
Gamification in Scientific Approach to Improve Students' Learning Motivation

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Abstract

Knowing the fact that students' learning motivation in learning English is low. This research investigates the effects of using gamification in scientific approach to conduct English learning in class. This quantitative research used experimental design to know whether there is an effect of gamification on students' learning motivation. The population of this research is students in SMP Negeri 6 Natar, however this research used purposive sampling to decide the sample to meet the needs of the research. A questionnaire was used to measure the students' learning motivation by using the Likert scale. To analyze the data, the researcher used Repeated measure T-Test. The results suggest that there is a significant improvement in students' learning motivation before and after treatment. The data implies that the pre-score of students' learning motivation is mostly in the medium level then it shifted to the high level on the post-score. The results show that the implementation of gamification in scientific approach improves students' learning motivation.

Keywords

Gamification, Scientific
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Introduction

Nowadays, many people use English to communicate with other people from different countries, languages, and cultural backgrounds. English plays a major role in many sectors including medicine, engineering, technology, tourism, banking, etc. People need speaking skills to reach communication goals. By speaking, people can communicate with others to express their ideas and to know others verbally. As English is widely used all over the world, there is a need for learners to acquire communication skills and the ideal platform is in the classroom. Nevertheless, being able to speak English is not easy for all people, especially for Indonesian students. Based on Bueno in (Rao, 2019) speaking is one of the most difficult skills language learners have to face. English as a foreign language is studied by students from primary school up to university level in Indonesia. Even though they had been studying English, they may understand English conversation but they find it difficult to speak in English. As stated by (Rao, 2019) even the learners have learned a language for so many years, they find it difficult to speak in real-time situations when it is demanded. There are some problems faced by the students in speaking English. It can be classified into two aspects as stated by (Tika & Abadi, 2021) which are students' linguistic problems such as lack of pronunciation, lack of vocabulary, and lack of grammar, and students' personality problems such as lack of confidence, shyness, and nervous. Moreover, (Dalem, 2017) explains that students are afraid of making mistakes since other people will be laughed at. In line with (Salihun, 2019) that explains students feel inhibited when they try to speak English since they are shy, unconfident, and afraid of making mistakes. Another factor is that based on (La'biran, 2017) the fact that most students are less active in speaking in class since the speaking class tends to be monotonous and uninteresting. From this point of view, we can say that students are less active in speaking in class since they are shy and afraid of making mistakes due to their lack of knowledge in pronouncing the words.

Hereafter, the success of students' language learning is affected by their motivation to learn. This motivation can help students to improve their skills. (Sun, 2019) states that motivation plays a great role in second language learning. It promotes the learning process and inspires and guides learners' learning. In line with (Rehman & Haider, 2013), motivation increases the performance of learning since it provides energy for the learner to achieve the task. It is claimed by (Gusman et al., 2021), that students learning motivation affects students'

achievement. It has been proven in junior high school students that there is a significant effect of student learning motivation on student achievement. Therefore, students with definite motivation will be actively participating in language learning which may lead to high learning efficiency. (Gardner, 1985) declares that motivation is the single most influential factor in learning a new language. Furthermore, (Al-Ghamdi, 2014) argued that motivation is a key factor in accomplishing a particular activity. Besides, there is a close correlation between motivation and ability states (Setyowati, 2019). She proposes that students who have high motivation have high competence in English. It is supported by (Putra, 2017) that motivation can have positive influences and affect the students to enjoy improving their speaking ability. Motivation becomes a way that exists in students' minds and influences their bodies to move and act in order to reach their goals. Hence, motivation contributes to the accomplishment of specific activities and correlates closely with language ability. Motivation has a positive impact on students' enjoyment and willingness to improve their speaking skills. Students with high motivation tend to exhibit higher competence in English. On the other hand, students with low motivation tend to struggle with language learning and cause to have low English competence. Ultimately, motivation serves as a powerful force within the students' minds, influencing their actions and propelling them toward their language learning goals.

However, a study by (Ayuningsih, 2022) implies that junior high school students are not aware that English is important, they just learn English as a formality, only to succeed in exams and have a good score. Their awareness of learning to speak English, because it is important for their sustainability of life, is very minimal or even less. Further, a study by (Yusda, 2019) also finds that students' motivation in learning English at junior high school is categorized at a mediocre level which means that students have average motivation in learning English. It is also explained that extrinsic motivation is more dominant than intrinsic motivation. Consequently, if students don't have the motivation to study, they won't engage in the learning process and they won't experience the process of learning. To overcome this, the teacher has to be more creative in conducting classroom activities to make students become active and participate in speaking English in class. As mentioned by (Rao, 2019), English teachers can create some fun activities in the form of language games to get the learners to speak in English classrooms. As a result, teachers should have the competence to encourage students' learning motivation. As stated by (Darwan & Fadhlika, 2023) in order to

attain learning outcomes for a subject, teachers must be able to motivate students to learn, focus that drive toward those goals, and strengthen that desire to maintain consistency in learning behavior.

In Curriculum 2013, the most used student-centered learning strategy is the scientific approach. Based on (Fauziati, 2014), the scientific approach is an approach of teaching designed with the same rigor as science at its best, students make observations, develop hypotheses about phenomena, devise tests to investigate their hypotheses, and communicate their findings to others. There are five stages in implementing a scientific approach namely: observing, questioning, experimenting, associating, and communicating. Scientific approach is believed as an approach to make the students active and improve their speaking. It is proved by (Tyasti et al., 2017) that the implementation of a scientific approach successfully engaged students' active participation in the teaching-learning process and improved three language aspects which are advancing students' pronunciation, expanding students' vocabulary, and enhancing students' grammar. Moreover, based on (Utami et al., 2016) explained that scientific approach can improve students' speaking achievement. It is stated that 87,93% of students passed the passing grade.

Furthermore, the scientific approach is able to help students to be active in learning. (Khairat, 2020) claims the implementation of scientific approach shows an improvement in students' speaking scores from pretest to posttest. He explained the implementation of the scientific approach invites students to be active in class since students have time to explore and get an opportunity to find the material from various resources. In line with (Miftari, 2019), the scientific approach develops students' speaking skills with various activities that can be done in each stage of the scientific approach. Therefore, the scientific approach can be a solution to make students active in class and able to improve students' speaking abilities.

However, there are some difficulties when using the scientific approach in teaching and learning English. According to (Zaim, 2017), from five stages of the scientific approach namely observing, questioning, experimenting, associating, and communicating. Not only does the teacher find it difficult to implement the stages of observing and questioning, but also the student finds it hard to follow this stage. Besides, the limited duration also makes the teacher unable to implement the rest of the stages and causes only several students involved to communicate what they have done in front of the class. In line with (Juliansyah, 2018), the

teacher and students also find problems when the scientific approach is implemented in the teaching-learning process. The problems that the teacher has are varied. They find it hard to select what activities and media which can be applied to support the teaching and learning process. In this case, a solution is needed to develop this scientific approach, especially in the observing and questioning stages. In accordance with activating the students in the learning process and helping them boost their willingness to be more engaged in classroom activities. The teacher must provide an interesting and diverse learning strategy.

In the teaching and learning process, the teacher's teaching strategy plays a great role in making the learning process reach the learning goals. Teachers must use a suitable learning strategy based on the objectives of the lesson that want to be accomplished and the material itself. The activity in English teaching should create an environment that encourages students to actively participate and speak up in the class as well as to boost student's confidence in speaking English in the class. One learning method that is believed to engage students' participation in class and make the learning process interactive and fun is using elements of games in language teaching which is called gamification. There is a growing body of empirical research that suggests gamification can positively impact students' motivation and engagement in the learning process. Studies have shown that game elements, such as conflict, cooperation, competition, feedback, rewards, and leaderboards, can increase students' intrinsic motivation, promote a sense of challenge and competition, and foster a more enjoyable learning experience.

Gamification is believed as a teaching method to boost students' motivation and engagement in the learning process. According to (Kapp, 2012), playing games with uncertainty can change how students feel about learning, increasing interest and, more crucially, enhancing long-term memory and encoding. As proved by (Nieto-Escamez & Roldán-Tapia, 2021) using gamification in online teaching for high school and university students in science subjects such as chemistry, biology, computer science, medicine, and business during the pandemic era is an innovative, engaging, and efficient teaching strategy. Moreover, it is perceived as a fun activity. In line with (Norma Yurissa et al., 2022) conducting virtual learning for elementary school students using gamification. This classroom action research shows that students' motivation improved in PJOK learning and encourages elementary students to be competitive and tackle problems. Additionally, (Grabner-Hagen &

Kingsley, 2023) confirm that the use of gamification in elementary schools in the US Midwest area improves academic results and makes the students more motivated in class since they have fun, they feel positive, and this makes them pay more attention in class. As stated by (Al Ghawail & Ben Yahia, 2022) who conducted a study in Pharmacy at Alasmarya Islamic University, gamification enables students to engage actively in chemistry lessons and to experience effective and enjoyable learning. Some studies have been conducted related to the use of gamification in the teaching and learning process virtually, however, studies on the use of gamification in English language teaching for offline classes are rarely found.

Besides, research on the use of gamification for junior high school students is harder to uncover than research on the use of gamification for elementary and university students. Gamification can be a powerful strategy to create an engaging and interactive learning environment that encourages students to actively participate in the learning process. One of the key benefits of gamification in education is that it taps into the intrinsic motivation of students, making learning enjoyable and rewarding. When students are motivated and engaged, they are more likely to be actively involved in the learning process, which can lead to better retention of information and improved speaking ability. Gamification helps to enhance the use of scientific approach by incorporating game elements and interactive experiences. It provides a dynamic and immersive learning environment that fosters the stages of the scientific approach. Based on (Nieto-Escamez & Roldán-Tapia, 2021) gamification can be implemented together with traditional lectures and can be a valuable instrument during post-COVID times.

In conclusion, since there is a relation between motivation and students' learning success, teachers should create a teaching-learning process that catches students' attention to actively participate in class by integrating the use of game elements. Gamification towards education may become an attractive and effective learning experience for the students since it supports the idea of engaging the students with the content. Besides, applying game elements in scientific approach might diminish the limitation of scientific approach implementation in English language teaching.

Literature Review/Theoretical Frameworks

Learning Motivation

All successful persons undoubtedly have a driving force behind their actions. A person who feels no impulse to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated. According to (Brown, 1994), motivation is an innate need, feeling, or desire that pushes a person to take on a particular activity. In another interpretation, motivation is the desire to take action. In accordance with (Putri, 2019) motivation is a psychological concept that acts as an internal condition that drives people to achieve particular goals. In short, motivation is seen as a desire that pushes a person to take action to achieve particular goals.

Moreover, (Hall, 2011) claimed that motivation is a crucial component in order to complete a specific action. In language learning, motivation is one of the most important factors. According to (Dornyei, 2005), motivation is one of the factors that significantly affect language learning because it serves as the main impulse for starting a second language study and later as the motivation to continue the learning process. In line with (Rehman & Haider, 2013), motivation is a vital component in students' learning and accomplishment at all levels of school. It can be concluded that motivation plays an important role in language learning as it serves as the driving force for initiating and sustaining the learning process. It is a key factor that significantly influences students' engagement, perseverance, and success in learning a second language.

Hereinafter, learning motivation is all efforts within oneself that lead to learning activities, ensure the continuity of learning activities, and give direction to learning activities so that the desired goals are achieved explains (Ibrahim & Widodo, 2022). In line with (Masni, 2015) learning motivation is the internal driving force that propels students to engage in learning activities so that the intended learning outcomes can be realized. Based on (Darwan & Fadhlika, 2023) learning and motivation are two concepts that are connected. Learning motivation is the main thing in carrying out learning activities, so without motivation, someone will not carry out learning activities. Therefore, learning motivation encompasses internal efforts that lead to continuous and purposeful learning activities, guiding individuals toward their desired goals. It serves as the internal driving force that propels students to actively participate in learning tasks, ultimately enabling them to realize intended learning outcomes.

The interconnectedness between learning and motivation highlights that without sufficient motivation, students are less likely to engage in learning activities. Consequently, educators and institutions need to create a supportive learning environment that fosters and nurtures students' motivation.

According to (Makmun, 2012), there are several indicators that can be used to measure students' learning motivation. Learning motivation consists of some indicators, namely: (1) learning duration, which is about how long someone is able to use the time to do an activity; (2) activity frequency, which talks about how often an activity is done in a period; (3) persistency is the continuity at the purpose of the activity; (4) perseverance, that is the ability in facing hindrance and difficulty; (5) devotion, which is about the sacrifice to achieve the aim; (6) aspiration level is the target that will be achieved with the activity that will be done; (7) qualification level that talks about the product or the output achieved from the activity; and (8) attitude, that is the behavior through the learning activity such as positive or negative attitude. Moreover, (Saeed & Zyngier, 2012) support that students' motivation relates to how much work and concentration they put into learning in order to attain success. Moreover, (Fitriani, 2017) declares that motivation is a need for students that has to be fulfilled to increase their spirit in finishing the task. This means that students may work for an extended period of time without ceasing. Then, they are tenacious in facing the challenges and bears the responsibility for completing learning activity successfully.

Thus, motivation is the willingness of a person to do something and it plays a great factor in influencing to achieve something. Learning and motivation are related to each other. Learning motivation contributes as a driving force for students to engage in learning activities. In measuring learning motivation, some indicators can be used as guidance namely: learning duration, activity frequency, and persistence.

Scientific Approach

The 2013 Curriculum is a curriculum based on the Ministry of Education Regulation No. 103 Year 2014 about Learning on Primary Education and Secondary Education. It has replaced the previous curriculum which is a competency-based school-level curriculum. This curriculum uses a scientific approach. In the 2013 Curriculum, the teacher is asked to use the

scientific approach which is intended to empower teachers to make the learning activities based on stages of the scientific method.

Based on (Nurdyansyah & Musfiquon, 2015) scientific approach is intended to make students know, understand, and practice what is being learned scientifically. The scientific approach is designed with the same rigor as science at its best. Students make observations, develop hypotheses about phenomena, devise tests to investigate their hypotheses, and communicate their findings to others (Fauziati, 2014). The focus of this approach is on students. The students are intended to participate actively in exploring the material. Based on the Ministry of Education Regulation, the scientific approach has five learning methods that can be adjusted with each characteristic of a lesson. The following are learning steps of the scientific approach based on the (Ministry of Education and Regulation, 2014) and (Fauziati, 2014), namely; observing, questioning, experimenting, associating, and communicating.

Gamification

The concept of gamification is the use of game design elements and mechanics in non-game contexts, such as education, marketing, or workplace training, to engage people to achieve a specific goal or outcome. Gamification based on (Kapp, 2012) defined as a careful and considered application of game thinking to solving problems and encouraging learning using all the elements of games which is appropriate. He states that gamification is not only about adding points, rewards, and badges to learning experiences. It is also supported by Terril in (Welbers et al., 2019) who define gamification as the act of taking game mechanics and applying them to other web properties to increase engagement. Moreover, (Deterding et al., 2011) explain gamification as an innovation in learning which integrates game features into non-game environments. Therefore, gamification is a considered application of game elements in a non-game context that can be perceived as an innovative way of learning.

Additionally, (Maloney, 2019) states that gamification employs a well-designed digital and non-digital game to stimulate learners' language, which includes elements of games or play into the learning environment to boost engagement and participation. Games have remarkable motivational power to encourage people to engage. Even without any reward, just for the joy of playing and the possibility to win states (Flores, 2016). Moreover, (Grabner-Hagen & Kingsley, 2015) supported that gamification in education lets the teacher gamify an activity. It

integrates game elements and reward mechanisms as part of learning while motivating and engaging the students and promoting healthy competition. Students learn a concept and practice skills just as if they are playing a game. In short, the use of gamification in education is about gamifying the learning activities in the classroom by applying game elements. It boosts students' engagement and helps improve their motivation.

The use of gamification in learning can make the educational experience challenging and fun while at the same time motivating the learners to move forward argues (Vassileva, 2008). Moreover, integrating gamification into education is able to create a more attractive and effective learning experience for students (Flores, 2016). In other words, gamification can be used to enhance learning experiences by making them more engaging and interactive for students. However, it is important to design gamification elements carefully and thoughtfully and to ensure that they are aligned with the learning objectives and goals of the educational activity.

Methods

This study employed a quantitative approach aimed at measuring whether gamification in a scientific approach improves students' learning motivation. The method used was an experimental design, where treatment was applied to observe changes in students' motivation before and after the intervention.

Research Design

The research utilized an experimental design with repeated measures, meaning that students' learning motivation was measured twice: before and after the gamification treatment. This design allows for comparison of results to determine if there is a significant improvement in motivation due to the intervention.

Participants

The population consisted of first-semester seventh-grade students at Junior High School 6 Natar, with each class having 34 students. A purposive sampling technique was used, selecting class 7C as the sample because all students in this class owned personal cell phones and were capable of using them, which supported the implementation of gamification.

Data Collection and Analysis

Data were collected through a learning motivation questionnaire administered before and after the treatment. The questionnaire contained 30 items based on eight indicators of learning motivation adapted from Makmun (2012). It featured multiple-choice questions with four options (A, B, C, D), scored on a Likert scale ranging from 1 to 4.

After data collection, analysis was conducted using a Repeated Measure T-Test to determine whether there was a significant increase in students' learning motivation following the gamification intervention compared to before it.

Findings and Discussion

The researcher administered a questionnaire on learning motivation twice, before and after treatment. There were five meetings for doing the treatment. It took two meetings to administer the pretest and posttest of questionnaire. The research data consist of the initial test scores (pretest) as a student's initial ability and the final test score (posttest) as the result data of students after the treatment. By using the repeated measure t-test, the score of students' questionnaires was calculated utilizing SPSS. According to the table below, learning motivation improved after being taught by using the modified scientific approach. The majority of students, initially distributed across medium motivation in the pretest, experienced a notable shift towards the high motivation category in the posttest. This improvement is highlighted by a substantial increase in the percentage of students falling into the high motivation interval.

Table 1 Students' Learning Motivation

Pretest				Posttest		
Interval	Frequency	Percentage	Category	Frequency	Percentage	Category
91 – 120	10	29%	High	32	94%	High
61 – 90	23	68%	Medium	2	6%	Medium
30 – 60	1	3%	Low	0	0%	Low
Total	34	100%	-	34	100%	-

The table implies that the percentage of students in the high motivation category increased significantly from 29% in the pretest to 94% in the posttest. This indicates an improvement, with a majority of students moving into the high motivation range. In the pretest, 3% of students were in the low motivation category, but in the posttest, there were no students in this category. This indicates an improvement as no students remained in the low

motivation range after the treatment by using the modified scientific approach. The improvement of students' learning motivation is proved as it is measured by using repeated measure t-test. The table below suggests that the value of sig. (2-tailed) is 0.000 which indicates that there is an improvement in students' learning motivation in that class.

Table 2 Repeated Measure T-test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
					Std. Deviation				
					Mean Error				
					Lower				
					Upper				
Pair 1	posttest - pretest	Mean	Std. Deviation	Std. Error	Mean	r			
		19.20	9.960	1.708	15.73	22.681	11.24	33	.000
		6			1		4		

The data suggests that the modified scientific approach had a positive impact on student's motivation. The absence of students in the low motivation category in the posttest further underscores the effectiveness of the treatment, as there was a complete elimination of students in the lowest motivation range. In summary, the findings reflect a successful treatment that led to improved motivation levels among the students, with a significant proportion transitioning to the high motivation category. This positive shift bodes well for the effectiveness of the learning method employed to enhance motivation within the educational context.

At first, most of the students considered a medium motivation in learning since English subject is a new subject for most students due to when they were in elementary school, they never learned English. The students considered to have low self-esteem in learning English, they are afraid of saying things in English and easily judged themselves unable to speak English. As stated by (Salihun, 2019) that students feel inhibited when they want to speak English since they are shy, unconfident, and afraid of making mistakes. It is in line with students' questionnaire results that show their attitudes toward speaking English, students try to avoid or make an excuse that they can not speak English. Even if they try to do the exercise, they tend to do it just the way it is.

Moreover, several things changed when the learning process implemented the modified scientific approach. By inserting the game elements into the scientific approach,

students' attitudes through learning English were changed. The elements of the game such as storytelling and conflict which were inserted in observing stages of the scientific approach gave a starter for students to build up the context about the language they intended to use. Therefore, their perceptions about speaking English were built in a way that they intended to solve a problem. Moreover, the immediate feedback that students got after playing the game gave them much opportunity to practice more without any fear of asking. The learning process became effective by using the application of the game, all students were aware of their ability and able to correct themselves. As supported by (Wulantari et al., 2023) that gamification provides students with real-time feedback and progress monitoring, both of which are crucial components of efficient language acquisition. Students receive immediate feedback on their performance, which helps them stay motivated, increase their self-awareness, and correct themselves so they do not repeat the same mistakes in the next round. In accordance with (Kumaran et al., 2023), gamification has positive effects as well as helps them succeed. It serves as a place where students can work on their mistakes by replaying the game. It allows them to loosen their fear of failure in learning.

These game elements help to improve students' learning motivation since it allows them to learn without having anxiety and able to make them concentrate more. (Farhan, 2019) states that using gamification can provide a stimulus to three important parts of learning namely emotional, intellectual, and psychomotor. Based on his research, students said that there is a lot of convenience to understand and attract students' attention because if they do not use this gamification they will be bored. Therefore, the game elements engage students to participate in learning since it makes them comfortable and gives stimulus to begin the material. With this modified method, students being active learners, can be more concentrated while learning and become persistent to finish the learning process by playing the game with the stages of the scientific approach. As a result, students' learning motivation was improved after the treatment. It shows that students' questionnaire results had improved on the learning duration, persistency, and attitudes indicators.

Further, the reward structure elements build positivity in students' behavior in learning such as they are eager to think of the right answer so that they will not lose their health point in the game. (Rofida & Kheider, 2022) explains that students show positive attitudes toward gamification which helps them improve their pronunciation and enrich their vocabulary. The

positive attitudes give students the opportunity to comprehend the material. Besides, games are always perceived as a fun activity for students at their age. As explained by (Rao, 2019), that English teachers can create some fun activities in the form of language games to get the learners to speak in English classrooms. To sum up, the use of gamification in the scientific approach is an engaging and effective way of learning. The game elements improved the use of the scientific approach and had a positive impact on students' attitudes and learning motivation. Students are involved in the process of learning and easily get immediate feedback as they make mistakes so that they can learn by themselves without having to be afraid or shy about learning English in class.

Conclusion and Implications

The results of this study demonstrate that the modified scientific approach incorporating gamification has a positive effect on students' learning motivation. The use of game elements created a comfortable and stimulating learning environment, which encouraged students to engage more actively in their studies. This improvement is reflected in increased learning duration, greater persistence, and more positive attitudes toward learning, as shown by the questionnaire responses. Therefore, it can be concluded that applying this modified scientific approach effectively enhances students' motivation to learn.

These findings have important implications for education. Teachers are encouraged to integrate gamification techniques into their teaching methods to foster student engagement and motivation. Additionally, curriculum developers should consider supporting innovative approaches like gamified learning within science education frameworks. Future research could further investigate the long-term impact of such methods or explore their application across different subjects and educational levels. Overall, this study suggests that a modified scientific approach with gamification can significantly improve students' motivation and potentially lead to better educational outcomes.

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