CREATING A FUN SCIENCE BOOK TO KNOW STUDENT MOTIVATION IN THE SCIENCE SUBJECT OF THE SOLAR SYSTEM MATERIAL.

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Abstract

The purpose of this research is 1) to make a valid fun science book on solar system material with the development stages of the ADDIE model, and 2) to know the learning motivation of students in science subjects on solar system material after using the fun science book media. This research is a development research by applying the ADDIE model. The research subjects were science teachers, students of class VII A and VIII G SMPN 3 Talang. This research consists of 4 stages, namely; 1) Analysis, 2) Design, 3) The results of the media validity test of the Fun Science Book by validator 1 get a percentage of 82.35% with a very valid category, validator 2 gets a percentage of 90.58% with a very valid category, and validator 3 gets a percentage of 95.29% with a very valid category. The average percentage of the 3 validators obtained was 89.41% which was categorized as "very valid". This proves that the cheerful science book media is valid for use in the learning process. The results of the student learning motivation questionnaire obtained a percentage of 85.93% on the tenacious indicator with a very interested category, the interest indicator obtained a percentage of 77.08% with an interested category, the achievement indicator obtained a percentage of 77.86% with an interested category, the perseverance indicator obtained a percentage of 80.98% with a very interested category and the independent indicator obtained a percentage of 77.08% with an interested category. The total average overall percentage of student motivation indicators is 79.8% with the category "interested", meaning that students are interested after using the Fun Science Book media can motivate students in learning science subjects on solar system material.

Keywords: Media, Fun Science Book, Solar System Material, Learning Motivation

1 INTRODUCTION

Many factors affect the science learning process, the first is the input of students, the second is instrumental input, media, methods, teachers and curriculum, the third is the input of the social and natural environment[1]. One of the psychological factors that has a major effect on the success of human activities including learning is motivation. In connection with this, if student motivation can be developed properly, the student's learning outcomes will be good. The opposite is true, if student motivation is not developed appropriately, then good learning outcomes will be difficult for these students to achieve[2]. Science in the curriculum has been well described, but in fact the quality of science learning in schools is not as expected[3]. This will have an impact on low student learning outcomes and on students' science abilities. This is in line with the 2018 PISA results that the science ability of students in Indonesia is in the bottom 10, which is ranked 74 out of 79 total participating countries[4].

Based on the results of interviews in the initial study at SMP Negeri 3 Talang conducted by researchers with one of the seventh grade science teachers that during the learning process in the classroom the teacher has implemented learning media, but only refers to the package book, student worksheet book and PowerPoint application. In the learning process provided by the teacher is not interesting, students tend to be bored and not enthusiastic about doing assignments. This makes VII grade students of SMP N 3 Talang at the time of learning less ready to follow it and affects their learning motivation. Based on the problems that exist in the field, namely low student learning motivation and teachers rarely use interesting learning media, researchers are trying to develop media that can be used in learning activities so that students can be motivated to learn and not feel bored in class, namely BUSARI media (Buku Sains Ceria). Learning activities can foster student interest in learning, students become active and not bored, and improve material understanding when teachers use game media in learning activities[5].

Fun Thinkers Book media can help create an active and not boring learning atmosphere[6]. Fun Thinkers Book is a learning media consisting of books, frames, and number blocks. This learning media is made with the concept of learning while playing by moving the number blocks from the left side of the frame that contains the question, to the right side of the frame that contains the answer. Therefore, researchers will develop Fun Thinkers Book media into a fun science book on Solar System material with several modifications. Some of the differences between fun science book media and Fun Thinkers Book media include: 1) Different book models than usual, 2) Frame material and number of tiles on the frame, 3) Content on the fun thinkers book media, 4) The location of the answer key on different media.

Fun Science Book media can also help educators to present fun learning so that it can improve and develop the quality, building motivation and potential of students in the learning process. The advantages of using the Fun Science Book media are: 1) Easy to carry anywhere, 2) Fun Science Book media is flexible, does not have to print books, 3) Only uses A4 size print-out paper. 4) Can be used at home, not only at school. The use of Fun Science Book learning media can help create an active and not monotone learning atmosphere. Solar System material was chosen to be developed in learning media due to the characteristics of the material which is abstract in visualization. So it is hoped that students who have low motivation can be re-motivated to learn and for teachers can provide a learning experience that is fun and not boring. So that this research has 2 objectives, namely:

1. Creating a valid fun science book on solar system material with the ADDIE model development stages.
2. Knowing the learning motivation of students in the science map of the solar system material after using the cheerful science book media.

2 METHODOLOGY

This type of research is R&D (research and Development) research with the ADDIE model (Analyze, Design, Development, Implementation, Evaluation). This research results in new products to be developed. The ADDIE development model is sourced from Arsyah's research[7]. However, due to limited research time, this research only reached the Implementation stage. the product that was created and developed was a BUSARI Media (Buku Sains Ceria) on solar system material for the learning motivation of seventh grade students of SMPN 3 Talang. The research procedure will be explained below.

1. Analysis Stage (Analyze)
   The analysis stage is carried out to find out the learning process and the media used in class VII at SMPN 3 Talang, this is done to match what is needed.
   a) Needs Analysis
      At this stage the researcher conducted an initial study by interviewing one of the seventh grade science teachers at SMPN 3 Talang related to the media used during the learning process. the results obtained by the researcher were that the teacher only relied on packet book media, student worksheet books and PowerPoint applications in science learning so that the researcher made the Fun Science Book media that could be used in the learning process to be more varied in presenting solar system material.
   b) Curriculum Analysis
      At this stage the researcher analyzes the application of the curriculum at school. The curriculum applied at SMPN 3 Talang has implemented an independent curriculum.
   c) Material Analysis
      At this stage the researcher will apply the material that will be used in the Fun Science Book media. The material chosen is solar system material.
2. Design Stage
   In the design stage, researchers made the initial design of the Fun Science Book media using Microsoft Word and Canva applications, making the frame of the props using wood, which would later be revised periodically before the validation process by validators who are experts in their fields.
3. Development Stage
   Researchers developed the Fun Science Book media on solar system material. Some stages in developing this media are: a) Realizing products in the form of learning media Fun Science Book. The making of this media is reviewed in terms of design, material and questions or quizzes that will be made different from existing learning media. b) Conducting an assessment of learning

media by testing its validity conducted by media expert validators consisting of 2 science lecturers and 1 science teacher and media question validators consisting of 2 science lecturers. c) Receiving various suggestions and input from validators to improve the learning media for the Fun Science Book to be appropriate so that a comparison of the initial media and the revised media is obtained. Fun science book media that has been validated and revised will then be applied to the trial class.

4. Implementation Stage
   At this stage the researcher implements the fun science book media After the Fun Science Book media is revised and declared valid, the product will be tested in small groups involving 9 VIII grade students and large group trials to VII grade students of SMP Negeri 3 Talang totaling 32 students with the intention of getting student responses regarding the ease of learning media created and developed. In addition, it is also to obtain student responses to the learning media developed through response questionnaires and learning motivation questionnaires.

Data collection techniques were carried out through several stages, namely interviews, questionnaires, observation and documentation. Quantitative analysis in this study was carried out with simple calculations through data analysis of media validation questionnaires, media question validation, research instrument validation and student response questionnaires. Quantitative data in the form of assessment scores that have been filled in are then analyzed using the formula according which is[8]:

$$V_{ah} = \frac{\text{TSe}}{\text{TSh}} x100\%$$

to get validation results from validators, the formula used is:

$$v = \frac{\text{vah1} + \text{vah2} + \text{vah3}}{3}$$

Description:

V = Combined validator

Vah1 = Validator 1

Vah2 = Validator 2

Vah3 = Validator 3

Tse = Total validation score by validators

Tsh = Total expected maximum score

Table 1. Validity Assessment Criteria

Assessment Criteria	Validity Level
81,00 % - 100,00 %	Very valid to use
61,00 % - 80,00 %	Valid enough to use with minor revisions
41,00 % - 60,00 %	Not valid to use, needs major revision
21,00 % - 40,00 %	Not valid to use
01,00 % - 20,00 %	Very invalid to use

Questionnaires are given for students to determine the level of student learning motivation after using the developed media. The questionnaire data is presented in tabular form and analyzed by percentage calculated using the following formula:

$$\text{P} = \frac{F}{N}\text{X}100$$

Description:

P: percentage number

F : number of scores obtained

N: maximum number of scores

The division of learning motivation categories after being modified can be seen in table 2.

Table 2. Student Motivation Criteria

Percentage range of learning motivation results (%)	Category
80-100	Very interested
65-79,99	Interested
55-64,99	Quite interested
40-54,99	Slightly interested
0-39,99	Not interested

The analysis for the student response questionnaire can use the formula:

$$P = \frac{\Sigma x}{\Sigma i}\ x\ 100\%$$

Description:

P = Percentage

Σx = Total score of respondents of all items

Σi = Total ideal score per item

to find out the criteria for student response questionnaires after being modified can be seen in table 3.

Table 3. Student Response Questionnaire Criteria

Percentage Range of Student Response	Criteria
80%≤P<100%	Very Interesting
60%≤P<80%	Interesting
40%≤P<60%	Moderately Attractive
20%≤P<40%	Less Attractive
0%≤P<20%	Not Interesting

The presentation of qualitative data in this study is presented in descriptive form, then the data collected in the form of suggestions and comments from validators will be presented through sentence explanations, tables, and pictures. Quantitative data is presented in the form of calculations sourced from assessments by validators, and the results of response and motivation questionnaires where the data is supported by tables and figures.

3 RESULTS

The problem in the field is that students' learning motivation in science subjects on solar system material is still low and teachers rarely use interesting learning media. There are many types and ways to awaken motivation in students, namely choosing the right and correct learning media, the design of learning in the classroom is made as well as possible, to provide complement for students[9]. Before the research was conducted, in the initial stage, the researchers conducted initial observations in January 2023, namely by interviewing one of the science teachers of SMPN 3 Talang to find out the learning media used and needed by teachers, curriculum and materials related to the research conducted and observing the situation around the school.

3.1 Media Validity of Fun Science Book

The media product developed by the researcher is an original design so that it needs to be revised first and then validated by validators who are experts in the field from 2 science education lecturers and 1 science teacher. The first stage carried out is the analysis stage.

3.1.1 Analysis Stage

1. Needs Analysis
   Based on the results of pre-research interviews, researchers took the initiative to determine the learning media needed by students to grow the learning motivation of seventh grade students towards science subjects. For this reason, researchers developed fun thinkers book media into a fun science book which was felt to be able to foster students' learning motivation when studying science subjects, especially on solar system material. The fun science book media is a fun media because it plays while learning. Busari media is media that can be used by teachers and students so that it will add to the variety of learning media in the learning process.
2. Curriculum Analysis
   Curriculum analysis is carried out to analyze the applicable curriculum at SMPN 3 Talang and determine which learning outcomes to develop in learning media. the applicable curriculum is the independent curriculum. The competencies aimed at the independent curriculum are different from the 2013 curriculum, where the independent curriculum uses learning outcomes arranged in phases. Researchers analyzed the curriculum in grade VII which is included in phase D. The purpose at this stage is to determine the material to be used in the busari media question (fun science book), the researcher chose the solar system material. The solar system material includes one learning outcome on the science understanding element, namely students elaborate their understanding of the relative position of the earth-moon-sun in the solar system and understand the structure of the earth's layers to explain natural phenomena.
3. Material Analysis
   This material analysis is carried out by researchers to determine what material will be applied to the fun science book media. Based on the results of pre-research interviews, researchers determined the solar system material that would be applied to the fun science book media. In the fun science book media, there are quizzes or questions that are the application of solar system material.

3.1.2 Design Stage

Researchers developed fun science book media by using the help of Microsoft Word application to make the layout of the frame and the contents of the media questions, as well as the answer key pattern and Canva to make instructions for using the media and the cover design of the fun science book media attached to the book cover. The props frame was made using brown plywood and the book cover was made using brown cardboard coated with black asturo paper, then on the cover a clipboard was attached to the left and right sides. then for color improvements on the props frame which was originally brown replaced green..

3.1.3 Development Stage

In the development stage that researchers need to do include: making prop frames, making media covers, making media content consisting of instructions for using the media, quizzes or media questions and answer key patterns, making research instruments in the form of media expert validation sheets, media question validation, validation of student response questionnaire instruments, and student learning motivation questionnaires. The media expert validation of the fun science book by 3 validators got a percentage of 89.41% with very valid criteria, where validator 1 gave a percentage score of 82.35%, validator 2 gave a percentage score of 90.58% and validator 3 gave a percentage score of 95.29%.

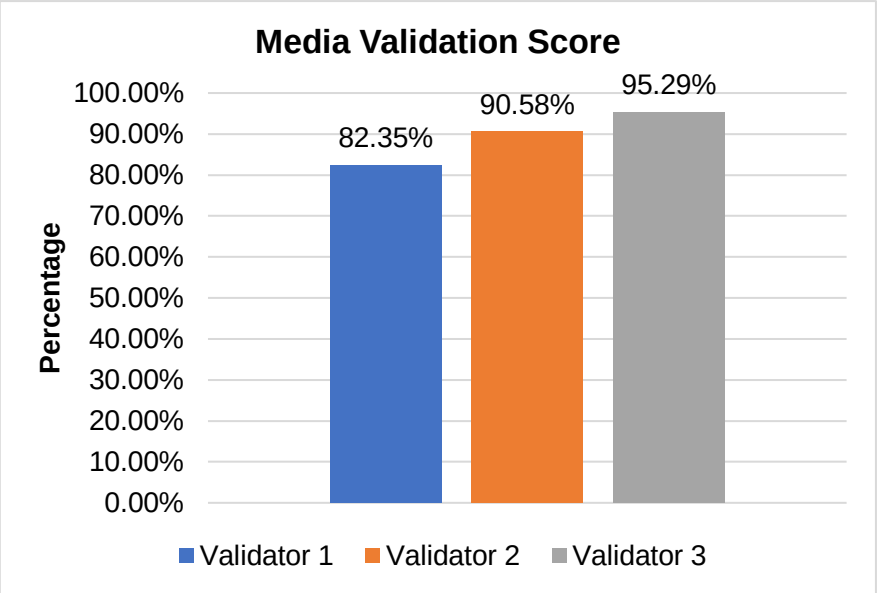

Figure 1. Media Expert Validation Results Diagram

The manufacturing of fun science book media questions that have been developed according to the next plan is revised first then in the validation process carried out by 2 validators. In the process of validating the fun science book media questions by 2 validators, a percentage of 75% was obtained which was included in the fairly valid criteria, where validator 1 gave a percentage score of 85%, and validator 2 gave a percentage score of 65%. Based on the results of the validation of media questions, it can be concluded that the Fun Science Book media questions on solar system material are declared quite valid and valid to use after revision.

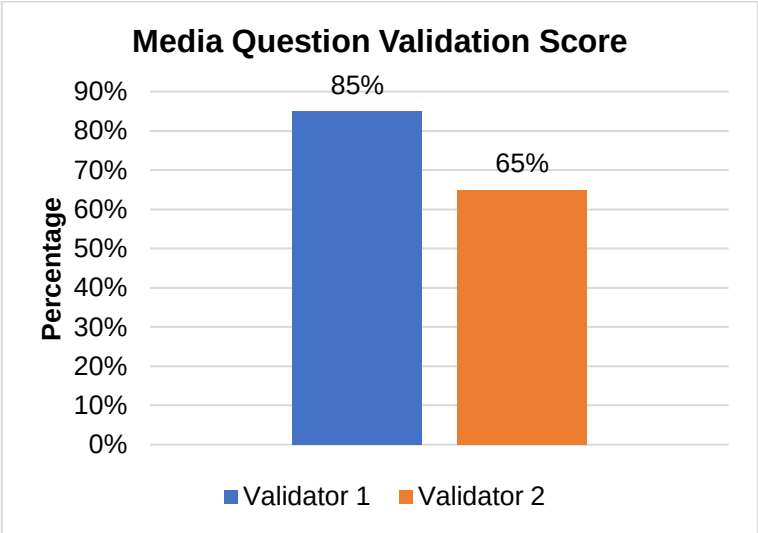

Figure 2. Media Question Validation Results Diagram

Figure 3. Fun Science Book Media

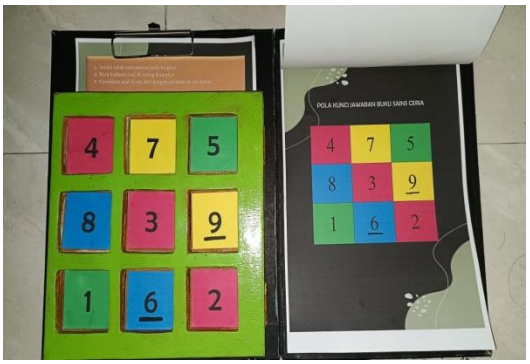

Figure 4. Fun Science Book Media Answer Key Pattern

3.1.4 Implementation Stage

At this stage, the fun science book media was implemented with small class and large class trials. The small class trial phase was followed by VIII G class students with a total of 9 students randomly selected by the teacher, and the large class trial was applied to VII A class totaling 32 students by giving a student response questionnaire to the fun science book media.

3.2 Results of Student Motivation Questionnaire

The results of the questionnaire of student learning motivation aim to determine the motivation that exists in students after the use of fun science book media. The questionnaire distributed to students consists of 15 questions which have 5 indicators in them, where each indicator has 3 questions. Indicators consist of tenacity, interest in learning, achievement in learning, perseverance, and independent in learning. The percentage value on the five indicators, namely the indicator of tenacity in facing difficulties is 86%, perseverance in learning is 81%, achievement in learning is 78%, interest and attention in learning is 77%, and independent in learning is 77%. The total average percentage of student motivation indicators is 79.8% with the interested category. This means that the use of fun science book media in the learning process is well received by students. This shows that the Fun Science Book media is able to motivate students and affect students' tenacity and perseverance.

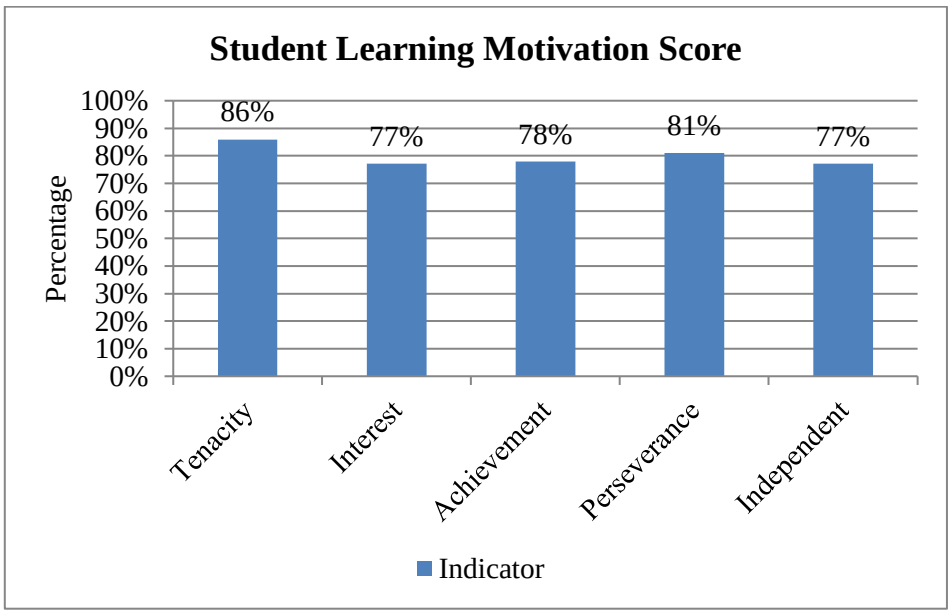

Figure 5. Percentage of Student Motivation Indicator Results

3.3 Learners Response to the Fun Science Book Media

After going through a long process at the media development stage, the next step is to see students' responses after using the fun science book media. The trial was held in order to find out how students responded to the media created and developed by researchers through a questionnaire. The same questionnaire given to students consists of 10 statement indicators in small and large class trials. After

the students filled out the questionnaire, the questionnaire was analyzed and the percentage results obtained were 87.77% in the small class trial which was included in the very interesting criteria. The large class trial received a percentage value of 83.62% which was included in the very interesting criteria.

During the researcher's small and large class trials, students seemed excited and interested in using the fun science book media. This makes the fun science book media can attract students' attention and be interesting to use in the learning process and can build student learning motivation, because the quality of the design and appearance of the fun science book media is very good. Learning media has an important role in the learning process and several benefits including attracting students' attention and interest which can motivate students, and develop students' interest and motivation[10].

Figure 6. Use of Fun Science Book Media

4 CONCLUSIONS

Research on the development of Fun Science Book media on solar system material consists of 4 stages, which are from Analysis, Design, Development, and Implementation validity of fun science book media obtained a percentage of 89.41% are categorized as very valid. While the validity of the fun science book media question obtained a percentage of 75% categorized as quite valid. the highest motivation indicator is the tenacity indicator at 86%, the perseverance indicator at 81%, the achievement indicator at 78%, the interest indicator at 77%, and the independent indicator at 77%. This shows that students are serious during the learning process, and it can be proven that students are motivated after using the Fun Science Book media with the average percentage of overall motivation indicators is 79.8%. Based on the results and discussion of the research, there are recommendations from researchers, such as Teachers can easily apply the Fun Science Book media that has been developed to overcome students who are easily bored during learning so that students can be motivated to learn science subjects in class, Students can use the Fun Science Book media themselves at home to improve their abilities and learn independently, and further development research needs to be carried out to correct deficiencies for increasingly valid and effective results.

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