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Research Article

Autonomous learning and the use of digital technologies in online English classrooms in higher education

Damar Isti Pratiwi [1]
0000-0002-8009-0215

Budi Waluyo [2*]
0000-0003-1919-2068

[1] Railway Mechanical Engineering Study Program, Politeknik Perkeretaapian Indonesia Madiun, Jawa Timur, INDONESIA
[2] School of Languages and General Education, Walailak University, Tha Sala, Nakhon Si Thammarat, THAILAND
[*] Corresponding author: budi.business.waluyo@gmail.com

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ABSTRACT

This study investigated to what degree students can be autonomous in EFL classroom by deploying different digital technologies, including *Google Form, Quizizz, Quizlet, Kahoot!*, and *Socrative*, and the efficacy of these tools in online English classrooms. Utilizing a quasi-experimental research design, a sample of 48 first-year railway mechanical technology students from an Indonesian polytechnic was used and assigned to control and experimental groups. Data was gathered through a survey questionnaire and two tests (pre- and post-test), and was analyzed using descriptive statistics, the *N*-gain formula, the paired-sample t-test and ANCOVA. The results revealed learner autonomy in listening, structure, and reading skills, encompassing self-reliance, information literacy, linguistic confidence, and learning strategy. Digital classes incorporating *Google Form*, *Quizizz*, *Quizlet*, *Kahoot!*, and *Socrative* were more effective than traditional classes in terms of learning outcomes. Therefore, this study proposed a learning model utilizing digital technologies and autonomous learning concepts to improve students' learning outcomes.

Keywords: autonomous learning, digital classroom, digital technology, EFL classroom, online learning

INTRODUCTION

Recent reviews and empirical research on digital technologies and autonomous learning have positively impacted language learners. Technology helps students learn and improve their competencies and achievement levels (Cripps, 2020; Pratiwi et al., 2021a). It also creates a shift in language pedagogy from teacher-centered to student-centered (Mahmud, 2018). Besides, it provides foreign language learners with opportunities for independent learning outside the classroom through an abundance of programs, websites, videos, online lectures, e-books, etc. (Ahmed et al., 2020; Ubaedillah & Pratiwi, 2021). Furthermore, digital technology is viewed as one of the most powerful tools to promote autonomous learning as it supports teachers to be the facilitator in class (Ling et al., 2020; Sadaghian & Marandi, 2021). Learners should take responsibility for their learning, take an active role in the learning context and methods, and evaluate their progress (Choi & Lee, 2020). At the same time, students collaborate to make connections between new ideas and prior knowledge; use language as a tool for learning; and develop language and thinking competencies (Tseng & Huh, 2019).

Among all the benefits, integrating technology and the autonomous learning concept has been proposed as an alternative strategy during the COVID-19 outbreak in the Indonesian EFL context. A recent study found that language learning in new, unconventional settings can be taken beyond the classroom to promote

autonomous learning, which seems to improve students' competency during the online teaching and learning process (Begum, 2019). Therefore, the learning goal of integrating technology and learning concepts is to make learners identify themselves, make decisions, and solve problems in dynamic processes. In this case, teachers are required to be digitally literate to support students with the skills they need to successfully acquire the target language (Cosgun & Savas, 2019). Utilizing e-learning could support the teaching and learning process in terms of a timesaving, borderless place to study and be practical (Mitaľ et al., 2021), which provides learners with high-quality learning access. Moreover, the university must provide the infrastructure for an online class and train teachers and students to use digital tools effectively and efficiently (Bawaneh, 2021).

Considering the beneficial effects of technology utilization on learner autonomy and its suitability for use in online learning, particularly in light of the COVID-19 outbreak, the present study aims to delve further into the relationship between autonomous learning and the implementation of digital technologies in online English classrooms at the university level. It seeks to investigate the degree to which the integration of multiple digital technologies in online English classrooms impacts students' autonomous learning. As previously stated, digital tools in the Indonesian context have been found to distract students during the teaching and learning process, increase plagiarism in students' assignments, and induce a willingness to cheat during examinations (Pratiwi & Ubaedillah, 2021; Ubaedillah & Pratiwi, 2021). This implies that the process of language learning does not encourage the capacity and motivation to act independently and cooperate with others (Najeeb, 2013). Independent learning, which should empower learners to take the reins of their autonomy in the target language (Ueno, 2019), is hindered. Consequently, investigating the nuances of autonomous learner categories in online EFL classrooms is essential to ascertain whether they have the potential to enhance students' learning outcomes. To contextualize the scope and significance of this study, the subsequent section reviews studies connected to autonomous learning and digital technologies.

LITERATURE REVIEW

Autonomous Learning

Learner autonomy is one's ability to take charge of his/her own learning (Ajideh, 2009; Andriani et al., 2018; Genc, 2015; Masouleh & Jooneghani, 2012)–the concept was called autonomous learning. Referring to that definition, language learners must determine learning objectives, define content and progressions, select methods and techniques to be used, monitor the acquisition procedure, and evaluate what has been acquired (Genc, 2015). In this case, the teaching and learning process does not mean being teacherless. Yet, the teacher's role becomes a facilitator that maintains the learning environment by providing curriculum, various materials, and tools, giving unlimited access to the resources, and continuously monitoring students' progress (Masouleh & Jooneghani, 2012). Learning facilities should satisfy learners' needs to stimulate learners' interest and motivation to practice autonomous learning (Saidalvi & Samad, 2019). One of which was by implementing multimedia to acquire language skills more effectively (Pratiwi et al., 2021b).

Autonomous learning was viewed not only as a teaching and learning strategy, but also as a way to understand the true meaning of learning (Andriani et al., 2018). It included content training, choosing activities, online activities, and utilizing ICT tools. Studies in Iranian and Indonesian university contexts have revealed that the technology tools helped encourage learners to be autonomous with support from the teacher to guide learners to various materials and psychosocial encouragement to motivate learners simultaneously (Sadaghian & Marandi, 2021; Yusnimar, 2019). Therefore, autonomous learning enhanced students' performance in listening and speaking, increased students' learning outcomes in reading and writing, and received positive feedback from the EFL learners (Choi & Lee, 2020; Pratiwi et al., 2016; Zulaihah & Harida, 2017).

Nonetheless, challenges might arise due to several factors, including a lack of teacher preparation, students' reluctant attitude, and class timing (Begum, 2019). Several drawbacks were also identified, including student-teacher interaction was less intensive since autonomous learning focuses on the individual learner; some students and teacher were quite uncomfortable because both may employ different learning strategies; it was pretty troublesome to handle strictly different learning achievements of each learner; and all learning

components need an extra hard-working to achieve goals as what has been planned at the beginning (Zulaihah & Harida, 2017). In conclusion, learners' autonomy can be achieved and benefit the students if only a concept is prepared by the teachers in order to learn the target material in the EFL classroom.

Digital Technologies in EFL Classrooms

Regarding modernization, ICT provided society with advanced standards in the context of global information (Ling et al., 2020) and supported the educational environment (Herzog et al., 2018). For instance, the development of multimedia education and e-learning has led to diverse teaching approaches and increased computer literacy for both students and teachers (Mitaľ et al., 2021). ICT integration in language classrooms makes language classes more interactive, flexible, and innovative due to various online resources as tools for valuable professional development (Cosgun & Savas, 2019). Teachers must integrate appropriate technology tools into instructional content and processes, support learners' thinking skills, and design effective technology uses across contexts and populations to address this issue (Asiri et al., 2021). Digitally literate teachers would integrate ICT tools with the learning curriculum and goals to support students' language learning efficiently and effectively; besides, they should encourage students' critical thinking skills and problem-solving through the materials provided. In addition, the implementation of technology also needs to consider learning contexts and the level of students.

Due to the positive impacts, digital technologies are often suggested as a means to facilitate the teaching and learning process in an EFL classroom, particularly during the COVID-19 outbreak (Choi & Lee, 2020). The popular digital tools used in EFL teaching were student response system (SRS) such as *Google Form*, *Socrative*, *Kahoot!, Quizizz*, and *Quizlet* (Rofiah & Waluyo, 2020). Various empirical research on digital technologies, whether on computer-assisted language learning (CALL) or mobile-assisted language learning (MALL), has been put forth and reported for their potential in the teaching and learning of English (Mahmud, 2018; Poudel, 2015; Purcell et al., 2013; Waluyo, 2020). EFL learners enjoyed using technological tools and indicated that digital technologies had become an important skill to bring them closer to the rich environment of the target language (Cripps, 2020: Panmei & Waluyo, 2023). Teachers' attitudes towards digital technologies perceive ICT as an effective tool in facilitating language teaching and learning, motivating students to learn, and developing all language skills (Ahmed et al., 2020). On the other hand, the studies also revealed that the students were not confident in using technologies in a language class. The teacher faced challenges in preparing the curriculum that addressed the use of digital technologies to support autonomous learning (Pratiwi & Ubaedillah, 2021).

The Study

The present study seeks to explore students' perspectives on their EFL autonomy and proves that providing digital tools in autonomous learning concepts as learning support can significantly improve students' learning outcomes in general English and specific skills–listening, structure, and reading. This study attempts to extend the exploration of the learning impacts of digital tools beyond the application in class through autonomous learning concepts. Specifically, the participants are non-English major (railway mechanical technology) students who are required to pass the TOEFL ITP with a minimum score of 450 after 14 meetings. Therefore, the present study addresses the following research questions:

1. How is the students' autonomy developed when digital technologies are employed in EFL classroom?
2. How are the students' learning outcomes in online EFL classrooms implementing autonomous learning concept?
3. Are there statistically significant differences in the learning outcomes of students in traditional and online learning classes?

METHOD

Participant

The study involved first-year students at a vocational university in Indonesia majoring in railway mechanical technology who were enrolled in a general English course in the academic year 2020-2021. There

Table 1. Course plan

Week	Materials	Control group	Experimental group
Week 1	Course introduction		
Week 2	Listening–Short conversation	Book	*Google Form*
Week 3	Listening–Long conversation	Book	*Google Form* & *Socrative*
Week 4	Listening–Monolog	Book	*Google Form* & *Kahoot!*
Week 5	Review listening	Book	*Google Form* & *Quizizz*
Week 6	Structure	Book	*Socrative* & *Kahoot!*
Week 7	Written expression	Book	*Socrative* & *Quizizz*
Week 8	Written expression	Book	*Socrative* & *Quizlet*
Week 9	Review structure & written expression	Book	*Kahoot!* & *Quizizz*
Week 10	Reading	Book	*Kahoot!* & *Quizlet*
Week 11	Reading	Book	*Quizizz* & *Quizlet*
Week 12	Reading	Book	*Socrative* & *Quizlet*
Week 13	Review reading	Book	*Kahoot!* & *Quizizz*
Week 14	Review–Listening, structure, & written expression & reading	Book	*Google Form*

were two classes consisting of 24 students in each class (n=48), which were divided into two groups: control (21 males and three females) and experiment groups (20 males and four females) using the purposive sampling method. The students ranged from 18-20 years old, whose first language was Indonesian, and English as their foreign language. They were required to pass the TOEFL ITP test with a minimum score of 425; thus, the general English course was taught using TOEFL material instead of English in daily communication or ESP (English for specific purpose) like English for railway mechanical technology. Before starting the course, informed consent was delivered to each student, stating that their identity was reported anonymously and that the research results would not affect their course study.

Research Design and Implementation

A quasi-experimental research design was implemented in this study by having one class as a control group and one class as an experimental group (**Table 1**). Both classes were conducted online through the *Zoom* meeting platform and lasted for 14 meetings. The control group was taught using traditional learning concepts by utilizing the book's printed material. In contrast, the experiment group was taught using autonomous learning concepts utilizing digital tools such as *Google Form, Socrative, Kahoot!,* and *Quizizz.* A pre-test was given before students started the class, while a post-test was given after the class finished.

Since the teaching and learning process had to be done online, the classroom has moved from the face-to-face method to the face-to-screen method through the *Zoom* meeting platform. For 14 meetings, both groups used the Zoom application. The control group used the printed book and discussed the content through *Zoom* meetings, while the experimental group was given treatment through digital technologies. The first week was a course introduction in which the teacher explained the course plan, materials, and ICT tools used for the experimental group. The teacher has provided the link for independent learning outside the classroom. The main ICT tools used in SRS platforms include *Google Form, Kahoot!, Socrative, Quizizz, Quizlet,* and some supporting practices through free-access websites and e-books.

The second meeting was listening to a short conversation. In this meeting, the teacher introduced *Google Form* as the ICT tool used in class. The listening audio has been inserted into the *Google Form* so the students can practice by themselves after class instead of practicing through the e-book and website links given. The third meeting was listening to a long conversation. *Socrative* is the primary learning platform besides *Google Forms*, e-books, and website links like in the previous meeting. At the fourth meeting, it was listening to the monolog. *Kahoot!* was used as the main learning tool. At the next meeting, *Quizizz* was utilized as the primary digital platform instead of e-books and website links to facilitate students' practice outside of the class.

Structure and written expression materials were taught for four meetings. The sixth meeting utilized *Socrative* and *Kahoot!* applications. While the seventh and ninth meetings utilized *Socrative* and *Quizizz,* the eighth meeting utilized *Socrative* and *Quizlet*. Like listening and structure, reading lasted for four meetings, from week 10 to 13. Starting from the tenth week, which utilized *Kahoot!* and *Quizlet*, the following week applied *Quizizz* and *Quizlet*. On the 12th week, *Socrative* and *Quizlet* were utilized in the class, while on the 13th week, *Kahoot!* and *Quizizz* were used as the digital platforms. At the last meeting, the teacher used *Google*

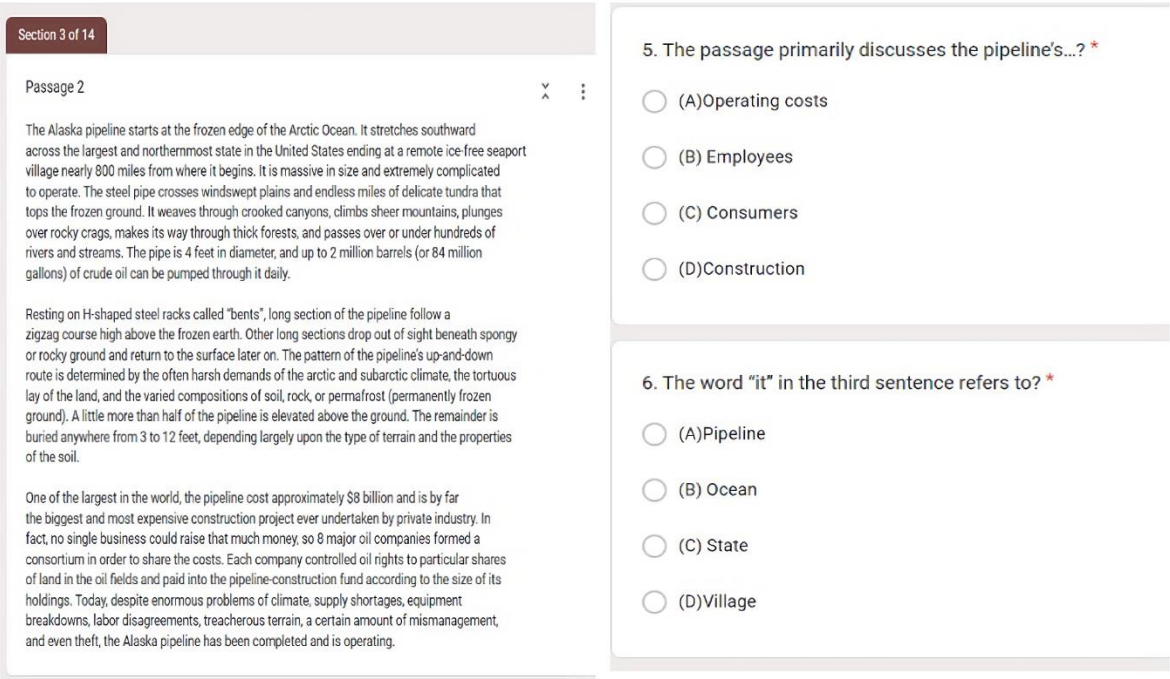

Figure 1. Sample of the reading quiz using *Google Form* (Source: Authors' archives)

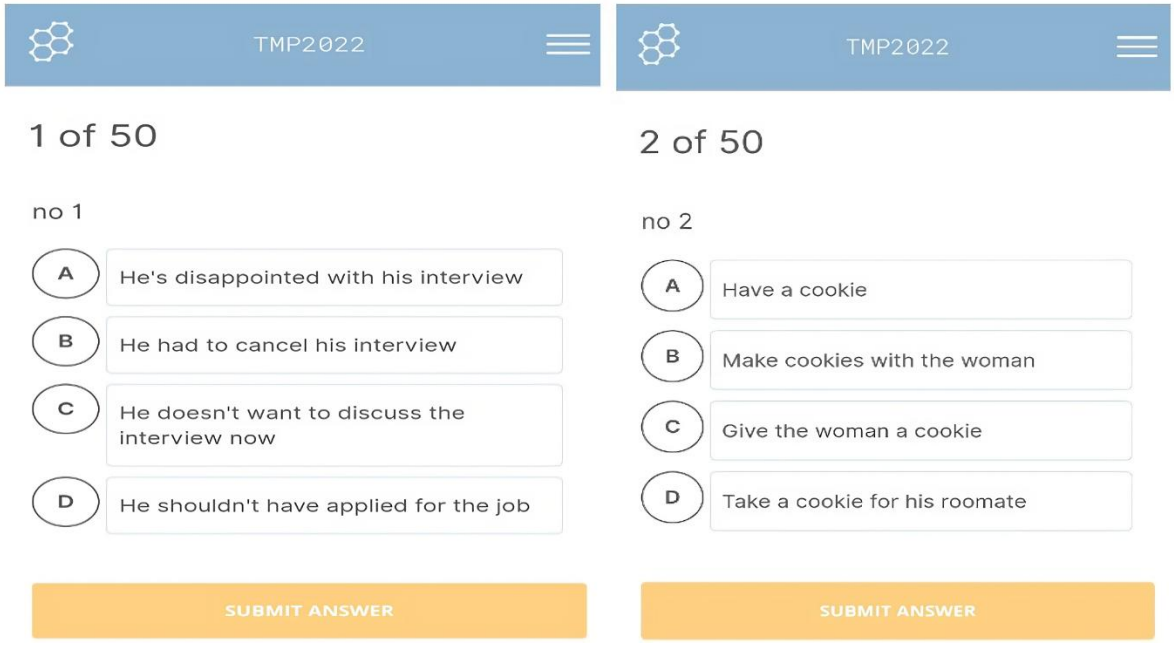

Figure 2. Sample of the listening exercise using *Socrative* (Source: Authors' archives)

Form as the ICT platform. *Google Form* was also used for the experimental group to have a pre- and post-test, while the control group did the test on paper.

Figure 1, **Figure 2**, **Figure 3**, **Figure 4**, and **Figure 5** shows samples of quizzes used in digital technologies.

Data Collection

This study employed two data collection procedures: a questionnaire and a test (pre- and post-test). After the program ended, the questionnaire was distributed to experimental group students (n=24) to identify learners' autonomy in an online EFL class with digital technologies. It investigated learner autonomy in three skills–listening, structure, and reading, including four categories: self-reliance, information literacy, linguistic

Figure 3. Sample of the structure exercise using *Kahoot!* (Source: Authors' archives)

Figure 4. Sample of the written expression quiz using *Quizizz* (Source: Authors' archives)

confidence, and strategy (metacognition). Each category consists of three questions, so there were 12 items in total. It employed a Likert scale of four with strongly agree, agree, disagree, and strongly disagree as indicators.

To be effectively understood by the participants, the questionnaire was distributed in two languages: English and Bahasa–as the students' target and native language. The validity of the questionnaire was checked through Lawshe's method of CVR (content validity ratio), and the reliability was calculated using an alpha coefficient (Cronbach's alpha) (Mondal & Mondal, 2017; Taherdoost, 2016).

Using eight panelists, the CVR results for the 12 items were >0.75, which meant all items were valid. The reliability of all items appeared to be >0.8, which meant reliable. **Table 2** shows the student's questionnaire.

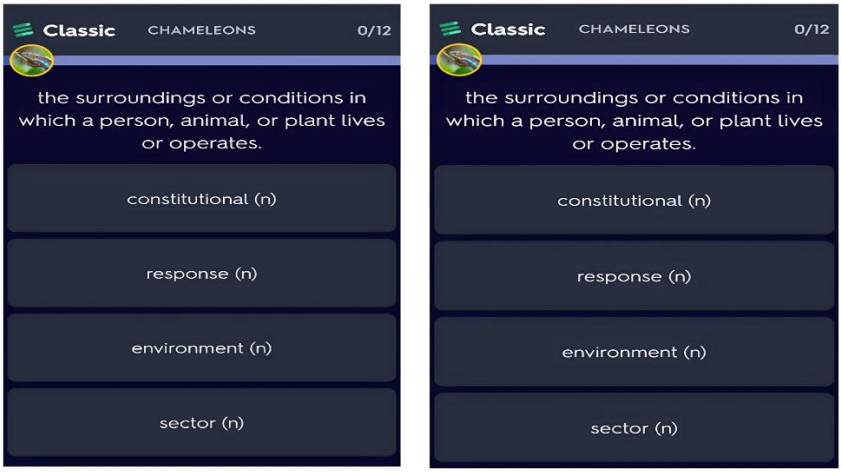

Figure 5. Sample of the vocabulary learning using *Quizlet* (Source: Authors' archives)

Table 2. Student's questionnaire

No	Statements
1	I listen to digital text on my own.
2	I understand the structure of the digital text on my own.
3	I read digital text on my own.
4	I am good at making listening choices using digital technologies.
5	I am good at making structure material choices using digital technologies.
6	I am good at making reading choices using digital technologies.
7	I choose listening to exercises on my own using digital technologies.
8	I choose structure exercises on my own using digital technologies.
9	I choose reading exercises on my own using digital technologies.
10	In listening to digital technologies, I can choose the method that suits me best.
11	In understanding structure with digital technologies, I can choose the method that suits me best.
12	In reading with digital technologies, I can choose the method that suits me best.

The test was administered to determine the students' learning outcomes in three skills: listening comprehension, structure and written expression, and reading comprehension. The pre-test was given before the program started, and the post-test was given after the program ended. Both tests were in the multiple-choice format, as this was easy to construct and mark (McLean et al., 2020).

The test items were taken from TOEFL ITP, the standardized test commonly used in Indonesian universities. There were three parts to the test: listening comprehension (50 items), structure and written expression (40 items), and reading comprehension (50 items). As this was a standardized test, all items did not need to be checked for validity and reliability. The test was given in a paper-based format for the control group, while the experimental group was delivered in *Google Form*. **Figure 6** depicts the sample of the test.

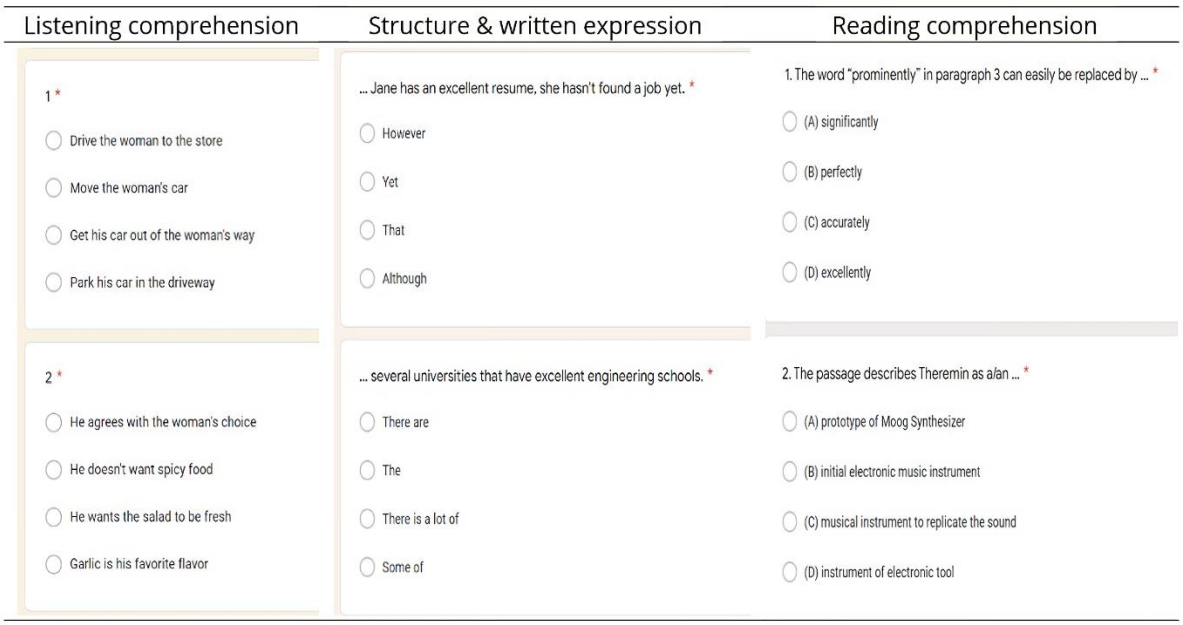

Figure 6. Sample of the test (Source: Authors' archives)

Data Analysis

The questionnaire results were tabulated and categorized to know the extent of EFL students' autonomy in learning using digital technologies. The analysis was in descriptive statistics using SPSS 25.0. Meanwhile, the control and experimental groups' test results were compared using the *N*-gain score formula to know the effectiveness of learning through digital platforms. This was done in Microsoft Excel and described based on the N-gain score category. The effectiveness differences between the control and experimental groups were then determined by comparing both results. Furthermore, the tests were analyzed in a paired-sample t-test and Cohen's d coefficient using SPSS 25.0 to find out the impact of the learning method in each group: traditional and digital.

Before analyzing the data through the selected method, the normality was first checked by looking at the values of *skewness* and *kurtosis*. The values between +2 and -2 indicated a normal distribution (George & Mallery, 2003).

Table 3. Descriptive statistics

	Mean	Standard deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Standard error	Statistic	Standard error
Experimental group post-test results						
Listening	47.00	5.61	.15	.47	.06	.92
Structure	46.79	6.32	.42	.47	-.60	.92
Reading	47.43	4.45	-.23	.47	-.66	.92
Total	47.13	3.24	1.08	.47	.32	.92
Control group post-test results						
Listening	42.83	3.81	1.09	.47	1.88	.92
Structure	40.79	4.18	.37	.47	-1.03	.92
Reading	42.75	4.28	-.96	.47	1.05	.92
Total	42.21	2.02	.21	.47	-.66	.92
Experimental group pre-test results						
Listening	42.33	4.39	-1.37	.47	1.59	.92
Structure	40.42	3.50	.87	.47	.79	.92
Reading	44.42	3.31	.09	.47	-.11	.92
Total	42.42	1.25	-.75	.47	.87	.92
Control group pre-test results						
Listening	40.54	3.40	-.32	.47	.08	.92
Reading	39.08	3.20	.75	.47	.23	.92
Structure	41.17	4.40	-.55	.47	-.41	.92
Total	40.33	1.86	.09	.47	-1.44	.92

As displayed in **Table 3**, all the values of *skewness* and *kurtosis* of students' tests fall within the suggested range. The normality was tested again using a z-test proposed by Kim (2013), where the skew values were divided by their standard errors. Kim (2013) proposed, "for small samples (n<50), if absolute z-scores for either *skewness* or *kurtosis* are larger than 1.96, which corresponds with an alpha level 0.05, then reject the null hypothesis and conclude the distribution of the sample is non-normal (p. 53)." The results of the study demonstrated a heterogeneous outcome, with some of the data displaying a normal distribution, while others did not. As this study focused on student scores, which have a propensity to be non-normal data due to varying cognitive capacities, the results of the two normality tests conducted earlier provided evidence of normality.

RESULTS AND DISCUSSION

Questionnaire Results

Learner autonomy could be revealed from questionnaire results, which consisted of 12 items on the four-point Likert scale (**Figure 7**). Among 24 participants, 66.67% (16 students) were determined as autonomous learners, and 33.33% (eight students) appeared as non-autonomous learners in EFL with digital technologies. More than half of the students belonged to autonomous learners in the total number of each category, except in the 'strategy (metacognitive)' category in which the percentage of autonomous learners and non-autonomous learners was equal (50%, 12 students).

Specifically, in the 'self-reliance' category, the students were more autonomous in reading (23 students, 95.83%) and listening (17 students, 70.83%). Yet, in structured skills, the students were categorized more as non-autonomous learners (14 students, 58.33%). In the second category, information literacy, students were 100% (24 students) autonomous in their listening skills, and 79.17% (19 students) were autonomous in reading. The students were detected more as non-autonomous learners (15 students, 62.5%) in structure for the information literacy category than in those two previous skills. In the next category, linguistic confidence, the students were more autonomous in all skills – listening (13 students, 54.17%), structure (20 students, 83.33%), and reading (21 students, 87.5%).

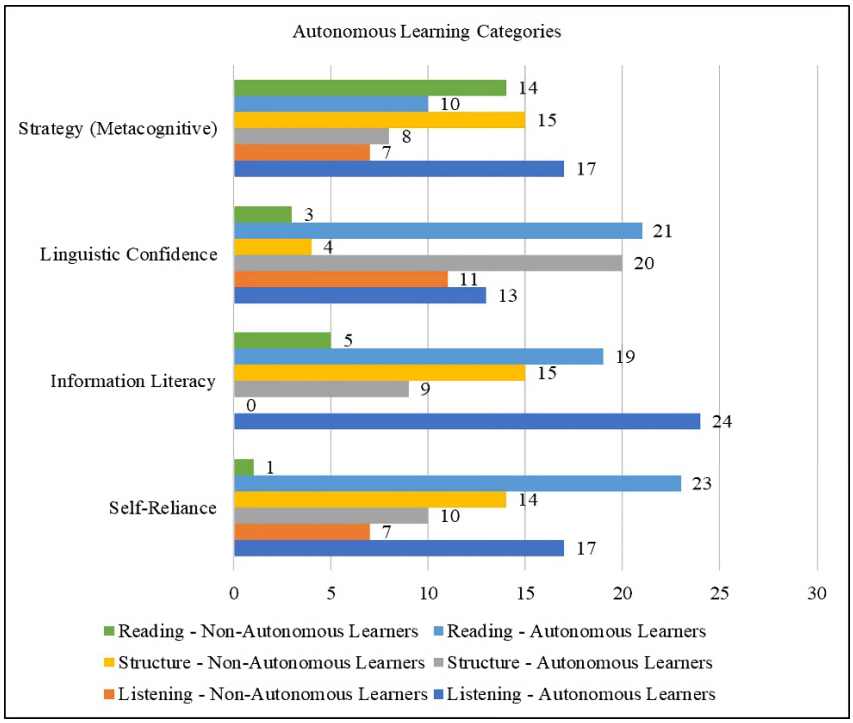

Figure 7. Questionnaire results (Source: Authors' archives)

Table 4. *N*-gain results

	N-gain score	*N*-gain category
Listening	.28	Low
Structure	.44	Medium
Reading	.30	Medium
Total	.36	Medium

Apart from autonomous learning categorization, the data could be analyzed through autonomy in each skill. Generally, the students were autonomous in reading (76.04%) and listening (73.96%). In structure, the autonomous and non-autonomous learners were equal (50%). In particular, in listening skills, the students were the most autonomous in the information literacy category (100%) and the least autonomous in the linguistic confidence category (54.17%). As for the self-reliance and strategy categories, the learner autonomy hit the same point at 70.83%. In structural skills, the autonomy was only in the linguistic confidence (83.33%), while the rest were non-autonomous. In reading skills, three categories were autonomous–"self-reliance" (95.83%), "linguistic confidence" (87.5%), and information literacy (79.17%)–and the strategy category was determined as non-autonomous for EFL learners in online classes utilizing digital technologies.

Test Results

An *N*-gain score analysis was performed on the students' tests (pre- and post-test) scores of the experimental group to determine the effectiveness of digital technologies in the EFL classroom. The results showed that the overall effectiveness, structure, and reading section were all on the medium side (**Table 4**). In the listening section, implementing digital technologies in the EFL class showed low effectiveness in improving students' scores.

A paired-sample t-test analysis was performed on students' test scores of the control and experimental groups (**Table 5**). It aimed to find out the statistical differences between learning methods for traditional and digital technologies in the EFL classroom of railway mechanical technology students. The confidence interval was set at 95%. In the control group, which implemented a traditional learning design, the effect size was small for each skill tested and medium for the total scores. This showed fair progress for students in the control group. In the experimental group, which implemented digital technologies, the effect size was small for each skill tested and significant for the total scores. This meant that learning using digital technologies showed significant progress in students' learning outcomes.

Table 5. Results of paired-sample t-test

	Paired differences					t	df	Sig.	Corr.
	Mean	Standard deviation	Standard error mean	95% confidence interval of difference Lower	Upper				
Control group									
Listening	4.67	6.98	1.43	1.72	7.62	3.27	23	.003	.041
Structure	6.38	7.70	1.57	3.12	9.63	4.06	23	.000	-.159
Reading	3.00	5.92	1.21	.50	5.50	2.48	23	.021	-.145
Total	4.71	2.69	.55	3.57	5.85	8.56	23	.000	.590
Experimental group									
Listening	2.29	3.91	.80	.64	3.94	2.87	23	.009	.417
Structure	1.71	5.23	1.07	-.50	3.92	1.60	23	.123	.014
Reading	1.58	5.81	1.19	-.87	4.04	1.34	23	.195	.104
Total	1.88	.537	.11	1.65	2.10	17.12	23	.000	.965
Control group & experimental group (post-test)									
Listening	-4.17	4.52	.922	-6.08	-2.26	-4.519	23	.000	.598
Structure	-6.00	7.75	1.58	-9.27	-2.73	-3.792	23	.001	-.049
Reading	-4.67	6.14	1.25	-7.26	-2.07	-3.723	23	.001	.10
Total	-4.92	1.53	.312	-5.56	-4.27	-15.74	23	.000	.935

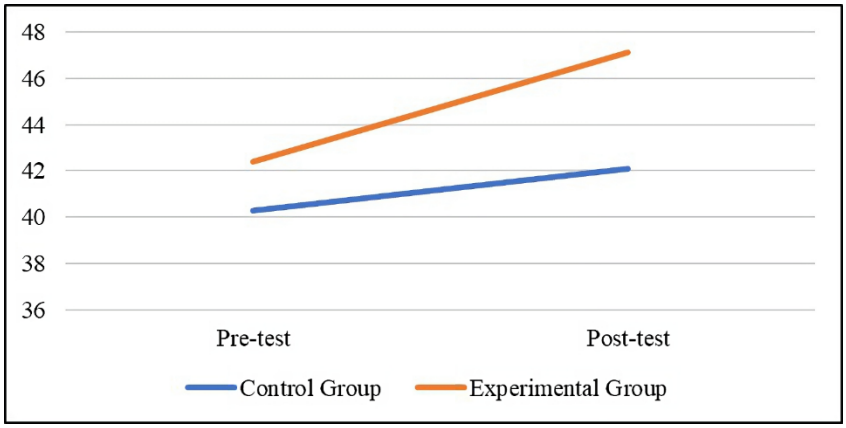

Figure 8. Students' scores improvement (Source: Authors' archives)

Meanwhile, the comparison of control and experimental groups in post-test results showed small effect sizes in structure and reading skills, and large effect sizes in listening skills and total scores. From the line chart displayed in **Figure 8**, regardless of the higher pre-test scores in the experimental group, it could be seen that students in the control group improved their scores moderately. In contrast, students in the experimental group improved their scores significantly.

Moreover, to clarify more of the significant differences, ANCOVA tests were performed. The results showed that on the total scores, the students in the experimental groups (M=47.13, SD=3.23) outperformed those in the control group (M= 42.21, SD=2.02): F=12.87, p=.001, with a large effect size ($\eta^{2=}$.22). It accounted for 73% of the variance in the outcome variable (R^2=.73). The significant differences were also noted in students' scores in listening (F=7.18, p=.010) with a large effect size ($\eta^{2=}$.14; R^2=.19), in structure (F=15.20, p<.001) with a large effect size ($\eta^{2=}$.25; R^2=.25), and in listening (F=11.45, p=.001) with a large effect size ($\eta^{2=}$.20; R^2=.23).

DISCUSSION

The primary objective of this study was to examine the link between autonomous learning and use of various digital technologies (*Google Form, Kahoot!, Quizizz, Quizlet*, and *Socrative*) in an online English learning in higher education. The first research question explored how the students' autonomy was developed when digital technologies were employed in the online EFL classroom. The questionnaire results revealed that the learners' autonomy in the EFL classroom utilizing digital technologies differed in the three skills–listening, structure, and reading. The differences were shown from the four categories explored in the strategy: self-reliance, information literacy, linguistic confidence, and strategy (metacognitive). Promoting autonomous

learning was significant in four categories of listening skills, but the students' learning outcomes improved insignificantly. This finding contrasts with the study of non-English major students in another Indonesian university, which significantly improved autonomous learning and students' learning outcomes (Recard et al., 2019). An experimental study in a Chinese university also showed that the learners were autonomous in their listening skills and significantly improved their learning outcomes (Guo, 2012). The contrastive results lead to an idea of providing the students with other platforms of digital technologies instead of using SRS such as *Google Form, Kahoot!, Socrative, Quizizz*, and *Quizlet* for listening skills. For instance, two experimental studies in the EFL learners' context have proved that using video or YouTube videos enhanced students' scores.

In reading skills, the students were autonomous in all categories, except the 'learning strategy'. This finding adds to knowledge that the students had difficulty finding the learning strategy for learning reading autonomously (Kizil, 2017). Kucukoglu (2013) explained that being autonomous in 'learning strategy' was very important in enhancing reading skills. Thus, the teacher had to guide and monitor the students using appropriate learning strategies in reading skills to improve learning outcomes in the reading section. Gulsen and Mede (2019) suggested using a cooperative learning strategy in learning reading to promote learners' autonomy. The teacher is encouraged to introduce the strategy to the students at the beginning of the class. This autonomy resulted in students' scores improving significantly, with medium effectiveness. This finding supports the previous study conducted in Saudi Arabia, which revealed that MALL improved learners' autonomy and their scores in reading skills (Hazaea & Alzubi, 2018).

On the other hand, some of the students were autonomous only in the 'linguistic confidence' category, while others were non-autonomous in structure skill. However, the students' scores showed significant improvement with medium effectiveness. This finding adds a positive impact in linguistic confidence autonomy to improve students' learning outcomes as the previous study conducted in the Indonesian university context on the TOEFL preparation program (Thu, 2019). It is suggested that teachers have to introduce an appropriate learning method in learning structure skills to achieve what they have learned. By providing appropriate learning methods that suit students' needs, the learning outcomes could improve significantly (Ubaedillah et al., 2020; Pratiwi & Waluyo, 2022).

The second and third research questions evaluated the students' learning outcomes in online EFL classrooms that employed the autonomous learning concept and compared them to those of traditional online learning classes. Summarily, the results indicated that students' learning outcomes were enhanced as the learners achieved autonomy, influenced by self-reliance, information literacy, linguistic confidence, and learning strategy (Ulla & Perales, 2021). In accordance with prior studies, there are several impediments in the utilization of ICT tools in fostering autonomous learning (Cosgun & Savas, 2019). The external factors included slow internet connection, technical difficulties, limited ICT training and workshop availability, the school's technology infrastructure, paid websites, and inappropriate materials (Goh, 2019; Ubaedillah et al., 2021). The internal factors encompassed lack of motivation of students and teachers, the difficulty of selecting the correct material, and time-consuming (Loan, 2019; Sulaiman et al., 2020). This was corroborated by a study in a Korean university context, which elucidated several factors that affected students' autonomous learning in an online EFL class utilizing digital technologies: interest, motivation, value, comfort, confidence, and satisfaction in the use of digital technologies (Choi & Lee, 2020).

Implication and Limitation

The findings of the present study implicate the model of utilizing digital technologies to promote autonomous learning beyond the classroom. The concept is to provide students with learning support in and out-of-class to learn the study target during an online class in the COVID-19 outbreak, that is, TOEFL material – listening, structure, and reading (**Figure 9**). Providing sufficient learning support is assumed to promote learners' autonomy, which will result in students' improvement in each skill and total scores. Thus, it is suggested that teachers of EFL classrooms, especially those in non-English major departments, utilize digital technologies in the teaching and learning process.

This study has certain limitations as it was only conducted in two classes of a non-English major at an Indonesian university with quasi-experimental research. There needs to be some improvements that may result in different findings when carried out on English major students with different research methods and action research to know the learning process of digital class in promoting learning autonomy. Since digital

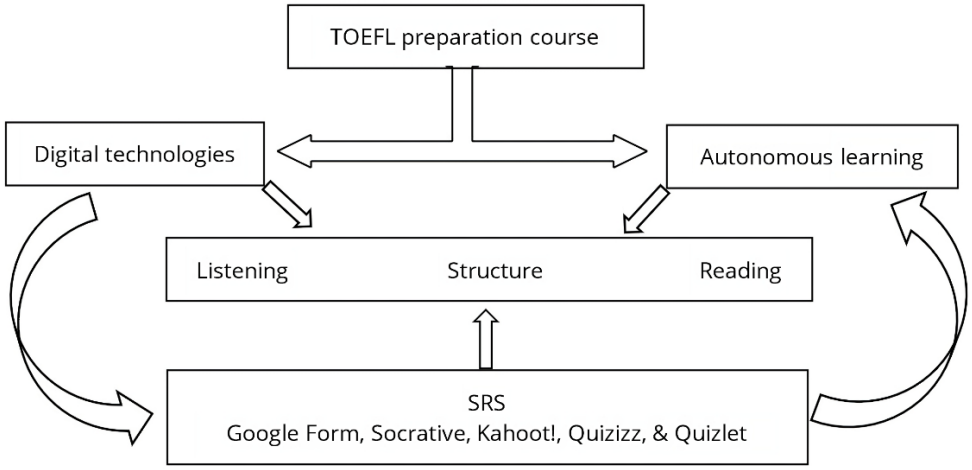

Figure 9. Proposed digital class concept (Source: Authors' archives)

technologies can help create an effective learning method that promotes autonomous learning, especially during online teaching and learning, more studies should be conducted to give in-depth language pedagogy. The proposed model of using digital technologies and self-directed learning in general English classes could help EFL teachers and students learn more.

CONCLUSION

This research has revealed the degree of learners' autonomy in listening, structure, and reading abilities. Four categories of autonomous learning are implicated in this study: self-reliance, information literacy, linguistic confidence, and learning strategy (metacognitive). This matter is critical during the COVID-19 crisis as all classes have shifted from face-to-face to face-to-screen, which integrates digital technologies in all aspects. Autonomous learning is believed to improve students' learning outcomes, which also benefits them during the online teaching and learning process as they must learn independently. The learning model utilizing digital technologies to advance autonomous learning has been suggested, and the three research questions have been addressed exhaustively. Although learners' autonomy yields varied results, students' learning outcomes demonstrate noteworthy improvement in a digital class compared to a traditional class. Thus, it ought to be taken into consideration that the efficacy of digital classes to encourage autonomous learning is affected by internal and external factors of EFL online learning (Waluyo et al., 2022).

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