2.626$

9.3 Pooled standard deviation

Control Group $S_1 = 3.109$ $n_1 = 45$
Experimental group $S_2 = 2.626$ $n_2 = 69$

$S_{pooled} = \sqrt{\dfrac{(n_1-1)\,S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}$ $= \sqrt{\dfrac{(45-1)\,9.67 + (69-1)\,6.90}{45+69-2}}$

$= \sqrt{\dfrac{44\,(9.67) + 68\,(6.90)}{112}}$

$= \sqrt{\dfrac{425.48 + 469.2}{112}}$

$$= \sqrt{\frac{894.68}{112}}$$
$$= \sqrt{7.988}$$
$$= 2.826$$

9.4 Questionnaire

S/No.	Questionnaire	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I am aware of the blend of technology with the conventional way of learning in my classroom	62.7%	33.2%	0%	4.1%	0%
2	I like using technology in my classroom to make my learning interesting	70%	20.3%	7.2%	2.5%	0%
3	I am aware of 'Quizizz' that gamifies vocabulary learning	65%	28.7%	0%	6.3%	0%
4	'Quizizz' motivated me to participate in my classroom activities actively	37.5%	45.9%	8.2%	6.5%	1.9%
5	'Quizizz' can be used synchronously for live activities in the classroom	44%	53.8%	2.2%	0%	0%
6	'Quizizz' made my learning easy and interesting	40.6%	52.3%	0%	7.1%	0%
7	I have taken my vocabulary tests on Google Forms earlier	25.2%	65%	4.6%	10.2%	0%
8	Google Forms could assess my vocabulary learning	24.8%	64.9%	5.3%	3.9%	1.1%
9	Google Forms can be integrated with 'AutoProctor' (Timer +Proctor) for authentic results	2%	11.3%	82.6%	5.9%	0%
10	The use of 'AutoProctor' during test-taking prevents malpractice	0%	3.7%	89.2%	4.3%	2.8%