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Implementatıon Of Dıscovery Learnıng Wıth Gamıfıcatıon Concept To Improve 21st Century Skılls

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ABSTRACT
The background of this study is the difficulty experienced by 75% of students in solving problems in learning, the difficulty of working together because they do not want to share knowledge with each other, and lack of confidence in presenting in front of others. One way to improve these skills is by implementing discovery learning with the concept of gamification. The purpose of this study is to implement discovery learning with the concept of gamification so that students can improve their 21st century skills as a foundation of character so that they are ready to face challenges in the 21st century. The research approach used is qualitative with an exploratory method. The data collection and analysis techniques were carried out using the Miles & Huberman model including (1) Data collection through literature studies and observations; (2) Data reduction in the form of observation tables; (3) Presentation of data in the form of scripts; and (4) Drawing conclusions. The results of this study indicate that students can solve problems in learning through critical and creative thinking skills, communicate and collaborate very well and can present confidently in front of the class. The conclusion of this study is that the application of discovery learning with the concept of gamification can improve 21st century skills. This finding indicates that a fun and challenging learning approach can encourage students to become learners to face the challenges of the 21st century.
***Keywords**: Discovery Learning; Gamification; 21st Century Skills*

ABSTRAK
Latar belakang dalam penelitian ini adalah kesulitan yang dialami 75% siswa dalam menyelesaikan masalah dalam pembelajaran, sulitnya bekerja sama karena tidak mau berbagi pengetahuan satu sama lain, dan kurang percaya diri presentasi di depan. Salah satu cara untuk meningkatkan keterampilan tersebut yaitu dengan penerapan discovery learning dengan konsep gamifikasi. Tujuan penelitian ini yaitu untuk mengimplementasikan discovery learning dengan konsep gamifikasi agar siswa dapat meningkatkan keterampilan abad 21 yang dimiliki sebagai fondasi karakter sehingga siap menghadapi tantangan di abad 21. Pendekatan penelitian yang digunakan yaitu kualitatif dengan metode eksploratif. Adapun teknik pengumpulan dan analisis data dilakukan dengan menggunakan model Miles & Huberman meliputi (1) Pengumpulan data melalui studi pustaka dan observasi; (2) Reduksi data dalam bentuk tabel observasi; (3) Penyajian data dalam bentuk naskah; dan (4) Penarikan kesimpulan. Hasil penelitian ini menunjukan siswa dapat menyelesaikan masalah dalam pembelajaran melalui keterampilan berpikir kritis dan kreatif, berkomunikasi dan berkolaborasi dengan sangat baik serta dapat presentasi dengan percaya diri di depan kelas. Adapun simpulan dalam penelitian ini yaitu penerapan discovery learning dengan konsep gamifikasi dapat

meningkatkan keterampilan abad 21. Temuan ini mengindikasikan bahwa pendekatan pembelajaran yang menyenangkan dan menantang dapat mendorong siswa untuk menjadi pembelajar untuk menghadapi tantangan abad 21.
Kata Kunci: Discovery Learning; Gamifikasi; Keterampilan Abad 21

INTRODUCTION

Science and technology are developing rapidly in the 21st century, especially in the era of revolution 4.0 and society 5.0. The skills needed in this century are important for students. Human Resources who excel in science and are skilled in solving everyday problems require mastery of various aspects of science and technology, as well as 21st century skills. Teachers play an important role in identifying students' learning needs, by strengthening the foundation of their character so that they are ready to face challenges in the Society 5.0 era (Nastiti & Abdu (2020).

Therefore, students need to have a good basic competency, and teachers must adapt to prepare them to become quality individuals. Jennifer Nicholas put forward the basic principles of 21st century learning which emphasize the importance of focusing on students. In this context, students are no longer considered as objects of teaching, but as subjects who are actively involved in the learning process (Herman et al., 2024). Collaboration between schools, teachers, and students with various parties is important to share experiences and information for the advancement of learning. In addition, learning should be connected to the real life of students, so teachers need to use methods that encourage them to apply the knowledge, values, and beliefs that have been learned in the context of everyday life. Contextual strategies can be used to help students relate their experiences to learning (Parhan, 2019). Learning in the 21st century also aims to prepare students to actively participate in their social environment and be involved in various programs in the community (Daryanto & Karim, 2017).

In this case, 21st century learning is focused on improving 4C skills (Critical Thinking, Collaboration, Creative, Communication). Critical Thinking is related to the active process of a person in reflecting on things in depth, asking questions to themselves, and seeking relevant information, rather than just accepting opinions from others (John Dewey in Alec Fisher, 2009). The goal is to achieve a deeper understanding (Johnson, 2009). Critical thinking skills also include the ability to access, analyze, and synthesize information, which can be learned, practiced, and mastered (Redecker et al., 2011). By implication, students can select relevant sources and information, identify quality sources, and evaluate these sources in terms of objectivity, reliability, and update (Septikasari & Frasandy, 2018).

Collaborative means working in groups of two or more people to achieve common goals, while appreciating each individual's contribution to the whole (Roberts, 2004). By implication, students must be able to discuss with their friends, exchange different views, seek clarification, and participate in high-level thinking, such as managing, organizing, critically analyzing, solving problems, and creating new, in-depth learning and understanding (Septikasari & Frasandy, 2018).

Creativity is an imaginative activity that reflects the ingenuity of the mind and is able to produce products or solve problems in unique ways. (Suratno, 2005). By implication, creative students are trained in conveying their ideas and thoughts in the form of opinions, determining sources of information, developing and selecting ideas in the form of results or products of achievement, and presenting them. (Septikasari & Frasandy, 2018).

Communication means the process of human interaction that can run reciprocally (Van, 2011). In this case, the reciprocity is in the form of feedback. By implication, students who have communication skills can convey thoughts and ideas effectively through oral, written, and nonverbal communication skills in various forms and contexts. In addition, communication is used for various purposes, such as providing information, instructions, and motivation (Septikasari & Frasandy, 2018) . This is in line with John Dewey's statement in Alec Fisher, (2009) which states that critical thinking is seen as a process of thinking in contemplating various things in depth. However, in reality, current learning only focuses on student achievement, because achievement is often associated with competition. As a result, even though they succeed independently, students behave individually so that they have difficulty adapting to developments in the era (Kurino & Herman, 2023) . This can be seen from the attitudes of several students in the class who are reluctant to share knowledge with their friends. Smarter students tend to be selfish and reluctant to share because they are afraid of being outdone.

As a result, they are unable to adapt to change and are less accustomed to working together. When they enter the workforce, they will find it difficult when required to collaborate. In this 21st century society, students need to have skills that include communication, collaboration, critical thinking and problem solving, as well as creativity and innovation to be able to function well in a society that is constantly changing.

A preliminary study based on my observations in grade IV of SD Evans Kota Bangun, showed that smart students tend not to want to share knowledge with their friends. Then some other students cannot find solutions when learning to solve problems and lack confidence in presenting in front of the class. This is certainly not in line with Brookhart (2010), who stated that every student must be able to develop their stance, opinions, and solutions to the problems they face, both for themselves and for society so that they are able to create new things by analyzing opportunities, challenges, and abilities effectively. In addition, the results of the diagnostic assessment of grade IV students at SD Evans Indonesia showed that 82% had an interest in games.

This is certainly an encouragement to increase student motivation in learning through their interest in games. The game that is often played is Mobile Legends. Research in Amalia & Naya (2023) states that one of the positive impacts of playing the online game Mobile Legends is that students can interact well.

One way to improve 21st century skills is to implement discovery learning. According to Riyanto (2010), the discovery learning model is seen as a learning process in which students seek and find information independently. In this learning, students are given the opportunity to seek, solve, and find their own solutions and answers. Thorsett, (2021) also revealed several advantages of this method, including: 1) students actively participate in the learning process; 2) this method can foster and increase students' curiosity; 3) support the development of lifelong learning skills; 4) provide a more personal learning experience; 5) increase student motivation because they are given the opportunity to experiment; 6) this method builds on students' prior knowledge and understanding. Previous research findings by (Tri Mulyanto et al., 2022) showed that the discovery learning model has a positive influence on the critical thinking skills of fifth grade students on the material of Human Respiratory Organs at SDN Dr. Sutomo V Surabaya. In line with that, Hartati et al., (2020) concluded that the application

of the Discovery Learning model is effective in improving critical thinking skills and cooperation skills in science learning for fifth grade students at SD Negeri 32 Bengkulu Tengah. The findings in Agustin & Winanto (2023) research state that the advantages of the Discovery Learning model aim to encourage, support, and build active student involvement, increase their self-confidence in the learning process, and provide personal experiences through experiments conducted in the classroom.

In this case, the aspect of novelty in this study offers the application of discovery learning while accommodating students' interests in playing games, namely the concept of gamification. Capatina, et all (2024) stated that gamification carried out by giving points, badges, and leaderboards can increase employee engagement, which in turn improves their ability to store and apply knowledge efficiently in the workplace. Social interaction serves as a link between gamification and knowledge sharing, emphasizing the importance of a collaborative learning environment. Furthermore, Stuart (2010) states that gamification will encourage users to engage in desired behavior. Furthermore, theoretically by increasing student engagement through changing tasks into games that motivate them through rewards when successful, it encourages desired behavioral changes. Thus, the use of gamification elements can increase student motivation and participation in class, and produce better learning outcomes (Plantak Vukovac et al., 2018; Park & Kim, 2021; Martínez-Hita et al., 2021).

Research by Aldalur & Perez (2023) shows that the application of a combination of gamification and Discovery Learning learning models through Webquests can improve academic outcomes, strengthen motivation, stimulate creativity, and improve workers' ability to apply the knowledge they have learned. In this case, the study highlights the application of discovery learning and gamification to students in the Software Engineering course. The research that will be conducted is by integrating gamification in implementing the discovery learning model to elementary school students.

Thus, so that students can improve 21st century skills as a foundation of character to answer the challenges of the 21st century while increasing student motivation through games, researchers offer a solution by implementing a discovery learning model with a gamification concept. The purpose of this study is to improve 21st century skills in grade IV students of SD Evans Indonesia Kota Bangun so that the foundation of students' character is ready to face challenges in the 21st century.

METHODS

Type and Design

The research approach applied is qualitative with exploratory methods. Qualitative research functions to explain, analyze, and describe existing phenomena (Sugiyono, 2016). The focus of this research is to improve 21st century skills through the application of discovery learning with the concept of gamification. The implementation is based on the Kemendikbud (2013) and Nauli & Sinambela, (2013) namely: 1). Stimulation or stimulation; 2). Problem statement or issue identification; 3). Data or information collection; 4). Data processing; 5). Verification or analysis and interpretation of data, also known as proof; 6). Generalization or drawing conclusions.

Data and Data Sources

The subjects in this study were 37 fourth grade students of Evans Indonesia Elementary School, Kota Bangun. The object of this study is the application of discovery learning with the concept of gamification. This study focuses on improving 21st century skills, namely critical thinking, collaboration, creativity, and communication. The subjects in this study were 37 fourth-grade students of Evans Indonesia Elementary School, Kota Bangun. The object of this study is the application of discovery learning with the concept of gamification. This study focuses on improving 21st-century skills, namely critical thinking, collaboration, creativity, and communication. Primary data in this study are sourced from observations made by researchers. While secondary data were obtained from study literature based on behavioral notebooks, initial assessment report results, and initial observation results made by researchers.

Data collection technique

The data collection methods used in this study are observation and literature study. Observations in the research process are carried out based on the 4C aspects below:

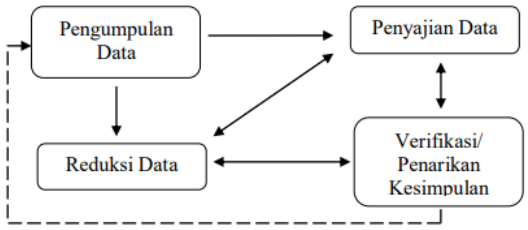
Tabel 1.Kisi-kisi Observasi

No.	Aspek yang Diamati (4C)	Indikator	Perilaku yang Diamati
1	Critical Thinking	Menganalisis informasi	Mengajukan pertanyaan yang relevan, membandingkan berbagai sumber informasi, mengevaluasi argumen
		Menyelesaikan masalah	Mengidentifikasi masalah, mencari solusi alternatif, mengambil keputusan
		Membuat inferensi	Menarik kesimpulan berdasarkan data yang ada
2	Collaboration	Bekerja sama dalam kelompok	Berpartisipasi aktif dalam diskusi kelompok, memberikan kontribusi ide, menghargai pendapat orang lain
		Membagi tugas	Menentukan peran masing-masing anggota kelompok, menyelesaikan tugas sesuai dengan tanggung jawab
		Mengatasi konflik	Mencari solusi bersama ketika terjadi perbedaan pendapat
3	Communication	Menyampaikan ide secara lisan	Berbicara dengan jelas dan runtut, menggunakan bahasa yang sesuai
		Menyampaikan ide secara tertulis	Menulis laporan, membuat presentasi, menggunakan bahasa yang efektif
		Mendengarkan dengan aktif	Memberikan respon yang sesuai, mengajukan pertanyaan untuk klarifikasi
4	Creativity	Menghasilkan ide-ide baru	Mengusulkan ide yang orisinal, berpikir *out of the box*
		Menggabungkan ide-ide yang berbeda	Menemukan solusi yang unik dengan menggabungkan berbagai konsep
		Menampilkan karya yang kreatif	Membuat produk yang inovatif, mengekspresikan diri melalui berbagai media

Furthermore, a literature study as secondary data was conducted to verify and prove the 4C capabilities based on behavioral records, diagnostic assessment results, and initial observation results in the form of narrative reports.

Data analysis

The data analysis technique in this study uses the Miles and Huberman data analysis model in Sugiono (2018) which is described as follows:



Gambar 1. Data Analysis

Based on the image above, several stages in data analysis are obtained below, namely:

1. Data collection, where researchers conduct literature studies to verify and prove that the problems to be studied do exist. Furthermore, researchers conduct observations to collect data in the field. Each step such as building rapport, interacting with subjects and informants at the beginning of the study is part of the data collection process.
2. Data reduction by summarizing, selecting, and sorting all forms of data obtained in the field to be compiled into a writing that will be analyzed. The results of the observation will be presented in the form of an observation table.
3. Data presentation by compiling all the data that has been collected in the form of a manuscript. Furthermore, the data is presented to process half-finished information into a writing that has a clear theme flow. Data will be grouped and categorized into a more concrete form, ending with coding. The coding process functions to connect each statement from the subject and informant according to the category and subcategory of the theme, and to provide a certain code for each statement conveyed by the subject.
4. Drawing conclusions or verification by directing the results to answer the research questions that have become the solution in this study.

RESULTS AND DISCUSSION

The teacher begins the activity by giving students a provocative question. The students' answers vary, some even got lost with their parents but were able to find their way back using the Google Maps application. After that, the activity continued with the teacher telling the story of an explorer who wanted to hunt for treasure. This activity received a positive reaction from most of them, where they wanted to help solve the symbols on the map.

Thus, this activity is in line with (Thorsett, 2021) statement which states that discovery learning can foster and increase students' curiosity. In addition, at this stage students get information about the rules, leaderboards and points obtained when completing missions and prizes when they succeed in getting treasure. In this case, the use of the above elements is in accordance with the statement of Capatina, et all (2024) which states that gamification carried out by providing points, badges, and leaderboards can increase participant involvement so

that it can improve their ability to store and apply knowledge efficiently. On the other hand, hearing this information, most students were very enthusiastic about finding the treasure. This is certainly in line with the use of gamification elements that can increase student motivation and participation in class (Martínez-Hita et al., 2021).

Next, the activity continued by dividing the groups. Then each group gets a mysterious map that has symbols that need to be solved by identifying their shape. In this activity, each group identifies the route of the journey that will be taken by observing the symbols on the map. There are various symbols such as colored lines that students identify as roads, water flows such as depicting rivers, triangles depicting mountains and so on. These identification processes are closely related to students' critical thinking processes. This is in line with John Dewey's statement in Alec Fisher, (2009) which states that critical thinking is seen as a process of thinking in contemplating various things in depth. In addition, in this activity, each student can communicate well to identify the symbols on the map. In line with the statement of Septikasari & Frasandy, (2018) which states that communication is carried out by conveying thoughts and ideas effectively through oral communication skills with the aim of providing information.

Next, each student collects information about the meaning of the symbols on the map via the internet or atlas book provided. There are 3 groups that choose to use atlas books and 2 other groups use the internet via mobile phones. The group that chooses to search in the atlas book can immediately find the meaning of the symbols on the map. Meanwhile, the group that searches via the internet has difficulty finding information, but with one guidance from the teacher, all groups can finally find all the meanings of the symbols on the map. Activities at this stage are closely related to students' critical thinking skills. This is in line with Redecker et al., (2011) who stated that critical thinking includes the ability to access, analyze, and synthesize information, which can be learned, practiced, and mastered. After completion, each group gets points for completing the first mission and most students also get additional points for their performance or behavior in searching for information (Stuart, 2010).

After each group finds the meaning of all the symbols on the map. The next activity is continued by making a map dictionary in the form of a booklet provided by the teacher. The booklet needs to be made by students by arranging, coloring, and writing the meaning of all the symbols found in the previous activity. In this activity, learning is efficient because each student focuses on making the booklet and does not make noise in the group. This is because each student has a desire to get additional points for their performance or behavior in making the booklet (Stuart, 2010). In addition, with teacher guidance, students learn to collaborate by sharing tasks in arranging, coloring, and writing symbols on the booklet. This is in line with the skills in collaborating by appreciating the contribution of each individual to the whole (Roberts, 2004). The results of making the booklet are very interesting because some write the meaning of the symbols based on the first symbols seen and some write the meaning of the symbols randomly. Then in terms of color selection it is also very interesting, where some students choose to use colors that make it easier to read the meaning of the symbols on the map. The results of making this booklet are in line with Suratno, (2005) who stated that creative thinking is seen as an imaginative activity that reflects the ingenuity of the mind and is able to produce products or solve problems in unique ways.

Next, each group presents the results of the problem identification by solving the symbols according to the map dictionary that has been made. There are three groups that identify the same travel path and two other groups identify differently. The difference lies in the path needed to start the journey to find treasure. In the process, most students who are usually not very confident and cannot speak in front of the class, can present it well. This is in line with Septikasari & Frasandy, (2018) who stated that creative students are trained in conveying their ideas and thoughts in the form of opinions, determining sources of information, developing and selecting ideas in the form of results or products of achievement, and presenting them.

In addition, when the previous presentation there was always no feedback from other students. In this activity, each group that received a presentation always got feedback from other students, both from the travel path and the meaning of the symbols on the map. This is in line with Van, (2011) who stated that communication means a process of human interaction that can run reciprocally.

After that, to prove the results of their investigation of the mysterious map given. Each group takes turns to look for treasure hidden by the teacher. The search for the treasure is still within the school environment. As a result, all groups can find the hidden treasure. Although there was one group that was confused because they misinterpreted the symbols on the map, with direction from the teacher they were finally able to find the treasure. Overall, each group actively participated in finding treasure through the results of the investigation on the map. This is in line with Thorsett, (2021) who stated that one of the advantages of discovery learning is that students can actively participate in the learning process.

In the final stage, after students find the treasure. Each group holds a discussion to clarify the understanding of the symbols on the map. Groups that are still not quite right in interpreting the symbols on the map and making improvements to the booklet. In addition, in this activity the teacher also invites students to discuss to re-understand the meaning of the symbols on the map according to what has been learned today. This process is very important so that students can have the mindset to continue learning. This is in line with (Thorsett, 2021) who stated that one of the advantages of discovery learning is that it can support the development of lifelong learning skills.

CONCLUSION

Based on the results and discussion above, it can be concluded that the application of discovery learning with the concept of gamification can improve 21st century skills. Improved critical thinking skills are seen in each group in learning can identify symbols on the map and analyze the information obtained. Then, the increase in creative thinking skills is proven by students being able to create booklets that are used as map dictionaries. By using the map dictionary, students can solve problems in learning. In addition, increased collaboration skills are seen in students who feel smart in this learning want to share knowledge and work together with other students to find treasure. Finally, communication skills are seen in most students who are confident in presentations and provide feedback to their friends. These findings indicate that fun and challenging learning models can encourage students to become learners to face the challenges of the 21st century. For further research, it is hoped that researchers can

test the effectiveness of implementing discovery learning and gamification in other learning subjects.

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