Developing instructional media of Labyrinth adventure to train problem solving and teamworking skills in inclusive school

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Abstract. Problem solving skills are one of the skills that are expected to be possessed in each student through learning process. This ability will be difficult to train when the learning process is only memorizing the material or it is not based on existing phenomena. Solving a question or phenomenon can be done not only by individually, but also through groups. Solving problem in group is requiring interaction between group members, including general students and students with special needs. Instructional media of Labyrinth Adventure is one of the innovations that can be used to train problem solving skills and teamworking in inclusive schools. The purpose of this study was to find out the feasibility of instructional media of Labyrinth Adventure and the effectiveness of instructional media of Labyrinth Adventure to train problem solving and teamworking skills in inclusive school. The collecting data methods used in this study are method of questionnaire, Method of test, and method observation. The results obtained from the structural media feasibility test of Labyrinth Adventure are follows 93.75% in the media aspect, 98.44% in the subject aspect, 100% in the aspect of language, and 95.50% in the aspect of inclusion. The effectiveness of the instructional media of Labyrinth Adventure has an average N-gain score of 0.75 on training problem solving skills and 0.79 N-gain in team working skills.

1. Introduction
Giving students the opportunity to be more active in learning is one of teacher's strategies in developing the cognitive, affective, psychomotor aspects of students. Through this strategy, students are expected to improve the students' potential [1]. However, there are some schools in Indonesia that have been given permission to combine the implementation of 2013 curriculum with another curriculum in their schools. One of widely curriculum that used in many countries is Cambridge curriculum.

Cambridge curriculum has provided student teaching materials from the most basic level to the highest level [2]. The provision of teaching set in the Cambridge program includes lesson plans, textbooks, work sheets, workbooks, and exams. The availability of teaching sets facilitates the teacher on learning and delivering the material. Similar things are found in the 2013 curriculum program.
Indonesian government has provided complete teaching set from syllabus, lesson plan, textbooks, and assessment [3]. Subjects Drugs and diseases are interrelated learning materials taught in the Cambridge curriculum. From the value data obtained, the average score of the worksheet on this subject is 70 with a maximum score of 100. Most students get a low score on questions in the form of problem solving. It identifies that students' problem-solving skills are still relatively low.

The ability of problem solving is one of the 21 abilities that students are expected to have. Problem solving ability is one of the process skills that students need to have through the learning process [4]. The process of problem-solving ability is (1) Define the problem, (2) Check the problem, (3) Plan the Solution, (4) Implement the plan that has been made, (5) evaluation [5]. This ability trains students in high thinking by providing a problem to solve or provide a solution. Problem solving process can be applied in instructional media of labyrinth adventure.

In The labyrinth most basic problem solving is finding a way out [6]. Educational games designed such as labyrinth can create stimulate thinking power including improving concentration and solving problems [7]. Problem solving instructional media of labyrinth can be modified with many materials in learning. This problem solving process can not only be done alone, but can also be done with a group work.

In practice of team working, each member in group has a role and responsibility for the success of the group. Some indicators to measure teamwork are (1) clear objectives, (2) open and honest in communicating, (3) cooperative decision making, (4) atmosphere of trust, (5) a sense of belonging, (6) good listening ability, (7) participation of all members. When this indicator has been met, the group can be considered successful [8].

However, teamwork is not an easy thing for members of a group. There are many factors that influence the success of teamwork. One of the factors is there are some students with special needs in the group. Feeble minded is including in Intellectual Developmental Disability (IDD). There are several categories of feeble minded children, which are: mild feeble minded, moderate feeble minded, and severe feeble minded. Mild feeble minded children are children who have the ability to be more developed than moderate and severe feeble minded [9]. It is necessary for students with special need to get special treatment in learning process to develop their ability.

Instructional media is something that can be used to convey messages and can stimulate students' thoughts and feelings so that learning motivation arises [10]. The innovations on media are needed to stimulate students' attention. One of the media innovations that can be used to help teachers in delivering the subject is learning media of the labyrinth adventure. This study has aim to find out the feasibility of the instructional media of Labyrinth Adventure and to find out the effectiveness of the instructional media of Labyrinth Adventure to train problem solving and team working skills in inclusive school.

2. Methods
This research development in developing instructional media of Labyrinth Adventure is using development model that have been modified. There are ten steps in this research and development as follows: 1) Potential and problems, 2) Data collection, 3) Design of product, 4) Design validation, 5) Design revision, 6) Small scale trial, 7) Media revision, 8) Large scale trial, 9) Product revision, 10) Final media of Labyrinth Adventure. Data collections are using several methods as follows: Method of test, and method of observation.

The subject of study is the junior high school students Permata Bangsa. In a small scale trial, five students were taken on grade IX, a large scale trial on grade VIII which conduct on ten students. Sampling is based on purposive sampling technique because the sampling is done based on the information of the science teacher.

Analysis data find out feasibility of the instructional media of Labyrinth Adventure is using observation sheet and be measured in percentage. Analysis data to find out the effectiveness the
instructional media of Labyrinth Adventure to problem solving and team working skills is using N-gain score. N-gain score is obtained from pretest and posttest.

3. Results and Discussion

Solving a problem is a basic activity carried out by humans in daily activity. In attempt to solve a problem, everyone will choose a strategy that is considered the most effective for solving their problem. If the strategy or method fails to solve a problem then it should be tried in another way to solve it. In an effort to solve problems, someone will go through several stages which are then used as indicators of problem solving. This study is using some indicators of problem solving skills that are: (1) identifying problems (Identify), (2) problem-solving planning, (3) execution of problem solving (Execute), (4) evaluation of the solution (Evaluation) [11].

After that, a test was conducted to see the problem solving abilities of students using pretest-posttest and analyzed using N-gain.

Table 1 N-gain of Students’ Problem Solving Skills

| Indicator | Pretest Score | Posttest Score | N-gain | Criteria |
|-----------|---------------|----------------|--------|----------|
| Indicator I | 66.67         | 91.67          | 0.75   | High     |
| Indicator II | 56.67         | 90             | 0.77   | High     |
| Indicator III | 64.17         | 93.33          | 0.84   | High     |
| Indicator IV | 55            | 85             | 0.67   | Moderate |

Explanation:
Indicator I : Problem identification
Indicator II : Design of problem solving
Indicator III : Problem solving
Indicator IV : Evaluation

Teamwork is a group whose individual efforts generate higher performance than individual performance [12]. Teamwork is considered capable of producing better performance than individual work. In this study is using some indicators for team working skills that have been modified, that: (1) Clear goal that all group members committed, (2) Open honest communication, (3) Cooperative decision-making, (4) An atmosphere of trust, (5) A sense of belonging, (6) Good listening skill, (7) Participation by all members.

After that, the teamworking skills of student are observed by using these indicators and analyzed using N-gain.

Table 2 N-gain Of Students’ Team Working Skills

| Indicator | Pretest Score | Posttest Score | N-gain | Criteria |
|-----------|---------------|----------------|--------|----------|
| Indicator I | 0.60          | 0.93           | 0.83   | High     |
| Indicator II | 0.50          | 0.86           | 0.72   | High     |
| Indicator III | 0.50          | 0.93           | 0.86   | High     |
| Indicator IV | 0.70          | 0.96           | 0.87   | High     |
| Indicator V | 0.70          | 0.90           | 0.67   | Moderate |
| Indicator VI | 0.74          | 0.93           | 0.73   | High     |
| Indicator VII | 0.64         | 0.96           | 0.89   | High     |

Explanation:
Indicator I : Clear goal that all group members committed
Indicator II : Open honest communication
Indicator III : Cooperative decision-making
Indicator IV : An atmosphere of trust
3.1. The Effectiveness of The Instructional Media of Labyrinth Adventure Media on Students’ Problem Solving Skills

The assessment of problem solving skills is performed for each student through pretest and posttest, where the questions in the pretest and posttest are related to four problem solving indicators: problem identification, design/strategies to solve the problems, problem solving, evaluation. The result of the students' pretest score obtained was 66.67. The instructional media of Labyrinth Adventure is said to be effective if the number of students who get an average of 4 indicators solve the problem with minimal classical completeness criteria at 70. After the students use the instructional media of Labyrinth Adventure, posttest is performed to know the problem solving skills after the students are given treatment. The average posttest score of students is 86.25.

The first indicator is an indicator of problem identification. The problem identification indicator has an N-gain score of 0.75 with high category. The meaning of these indicators is that students can determine the problem of a phenomenon or question. A question or phenomenon can lead students to conduct investigation, exploration, and critical thinking [13]. This aspect is very important for students as it is the stage of students to collect data to be used in solving the problem. The importance of this stage is mentioned in the solving process the problem on the determination or understanding of the problem correctly [14].

The increase of N-gain score in the indicator of problem identification is because students have been trained to be able to understand a problem well through learning process using the instructional media of Labyrinth Adventure. One of the components in the media labyrinth adventure is the questions in the form of problem based that are often in daily life, in solving the problems that presented students also try to understand the main problem of a phenomenon. Students need to determine or identify problems from existing data, without underestimating every situation that found, or blaming others [15]. Each student has a different ability to find and understand information to student with special needs. Each student has their own strategy in understanding available information [16].

Next indicator is an indicator of design / strategies to solve problems. The indicator of design/strategies to solve problems has an N-gain score of 0.77 with high category. This indicator is an extension of the identification problem indicator in which the students in the group make a plan that is used to solve a problem. The behavior one adopts when facing a problem is crucial in designing a plan for a solution [17]. Creating a plan in the problem-solving process is an important step, because the individual or group after processing the data of a problem must choose the most effective plan in solving the problem.

This indicator has increased indicating that the instructional media of Labyrinth Adventure is effective in improving students' skills in making a planning in problem-solving process. The development of problem-solving skills is aimed at more rational thinking and decision-making processes, not classical courses [18]. Decision making can be seen one of them when students answer questions and maintain the number of lives in the game of the instructional media. The decision-making when answering the problem is done in a discussion so that not only one or two students who play a part, in addition to the process of maintaining life is one strategy of the group to finishing the instructional media of Labyrinth Adventure. These conditions provide opportunities for students in developing self and group potential.

After that is indicator of problem solving. The indicator of problem solving has an N-gain score of 0.84 with high category. This indicator is the implementation stage of the plan that has been agreed by the students with their group. This stage in the group cannot be done only by some members only but the participation of all members of the group to obtain maximum results.
The increase in the third indicator shows the highest increase in N-gain score. The increase of N-gain score indicates that students have become accustomed to finding solutions to problems. The importance of this stage for the students is also strengthened which mention that the goal of learning is basically students to try their own search for problem solving and knowledge that accompany it, producing knowledge that really meaningful [19]. So every student is expected to overcome the particular problems that exist around. This stage requires the ability of the identification and preparation of plans in data processing so that the solution provided can effectively solve the problem. Says a problem-solving skill is the ability of students to use existing information to determine what to do in a particular situation.

The last indicator is indicator of evaluation. The indicator of evaluation has a N-gain score of 0.67 with the moderate category. The indicator of evaluation has the meaning of reviewing the solving that has been done already reached the expected target or not. The evaluation stage in learning process using the instructional media of Labyrinth Adventure can be seen when students’ lost the lives of the main character in the game. When a student with his or her group loses one of main character’s lives, the group will evaluate their weakness or their mistake of the plan they have made. In addition, this stage is also seen when students in the group answer the questions presented wrongly, then the group will evaluate the cause of the error.

The use of the instructional media of Labyrinth Adventure can be said to succeed because with this media students are encouraged to find as many sources to solve an existing problems. When the students express the results of their group members' thinking, they indirectly explore the material being studied. The result of the discussions is in the form of answers to the problems that have been provided. The student who have the ability to make decisions or actions to solve problems, indicate the power of critical thinking is good.

3.2. The Effectiveness of The Instructional Media of Labyrinth Adventure Media on Students' Team Working Skills

At the first meeting it is considered as a pretest that aims to know the students' team working skills before using the instructional media of Labyrinth Adventure. In the first meeting is usual learning process that using the jigsaw model with a discussion method where students are divided into groups to work on the workbook.

At the second meeting is considered as a posttest which aims to determine the increase of students’ team working skills after being given treatment using the instructional media of Labyrinth Adventure in learning process. The students are divided into 2 groups where 1 group consists of 5 students. The group can work effectively if it consists of 5-6 students. Furthermore, students with the group finished the media labyrinth adventure [20].

Clear goal indicator that all members committed has N-gain score of 0.82 with high category. The clear goal that all members committed indicator means that the objectives of the group to be achieved are the goals of each individual in the group. Putting together group members' goals is important because when the goals of each member are different, the group cannot optimally achieve the group's goals. The purpose of the group of students one of them is to finish the instructional media of Labyrinth Adventure.

Next indicator is an open honest communication indicator. The open honest communication indicator has N-gain score of 0.80 with high category. The indicator of open honest communication has the meaning of the openness in communicating between fellow members of the group. The communication among group members is needed in building trust and effectiveness of work in group. Built open honest of communication between groups members cannot be done in the short term. It is takes time for each member to understand the character of each group members and build the trust so that team work becomes more effective.

Indicators open honest communication can be seen when students with his group working on the question inside the instructional media of Labyrinth Adventure. When working on a question which is problem based form, each members group gives their opinion to solve the question. It will
periodically build up the openness of communication. The openness in communicating group members has an important role in building trust among in the group members. Then is indicator of cooperative decision-making indicator. The cooperative decision-making indicator has N-gain score of 0.86 with high category.

Next indicator is an atmosphere of trust indicator. An atmosphere of trust indicator has N-gain score of 0.87 with high category. The indicator of atmosphere of trust means that good groups generate trust among of all group members. The atmosphere of trust between group members cannot be done in a short time, but it takes time for each member to understand the character of his group's mates. Building trust in group members is an important part in the process of achieving group goals [21]. The atmosphere of trust is very important because it will affect the group in making decisions, openness in communicating between members, to the ability of students to listen to opinions or suggestions of members of the group.

Indicators of an atmosphere of trust in learning process using the instructional media of Labyrinth Adventure can been when students give their group friends a chance to solve problems in the media, and when students receive suggestions or solutions provided by their group mates. Each member has the same duty in maintaining an atmosphere of trust in his group. The atmosphere of trust is very important to maintain the harmony among of all group members, which will greatly affect the success of the group.

Next indicator is a sense of belonging indicator. A sense of belonging indicator has an N-gain score of 0.67 with moderate category. The indicator of a sense of belonging has the meaning that the group is belong of the all of group members. Good listening skill indicators in learning process using the instructional media of Labyrinth Adventure can be seen when students take suggestions or solutions that given by group members when answering question in the media. In addition to achieving group goals, good listening skills are also very important for each member to create an atmosphere of confidence in the group [22].

The last indicator is an indicator of Participation by all members. The indicator of participation by all members has an N-gain score of 0.89 with high category. The indicator of participation by all members has the meaning of each member actively participating in his group in order to achieve group's goal. Rate score of N-gain in each indicator to measured team working skills using the instructional media of Labyrinth Adventure shows that the instructional media is effectively in enhance the team working skills in students. Game activity will foster skills of cooperation among students in groups seen from the dynamics created by relationships among group members, thereby training students to believe in their own ability and believe in the ability of their friends, as well as improving capability of the group.

4. Conclusion

According to the discussion above, some conclusion arise: 1) The Instructional Media of Labyrinth Adventure to Train Problem Solving and Team Working Skills in Inclusive School which have been developed are declared feasible to use in learning process as instructional media on drugs and disease subject. 2). The Instructional Media of Labyrinth Adventure is effectively used to train problem solving and team working skills of general students and students with feeble minded in junior high school.

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