



Time token model and wordwall interactive game in learning: effectiveness on communication and collaboration skills



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ABSTRACT

The learning in Biology Education Study Program at Sembilanbelas November Kolaka University, which was specifically designed to hone students' communication and collaboration skills, was considered not optimal. Therefore, a study was conducted to determine the effectiveness of integrating the time token learning model and wordwall application-based interactive games on student communication and collaboration skills. This research is a pre-experimental type with a one-group treatment design. The population was 144 students', and 24 samples were obtained through the purposive sampling technique. The research data was collected through observation techniques with communication and collaboration skills observation sheets as instruments. Data were analyzed descriptively and inferentially followed by the N-Gain test. The results showed that the average scores for communication and collaboration skills before and during treatment were respectively 45.31 and 78.53; 42.19 and 86.64. The results of the paired sample t-test all show the sig. $0.000 < 0.05$. The results of the N-Gain test on communication skills were 61.93% (effective enough category) and collaboration skills were 78.75% (effective category). Thus, it can be concluded that integrating time token learning models and interactive games based on wordwall applications effectively improves students' communication and collaboration skills.

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INTRODUCTION

Nowadays, the presence of higher education as an educational institution is expected to be able to produce graduates with certain expertise to fulfill human resources in the industrial sector



(Bary & Febrinda, 2020). The hope is that graduates with good quality will be easily absorbed in the world of work or be able to present positive activities in society (Rachmawati, 2012). Formation of expertise through a variety of courses not only instills aspects of knowledge and hard skills but also soft skills (Ampera, 2017). However, "educated unemployment" is still found and becomes a problem. There is a mismatch of skills required by companies, one of which is related to the gap in soft skills (Dubey & Tiwarib, 2020; Murugan et al., 2020). Janove (2020) on the Society for Human Resource Management (SHRM) website explains that 46% of new employees experience failure within 18 months period and 89% is caused by low soft skills.

The cultivation of soft skills from academic institutions is still considered less than optimal by industry circles (Murugan et al., 2020). Higher education as an academic institution plays a major role in shaping the hard skills and soft skills of prospective graduates (Hakiki et al., 2020). If hard skills are needed to complete specific jobs, then soft skills are needed for all types of work. Thus, soft skills are seen as very important in supporting a graduate's career. Therefore, internalizing soft skills in the learning process is something that must be done. The soft skill itself is an individual's ability to establish relationships with other individuals and the ability to self-regulate to be able to work optimally (Firdaus, 2017). Based on a survey by the National Association of Colleges and Employers (NACE) (2022), collaboration and communication skills are two of the top four soft skills that employers look for when selecting prospective job candidates.

Communication skill is defined as a person's skill in using resources (sorting, selecting, and sending appropriate symbols) effectively so that the communicant can interpret and respond according to what is meant by the communicator (Karyaningsih, 2018). The ability to collaborate, which is also commonly referred to as the ability to work together, is defined as the ability of individuals within groups and between groups to be able to support each other so that solidity is built in achieving common goals (Pratiwi et al., 2018). It should be understood that to maximize collaborative activities interpersonal skills such as communication skills are needed. Thus, these two abilities have interrelated key roles.

Communication and collaboration skills are needed in today's professional and social world, both in the context of (a) individuals, (b) teams, and (c) organizations (Partono et al., 2021). Communication and collaboration skills complement each other. According to Rachman et al. (2023), strong communication skills help build the foundation for effective collaboration, while collaboration skills require good communication to facilitate coordination, joint problem-solving, and good decision-making. The two together enable individuals, teams, and organizations to better achieve their goals, generate innovation, and maintain good relationships with others.

Currently, the Biology Education Study Program at Sembilanbelas November Kolaka University (USN Kolaka) is trying to help students prepare themselves to face the competition in the world of work. Of course, the study program must be able to guarantee that all graduates can be absorbed into the labor market. Through one of its missions, namely organizing learning programs with maximum service standards, learning practices should be directed at being able to build various skills, including communication and collaboration skills. Learning practices within the Study Program's scope which are specifically designed to hone students' communication and collaboration skills are considered not optimal. Based on the results of reflection on learning and observations that the writer did, it was found that students rarely asked and answered questions from lecturers, students had not been able to communicate their ideas, and had not been able to compromise to unite ideas in groups so that they did not get the best results in solving problems. This condition shows that students' skill to communicate and collaborate is still low.

An alternative solution to overcome the above problems is to involve an innovative learning model that emphasizes experiential learning through communication and collaboration activities.



One cooperative learning model that is considered appropriate for teaching social skills is the time token learning model (Susatyo, 2021; Veryani & Astuti, 2022). Cooperative learning in a university environment can be an effective way to influence student academic goals by ensuring that students work together and interact to achieve learning goals (Mendo-Lazaro et al., 2022). According to the meaning of the time token syllable, namely "time" and "token" which means sign. According to Susatyo (2021), this time limit serves as a stimulus for students so they can explore thinking activities and communicate their ideas. Each group member will be given a speaking limit of 30 seconds. Thus, all students in the group fairly get the same opportunity without any domination.

To optimize student communication and collaboration activities through the time token learning model, the involvement of information technology is necessary. Wordwall is a digital-based application that displays various forms of quizzes by combining sound, color, and moving images into an interactive game (Khairunisa, 2021). This facility can be utilized by educators as a media aid in learning as well as an assessment tool. Therefore, besides functioning as an educational tool, it is hoped that word wall-based games can also create a dynamic and entertaining learning environment.

In previous studies in the field of education, the time token cooperative learning model was implemented separately with wordwall games, where the time token model was applied to improve student's communication skills and social skills (Siregar, 2019; Dewi et al., 2020). Meanwhile, the wordwall game is utilized to improve students' vocabulary acquisition and learning activeness (Harmon et al., 2009; Harsanti & Lathifah, 2023). So the combination of the implementation of the time token model and wordwall-based interactive games is considered very appropriate and is expected to further maximize the improvement of learning quality, especially in building students' social skills such as communication and collaboration skills. Concerning the previous explanation, a study was conducted to determine the effectiveness of integrating the time token learning model and wordwall-based interactive games on the communication and collaboration skills of Biology Education students at USN Kolaka.

RESEARCH METHODS

Research Design

This research is a quantitative type of pre-experimental research, namely research that does not involve a control group (Alonemarera et al., 2023). The research design can be seen through the schematic in Figure I.

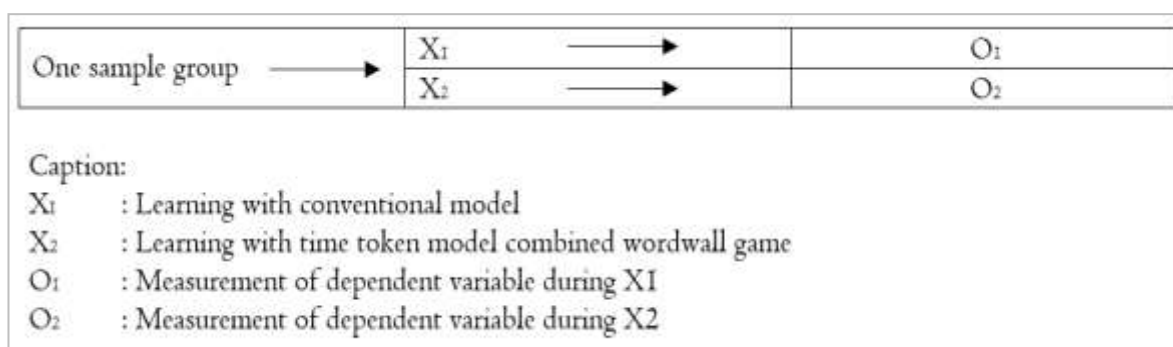


Figure I. One-Group Treatment Design.

Population and Samples

The population of this study was all active students of the USN Kolaka biology education study program of the 2022/2023 academic year, totaling 144 people. Through the purposive



sampling technique, 24 students of the fourth semester were determined to be joined in I study group as the research sample. The choice of purposive sampling technique was due to limited access. It was difficult for researchers to access the entire population they wanted to study. In this situation, purposive sampling allows the researcher to select a sample that can be accessed more easily but still represents the larger population. The biology education study program of USN Kolaka's students only has 1 class in each level and these 4th semester students have the largest number of class members among the classes actively studying.

Instruments

The research data was obtained through observation techniques with research instruments in the form of (1) communication skills observation sheets containing 6 aspects of assessment, namely (a) oral communication, (b) receptive communication, (c) understanding of communication intentions, (d) use of communication strategies, (e) communicate clearly, (f) presentation skills of a message; and (2) an observation sheet on collaboration skills which contains 4 aspects of assessment, namely (a) working productively, (b) respecting opinions, (c) compromising, (d) shared responsibility. As a supporter, an observation sheet of the implementation of the learning model syntax is used. The instrument was used when the learning process was in progress, namely when the learning process was with the conventional model (called before treatment) and when the learning process applied the time token model combined with the wordwall game (called during treatment). Before being used, the instruments were first validated by experts, and validity values of 0.76; 0.82; and 0.86 were obtained based on Azwar's (2015) validity categorization.

Procedures

The steps for learning time tokens in this study were adapted from Asnita & and Khair's research (2020) as follows. (1) Lecturer conveys learning objectives; (2) Lecturer condition students to carry out learning through games in groups, including dividing students into 6 groups; (3) The lecturer arranges the tasks for each group; (4) The lecturer gives 15 minutes for each group to discuss and share information; (5) Each group member is allowed to speak/explain for 30 seconds regarding the answers raised from random questions that appear on the wordwall game feature screen; (6) Each group member hands over the token first to the lecturer before giving comments. One token is valid for one speaking opportunity. Students who run out of tokens cannot talk anymore. Students who still have tokens must use their time until it runs out to talk. And so on until all group members have spoken; (7) The lecturer assesses according to the time each student uses in speaking. To obtain convincing information, the data was collected before treatment and when the treatment was repeated 3 times each for both communication and collaboration skills data.

Data Analysis

The research data were analyzed descriptively and inferentially. Before inferential analysis, the Saphiro-Wilk data normality test was first carried out. Ahadi & Zain's (2023) research concluded that the Shapiro-Wilk test can be used if the sample size is small. According to Biu et al. (2020), a sample is considered small if the number is ≤ 40 . A homogeneity test was not carried out because this study only used one sample group. Sianturi (2022) in his research stated that the homogeneity test is used only if a study involves two or more sample groups. This was confirmed by Usmadi (2020) in his research that the homogeneity test was carried out as a prerequisite in the independent sample t-test and ANOVA analysis.

The determination of the category of communication and collaboration skills (Saeful, 2022) can be seen in Table I.



Table 1. Category Communication and Collaboration Skills

Value	Category
≤ 60	Not enough
61 – 70	Enough
71 – 80	Medium
81 – 90	Good
91 – 100	Very good

Students are considered to have communication and collaboration skills if each of them has reached the medium, good, or very good category. Corrective action is needed if it is in the not enough or enough category. To determine whether there is a treatment effect, a paired sample t-test inferential statistical test is performed with a significance level of 5%. Furthermore, to determine the level of interpretation of the effectiveness of the treatment, it is continued with the N-Gain test. The level of interpretation of effectiveness based on the N-Gain value (Hake, 1999) can be seen in Table 2.

Table 2. Category Interpretation of N-Gain Effectiveness

Percentage (%)	Interpretation
< 40	Ineffective
40 - 55	Less effective
56 - 75	Effective enough
≥ 76	Effective

Treatment is considered to have a positive impact as expected if the N-Gain meets the description of being effective enough or effective. Corrective action is needed if the N-Gain only meets the description of less effective or ineffective. Both descriptive and inferential statistical tests were performed with the help of IBM's SPSS software version 20.

RESULTS

The entire syntax of the time token model is fully implemented (100%) in the learning process. Data on student communication and collaboration skills are obtained by determining the average of 3 repetitions of data retrieval each when the learning process has not yet implemented the time token model combined with the wordwall game and when applying the time token model combined with the wordwall game to produce 2 groups of data in general. Furthermore, the data were analyzed descriptively and the results can be seen in Table 3.

Table 3. General Analysis Results of Student Communication and Collaboration Skills

Value	Communication Skill		Collaboration Skill	
	Before treatment	During treatment	Before treatment	During treatment
Highest	66.67	94.44	68.75	97.92
Lowest	25.00	58.33	25.00	68.75
Median	46.52	78.47	41.67	87.50
Mean	45.31	78.53	42.19	86.64
Category	Not enough	Medium	Not enough	Good

If the sample is analyzed individually, then the distribution of students' communication and collaboration skills levels can be seen in Table 4.

Table 4. Distribution of Student Communication and Collaboration Skills Levels

Value	Category	Communication Skill				Collaboration Skill			
		Before treatment		During treatment		Before treatment		During treatment	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
≤ 60	Not enough	19	79.17	1	4.17	21	87.50	0	0
61 - 70	Enough	5	20.83	5	20.83	3	12.50	1	4.17
71 - 80	Medium	0	0	7	29.17	0	0	5	20.83
81 - 90	Good	0	0	7	29.17	0	0	7	29.17
91 - 100	Very good	0	0	4	16.67	0	0	11	45.83
Total		24	100	24	100	24	100	24	100

The results of the analysis of each aspect of the assessment of communication and collaboration skills and the difference in conditions before and during treatment are presented in Figure 2 and Figure 3.

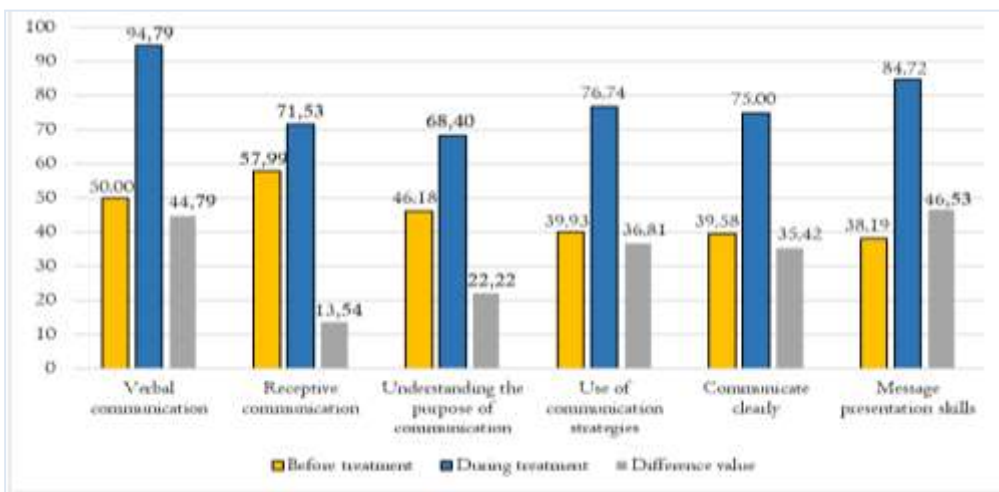


Figure 2. Student Communication Skills for Each Aspect of Assessment

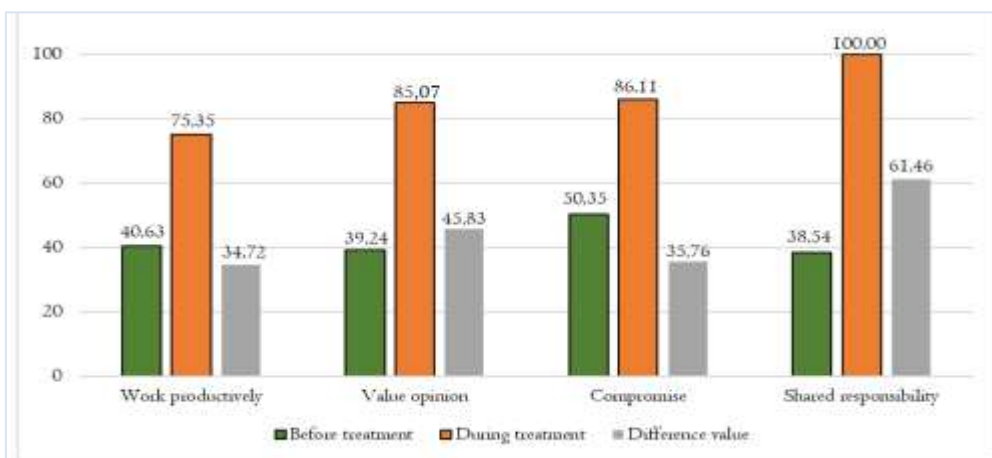


Figure 3. Student Collaboration Skills for Each Aspect of Assessment

Next, an inferential test is carried out by first testing the normality of the data. The results of the normality test and paired sample t-test followed by the N-Gain test are presented in Table 5.

Table 5. Normality Test Results, Paired Sample T-Test, and N-Gain

Variable	Data Group	Normality test (Shapiro Wilk)	Paired sample t-test	N-Gain
Communication skill	Before treatment	0.540	Sig. 0.000	61.93 %
	During treatment	0.599		
Collaboration skill	Before treatment	0.068	Sig. 0.000	78.75 %
	During treatment	0.073		

Table 5 above shows that all research data are normally distributed (Sig. ≥ 0.05). Therefore, data analysis was continued by performing a parametric paired sample t-test and the Sig. < 0.05 , which means that there is an effect of integrating the time token model and the wordwall game on students' communication and collaboration skills. Because there was an influence from the treatment, the N-Gain test was then carried out to see how far the effectiveness of the treatment was. The results of the N-Gain test for communication skill data show that the percentage is in the category of effective enough interpretation. The skill of collaboration is in the category of effective interpretation.

DISCUSSION

In the era of the Industrial Revolution 4.0, success in finding work is not only determined by the quality of formal education but also by soft skills. Communication and collaboration skills are considered important soft skills for workers to support their productivity. Thus, students as prospective graduates need to be prepared as well as possible. One alternative solution that can be taken is the integration of learning models with relevant media to build communication and collaboration skills.

The results of this study indicate that the integration of time token model learning and wordwall-based interactive games in learning can improve students' communication and collaboration skills. The ability of students who were initially only in not enough and enough category (Table 4), when given treatment finally were able to reach the very good category (Table 4). The results of the N-Gain test showed that the treatment given had an effective enough impact on communication skills and had an effective impact on collaboration skills. In other words, the integration of the time token model and wordwall-based interactive games in learning has a positive influence on students' communication and collaboration skills. Evidence from several studies shows that the use of the time token learning model has a positive impact on improving students' speaking and social skills (Asnita & Khair, 2020; Anggraini et al., 2021; Dewi et al., 2020). In addition, educational games based on wordwalls are proven to be able to inspire students' enthusiasm and activeness in learning as positive collaboration is formed between students in groups to solve problems together (Hidayah, 2022).

Based on the analysis of each aspect of the assessment on communication skills, the time token model combined with the wordwall game has the greatest positive impact on the presentation skills assessment aspect when viewed from the difference value obtained. According to Ismail & Pranadani (2023), the skill of presenting a message refers to a person's ability to be calm and precise in responding to the audience by adjusting the tone of voice and position during the presentation. When learning uses the time token model, before each member is asked to speak/explain the answers to the questions that appear on the wordwall game feature screen, each group is first allowed to discuss and share information for 15 minutes. This is believed to give time



for each member of the group to be able to learn and unite thoughts together in the team so that when it comes to answering questions, the member on duty can be calm and show positive expressions to the audience. As stated by Febricola (2023) on the GuruInovatif page, working in groups through the application of cooperative models can provide space for students to exchange ideas before presenting them in front of the class. This can increase self-confidence among all students.

The aspect that experienced the smallest increase in the assessment of communication skills was found in the aspect of receptive communication. According to Hasiana (2020), receptive communication is a person's ability to understand the essence of the message, whether it is obtained through hearing, reading, or identifying activities. Characteristics of someone experiencing difficulties in receptive communication include the inability to understand sentences as a whole and the inability to understand single words or complex sentences. According to Firdiansyah (2022), a lack of vocabulary mastery can make it difficult for someone to understand an information presentation. This is consistent with the conditions found during the study where there was a tendency for students to use the Indonesian language which was contaminated with elements of the regional language, both in terms of the pronunciation and meaning of the language. Besides not all students understand the use of standard Indonesian, they also feel embarrassed if they have to use standard Indonesian other than at formal or official events. According to Mahmud (2018), the habit of communicating in this way will more or less have an impact on the use of Indonesian, including the mastery of various vocabulary. To compensate for these conditions, learning that requires students to be active in communicating both orally and in writing needs to get used to it. One of them is through the application of the time token model combined with wordwall games as in this study.

Students are required to have good communication skills. One of the goals is for them to be able to establish positive relationships in the work environment in the future. Being able to communicate effectively based on communication ethics and being aware of the variety of languages in the work environment towards internal and external parties will lead to career success and minimize misunderstandings (Wijayanti et al., 2021). The Society for Human Resource Management (SHRM) has surveyed 100,000 employees and 400 companies, the results showed that poor communication between employees can cause a company loss of USD 62.4 million per year (SHRM, 2016).

Apart from communication skills, another soft skill that is also needed by an employee according to NACE (2022) is collaboration skills. Survey results by the Corporate Executive Board Co. (CEB) in 2013 of 23,000 employees found results, two-thirds of employees reported that their work over the past three years required increased collaboration. In addition, the survey on new work environments also shows that 57% of respondents do more work with those in different geographical locations, and 60% work with at least 10 people every day (Ladika, 2014). In other words, collaboration not only promotes greater productivity but also builds healthy relationships between employees.

The results of the analysis of each aspect of the assessment on collaboration skills show that the aspect of shared responsibility experiences the greatest change when viewed from the difference value obtained. A sense of shared responsibility according to Junita et al. (2021) refers to being active in contributing to the group, doing group work to the fullest, and actively following the direction of the group leader. The series of learning syntax owned by the time token model combined with wordwall games are believed to be able to accommodate and build student cooperation in teams. According to Son (2019) in his research, the time token cooperative model can train students to be more responsible in learning, build the ability to express thoughts, and help students to be able to respond to other people. By the characteristics of the time token model,



namely that all group members are required to speak even though there is a time limit, in this study each group member was allowed to speak/explain for 30 seconds regarding the answers put forward from random questions that appear on the wordwall game feature screen. Thus, the final score of the group is determined from the accumulated scores each member gets while speaking. This requires that each group can organize the division of tasks, discuss with each other, and share information so that all members gain a good understanding in preparation for answering questions.

The aspects that experienced the smallest increase in the assessment of collaboration skills were found in aspects of working productively. According to Mahawati et al. (2021) working productively is being able to use time properly to stay focused on work. When collecting research data, it was found that several students were unable to use 30 seconds well. They gave too many arguments outside the context of the questions which took up the allotted time. Explanations out of context with questions can be triggered by the feeling of tension or panic that may arise while answering. Yuniarti et al. (2022) in their research stated that panic can cause anxiety which causes a person to become disoriented in taking an action.

To help students overcome feelings of tension that can arise, the use of the time token model in the learning process in this study is combined with games based on wordwall applications. Through the wordwall application, it is hoped that students can perform while playing a game. According to Putri et al. (2021), wordwall games can be used at all ages or levels, both elementary and advanced levels. In addition, through playing activities while learning students can hone creativity through interaction with fellow friends both individually and in groups (Du et al., 2022).

The use of game-based wordwall applications in this study is a manifestation of the involvement of technology in education, especially in the learning process. As stated by Kiswanto (2022) on the SEVIMA website, it is very important to involve information technology in today's modern education. He further said that information technology intervention is needed in modern education to support the implementation of learning practices at both the school and tertiary levels. Information technology functions as a tool in teaching and learning activities through a variety of modern communication media. Information technology makes it easier for teachers to find variants of teaching methods that are more up-to-date. Besides that, the main capital to support the growth of students' interest in learning is to present material in a variety of ways, according to various learning methods. Students will enjoy the learning process more when their learning activities are fun.

CONCLUSION

From the findings of this study, it can be concluded that the integration of the time token learning model and wordwall-based interactive games effectively improves the communication and collaboration skills of Biology Education students at Sembilanbelas November Kolaka University. Thus, the time token model combined with wordwall-based interactive games can be recommended as a strategy for improving the learning process, especially in the formation and development of student communication and collaboration skills. As a form of developing research activities, future researchers can carry out further testing by combining the time token model and wordwall-based interactive games with other relevant learning models/methods/media.

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