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Development of Ludo-Science Media with a Somatic Auditory Visual Intellectual (SAVI) Approach to Train the Activeness and Conceptual Understanding

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Abstract

This study is aimed to develop an educational game media called ludo-science that is compiled with Somatic Auditory Visualization Intellectually (SAVI) approach which can be used to train the activeness and students' conceptual understanding. The development procedure is reference to the ADDIE development model. The research data were obtained in the form of validation data, readability data, response data, activeness data, and pretest posttest scores. The results showed that after going through the product validation process by material experts obtained an average percentage of 92,70% and included in the category of very feasible. Product validation by media experts obtained an average percentage of 82,39% and included in the very feasible category. The average readability gained 95,75% and included in the excellent category. The results of activeness obtained an average activity of students by 82,94% and included in the category of very active. The pretest and posttest showed an increase in students' conceptual understanding. The classical calculation state that at the pretest the concept understands is 37,27% while at the posttest is 63,59%. The average questionnaire responses for the use of Ludo-science media with SAVI received an average of 86,79% and included in the excellent category.

Keywords: SAVI, Ludo-Science, Activeness, Conceptual Understanding.

INTRODUCTION

The curriculum 2013 is a refinement of the mindset in developing learning patterns that were initially teacher-centered to student-centered (Ministry of Education and Culture, 2014). Winarti (2013) states that active learning is a teaching and learning system that emphasizes students' physical, mental, intellectual and emotional activeness in order to obtain learning outcomes in the form of a combination of cognitive, affective and psychomotor aspects. Khasanah (2016) said the activeness of students can be seen from responding to questions or instructions from the teacher, listening and paying attention to the teacher's explanation, dare to express opinions, and actively working on the questions given by the teacher. Wibowo (2016) revealed that the activeness of students in the learning process can stimulate and develop their understanding of a concept.

Conceptual understanding in science learning is one of the problems that is quite serious in the world of education today. Students throughout Semarang City have difficulty learning science in the mastery of concepts. This is caused by factors that cause learning difficulties including interests, talents, motivation, intelligence, school facilities, teachers, facilities or infrastructure and support, and activities (Arief, 2012).

Problems found in the learning process, provide awareness for teachers to provide innovation in learning. The selection and use of appropriate learning approaches, methods or strategies are intended for effective and motivating science learning. Vikagustanti et al. (2014) states that teachers need to choose methods, approaches, learning resources and appropriate learning media so that learning is more interesting. Darkasyi et al. (2014) states that the use of an appropriate learning approach is expected to increase students' motivation, interest and understanding of the subject matter.

Huda (2014) states that somatic, auditory, visualization, intellectual (SAVI) is a learning approach that involves all learners' senses in the learning process. SAVI learning requires excitement in learning and active involvement of students through the activity of the body, senses, intellectual and emotional in learning so that students can construct their own understanding of the concept (Wardani, 2012). The characteristics of SAVI can be seen from the elements: 1) somatic (learning by doing) practicing problem solving skills in students is the process of learning by doing something. 2) auditory (learning by hearing) is a

learning process by listening, listening and speaking, expressing opinions. 3) visualization (learning by seeing) is a learning process by seeing, observing and describing. 4) intellectual (learning by thinking) is in the process of learning to solve problems and think.

Shoimin (2014) states that the stages that need to be taken in the SAVI learning approach are preparation, delivery, training, and the display of results. The strengths of the SAVI learning approach according to Shoimin (2014) are (1) generating full integrated intelligence of students through the incorporation of physical motion with intellectual activity, (2) fostering cooperation because smarter students are expected to help the less intelligent, (3) maximize the sharpness of the concentration of students, and (4) train students to get used to thinking and expressing opinions and dare to explain the answers.

The use of SAVI learning approaches in learning makes students no longer be passive in participating in learning. Students will feel happy and motivated to learn because this learning approach is accompanied by media images so that it can motivate students to participate in learning (Yulianitha, 2014). Teachers who are in charge of science subjects tend to often apply the lecture method, even though science can be packaged in a fun way and involve students even further, so students can be more motivated to learn and the concepts of science can be better understood. The use of an appropriate learning approach can help teachers to build a pleasant learning atmosphere. Dewi et.al, (2020) didresearch and states that multicultural education through traditional inquiry-based games can improve student character.

Learning media used also affect the activeness and understanding of students' concepts. Media in learning is one important component in supporting the success of learning. Arsyad (2013) argues that learning media serves as a tool for teaching and learning to influence the conditions and learning environment. From this function, learning media can be used as a generator of desires, interests, and motivations and stimuli to be more active in learning activities. The function of this media is very much in harmony with the function of the game which has many enthusiasts and active stimulants.Sriwahyuni & Mardono (2016)states that the use of educational game media can improve learning outcomes so as to achieve completeness standards. Albab et al (2018) stated that group investigation assisted by science chain cards had a strong influence on students' communication skills. The

amount of influence exerted in the study was 58.00%. Dewi et al (2019) state that learning using Digital Storytelling media with a conservation approach can improve students' understanding of concepts in classification material.

One alternative to overcome these problems is the creativity required by the teacher in selecting learning media that can involve students as a whole, can arouse the enthusiasm and activeness of students to learn so that learning achievement can be increased, one of them is the Ludo-science game media. The Ludo-science game was adapted from the Ludo game but was innovated by adding question cards about science concepts. Dewi and Akhlis (2016) state that a multicultural-based science approach using games can be used as an alternative to shape students' character. Students are formed in several groups and must answer the question card to win the game. Ludo-science is a fun medium, because students are invited to play while learning to answer various questions presented by the teacher. For some people, learning is more effective and useful if it is done by playing with questions (Suprayogo, 2009). Learning media in the form of games have been developed by researchers to support the learning process. Dewi et al (2019) developed the Science Uno Card about the Solar System which is effective for improving students' scientific communication skills. Setyaningsih and Dewi (2015) developed a scince-edutainment-based board game media for food themes for grade VIII students, then Susanto et al., (2013) developed interactive multimedia with education games on integrated science learning of light themes for junior high school students.

This study takes the focus of the study on the material Excretion System. Excretion system is material learned in class VIII. Sub materials in the excretion system discussed include (1) the structure and function of the excretion system in humans (2) disorders in the human excretion system, and (3) efforts to prevent or overcome them. Basically the excretion material is abstract and memorized, so that in the delivery it takes an interesting learning media and helps in understanding the material. One of them is the Ludo-science media. The use of Ludo-science media is expected to provide a clear picture of the material and sub-material studied; help students group concepts; help active students find and understand the material, so that it can make short-term memories into long-term memories as well as understanding students' concepts. Understanding the concept is needed by students to solve a case or problem. Cholifah et al., (2016) state that

conceptual understanding was obtained in the learning process.

Based on the background that has been described, a research will be conducted under the title Development of Somatic, Auditory, Visualization, and Intellectual (SAVI) Media Approach to train the students' activeness and conceptual understanding.

Based on the background of the problems that have been raised, then the problem in this research can be formulated as follows:

1. How is the validity of the Ludo-science media with the Somatic, Auditory, Visualization, Intellectual (SAVI) approach developed?
2. How is profile the activeness and students' conceptual understanding after implementing learning with Ludo-science media Somatic, Auditory, Visualization, Intellectual (SAVI) approach?
3. How is the effectiveness and response to the use of the Somatic, Auditory, Visualization, Intellectual (SAVI) approach developed by Ludo-science media?

METHOD

The study was conducted in two high schools in the academic year 2019/2020. There were 3 research subjects including in small scale trials consists of 8 students of class IX, in large-scale trials consists of 32 students of class VIII, and in the implementation phase consists of 32 students of class VIII. The development and research model used in this study is the ADDIE model. ADDIE is a development model that consists of five stages, namely analysis, design, development, implementation, and evaluation (Anam & Hakim, 2017). Wyostek & Downey (2017) argues that the ADDIE model is better used for large-scale research, but can also be used in small-scale research.

The data were taken by eligibility questionnaire, readability questionnaire, response questionnaire, activity observation sheet and pretest-posttest value. Data collection methods used were documentation, observation, questionnaires, and tests. The documentation method was carried out as evidence of the conduct of the study. The observation method was carried out at the initial observation stage in junior high school for grade VIII students and junior high school science teachers. The questionnaire method is intended to determine the characteristics and feasibility of Ludo-science media. The questionnaire instruments used were: (1) media validation questionnaire for 3 media experts and 3 material experts (2) activation observation sheet by 4 observer (3) the response questionnaire by student and teacher (4) two tier multiple choice.

The test method used pretest and posttest methods in the form of reasonable multiple choice conducted at the implementation stage. Before being used in the pretest and posttest, the questions are firstly tested on students who have received the excretory system theme material so that the reliability of the questions is obtained. The reliable value obtained is 0.887. The test instrument (reasoned multiple choice questions) that was used has also been validated in content using the Aiken V formula and declared valid.

RESULT AND DISCUSSION

This research is a research and development research of SAVI ludo-science media in which the research that has been done has obtained the results including: (1) data analysis stage in the form of observations at a junior high school in Semarang, Indonesia, (2) data design stage, (3) development stage data in the form of data validation of SAVI ludo-science media by material and media experts, as well as media characteristics data (4) implementation stage data in the form of activeness profile data and students' conceptual understanding, (5) evaluation stage data in the form of data on students' responses to the SAVI-ludo-science media, and (6) documentation, as evidence of conducting research. This is SAVI's ludo-science media design.

Figure 1 Question Card

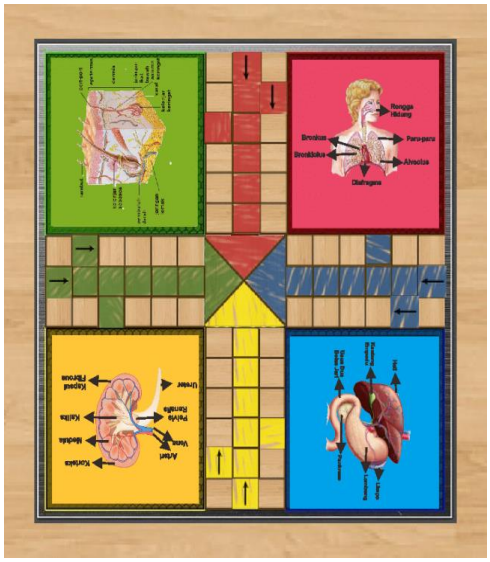

Figure 2. Ludo-science boards

Validity of Ludo-science Media Approach SAVI

The feasibility of the SAVI-ludo-science media approach was assessed by 3 material experts and 3 media experts. The results of the material expert's assessment of the media are presented in Table 1.

Table 1. Data of Validation of SAVI-related media ludo-science by Material Expert

No	Rated aspect	1	2	3	%	Criteria
1	Theory					
	1 In accordance with the indicators in the grid	4	4	4	100	Very decent
	2 Material compatibility with KD	4	4	4	100	Very decent
	3 There is no misconception	4	3	4	91.67	Very decent
2	Construction					
	1 Media SAVI approach	3	4	3	83.33	Very decent
	2 Formulated clearly	4	4	4	100	Very decent
3	Language					
	1 Use good and correct language	3	4	3	83.33	Very decent
	2 Communicative sentence formulation	4	4	3	91.67	Very decent
	3 The sentence used can be understood clearly	4	4	3	91.67	Very decent

Data shown in Table 1 namely regarding the details of the assessment of the feasibility of the media by material experts. The average obtained is 92.70% and is included in the very feasible category. Every aspect of obtaining criteria is very feasible to use. SAVI-supported ludo-science media are also validated by media experts. The results of the media expert's assessment of the media are presented in Table 2

Table 2. Validation of ludo-science media with SAVI approach by Media Experts

No	Rated aspect	1	2	3	%	Criteria
1	General Display					
	Media design is in accordance with excretion system material	3	3	4	83.33	Very decent
	Attractive media packaging	3	3	3	75.00	Worthy
	Attractive media design seen	3	3	4	83.33	Very decent
2	Special Display					
	Color selection in media	3	4	4	91.67	Very decent
	The use of image quality and size	3	3	4	83.33	Very decent
	Selection of font types and sizes accordingly	2	3	4	75.00	Worthy
	Media presentation					
	Media is easy to carry and move	4	3	4	91.67	Very decent
3	Color clarity of print	4	3	3	83.33	Very decent
	Paper selection accuracy	4	3	4	91.67	Very decent

The average feasibility of the media by media experts is 82.39% and is included in the very feasible category. The majority of aspects of getting the criteria are very feasible except 2 aspects namely the packaging of the media and the type of fonts which obtain the criteria of being feasible.

The feasibility of the SAVI-approached ludo-science media was assessed by material and media experts, where the material experts consisted of 3 people consisting of 2 Integrated Science Faculty lecturers from a Faculty of Mathematics and Natural Sciences and 1 science teacher. Based on the feasibility test, the material experts agreed that the SAVI-supported ludo-science media was very feasible. The second validation is in terms of media where the media expert consists of 3 people, 2 lecturers of Integrated Science at Faculty of Mathematics and Natural Sciences and 1 teacher of science subjects in Indonesia. Based on the feasibility test, the media experts agreed that the SAVI-approached ludo-science media was very appropriate.

Supported by previous research by Taufiq *et al.* (2014) that the development media received a score with very decent criteria from all experts. This is because the suggestions and input provided by experts are directly applied to the media. Media experts give several revisions, among others: (1) The image is adjusted to the material, (2) the font size is not consistent, (3) there is writing that is illegible. Font size is important to note so that users can clearly read the text presented. In accordance with this, Ashyar (2012) states that forming effective writing needs to be done so that the message to be conveyed is easily understood by the reader.

Readability questionnaire was given during a small-scale trial of 8 class IX students. The results of the media readability questionnaire are presented in Table 3.

Table 3. Readability Questionnaire Data The ludo-science media approached SAVI

No.	Rated aspect	Achievements (%)	Criteria
1	Attractive media display	100.00	Very good
2	A harmonious color mix	93.75	Very good
3	The picture in the media is clear	90.63	Very good
4	Images and components match the theme	96.88	Very good
5	Font type and size are easy to read	93.75	Very good
6	Ideal media size to use	87.50	Very good
7	Material according to need	100.00	Very good
8	The material is presented simply and clearly	100.00	Very good

No.	Rated aspect	Achievements (%)	Criteria
9	The picture clarifies the material	96.88	Very good
10	Media in accordance with the material	100.00	Very good
11	The language used is simple and easy to understand	93.75	Very good
12	The use of media is easy and practical	93.75	Very good

The data shown in Table 3 is about the details of the SAVI approach to the readability of the ludo-science media. Every aspect gets very good criteria. The average obtained is 95.57% and included in the very good category.

The readability of ludo-science media with SAVI approach is known from the results of the readability questionnaire sheets given during the small-scale trial. The small-scale trial phase used a readability questionnaire that was previously validated by the expert construct. Readability questionnaire was given to 8 students of class IX. This was done because students of class IX had received material in the excretion system when in class VIII. The readability questionnaire had 12 aspects that were assessed.

All aspects of achieving excellent categories. The average readability questionnaire score obtained in small-scale trials was 95.57% and included in the excellent category. Complete data can be seen in Appendix 16. The results obtained in the readability questionnaire were used for media revision material before being used during large scale trials and implementation.

Indicators of the characteristics of Ludo-science media with SAVI approach are as follows: (1) the use of media in accordance with the time allocation, (2) with SAVI approach (3) interesting media and practical (4) durable / can be used repeatedly, (5) conformity to the material and learning objectives, (6) conformity to needs, (7) the language used is simple and easy to understand, (8) train activeness, (9) train concept understanding. Media characteristics*ludo-science* the SAVI approach is explained in detail in the next paragraph. Media characteristics can be seen from the results of the material expert validation sheet, the media expert validation sheet, the readability questionnaire sheet and the usage response questionnaire sheet.

Indicator 1 is conformity with time allocation. The information in table 1 shows that the suitability of the material with BC obtained an average of 75%. This is evidenced by the results of the validation by material experts who state that the suitability of the material with basic competencies is included in the very feasible category. Basic competence 3.10 has 4 meeting hours. The SAVI ludo-science media is

equipped with 80 question cards. The eighty cards are divided into 4 sets according to the material of the excretory system namely kidney, liver, lung and skin. This arrangement is based on consideration of the number of meeting hours in the excretion system chapter. Each meeting can use a set of question cards according to the material being studied. Time allocation is an important factor in media selection.

Indicator 2 is SAVI approach. This media with SAVI approach is proven by obtaining an average of 91.67% in table 1. The material expert agreed that the media ludo-science was arranged with SAVI approach. Shoimin (2014) describes the characteristics of SAVI can be seen from the elements: 1) Somatic (learning by doing) is the process of learning by doing something. Problem solving skills (problem solving) in students can be trained through the learning process by doing something. Students must solve the problems contained in the question card to win the game. Students are allowed to find information from various learning sources. 2) Auditory (learning by hearing) is a learning process by listening, listening and speaking, expressing opinions. Learners must listen carefully to the questions read by their friends and answer these questions verbally. 3) Visualization (learing by seeing) is a learning process by seeing, observing and describing. Students can learn from the pictures contained on the back of cards and ludo boards. The picture printed on the back of the card and the Ludo board relates to the material of the excretion system. 4) Intellectual (learning by thinking) is in the process of learning to solve problems and think. Learners carry out a discussion process to solve questions from question cards. 4) Intellectual (learning by thinking) is in the process of learning to solve problems and think. Learners carry out a discussion process to solve questions from question cards. 4) Intellectual (learning by thinking) is in the process of learning to solve problems and think. Learners carry out a discussion process to solve questions from question cards.

Indicator 3 is attractive and practical packaging. The information in table 2 shows that the media display is attractive with an average percentage of 83.33%. SAVI-supported ludo-science media can be self-made and easy to use / move. Table 2 data shows that the use of media is easy to carry and move or practical with an average percentage of 91.67%. Media experts agree that SAVI's ludo-scientific media are compiled in an interesting and practical way. The color selection is very precise and the size of the letters is clear.

SAVI's ludo-science media uses primary colors so the display is bright and attractive. Muazzomi (2017) states that adjusting the color of the letters to the background of the learning media used can arouse students' learning interest in the subject matter. In addition, Purnama (2010) also believes that a suitable coloring can support a message well conveyed. The pawn used is also painted in primary colors. The size of the SAVI-close ludo-science media that is not too large makes this media transferable / easy to use and self-made.

Indicator 4 is media resilience. SAVI-supported ludo-science media are durable / can be used repeatedly, and are supported by the availability of materials / materials easily obtained.. Paper selection is in accordance with obtaining an average percentage of 91.67% in table 2. The paper used is vinyl type sticker paper that is resistant to water. The media is not easily damaged and can be used repeatedly. Media SAVI-supported ludo-science is durable and can be used repeatedly. This was agreed by the media experts who stated it was very feasible on these indicators. Making ludo-science media near SAVI itself is quite simple. The materials used to make SAVI-approached ludo-science media are wood, boards, paints, paperboard, and stickers. Researchers use the chessboard to be modified as a ludo board. Chessboard selection with the consideration that the chessboard can be used as a place to store pawns and question cards to be more practical. The chessboard is then covered with stickers that have been designed to look like ludo. The sticker paper used is waterproof paper. SAVI-supported ludo-science media are durable / can be used repeatedly, and supported by the availability of materials / materials easily obtained. This is in accordance with research by Dick and Carey (2012) which states that one of the requirements of a good media is that it is durable.

Indicator 5 is compatibility with the material and learning objectives. The material in the media matches the learning objectives and is presented simply and clearly. The material suitability aspect obtains an average of 100% in table 2. The basis of learning objectives in this study is used from Regulation of Ministry of Education and Culture year 2018 No. 37 that concerning core competencies and basic competencies (Ministry of Education and Culture, 2018). Media must have clear objectives in learning because not every media is able to achieve certain learning goals (Mahnun, 2012). SAVI's ludo-science media is arranged with the aim of learning in the excretion system chapter. The design of ludo-science

media is adapted to the theme.On the main board there are pictures of excretory organs namely the liver, kidneys, lungs, and skin. The pictures are equipped with captions so students can read and learn while playing. On the back of the question card there is also a picture of the excretory system, both organs, excretion processes and abnormalities of the excretion system. Learners can see the picture when the opponent reads the questions. The picture has been adjusted to the contents of the questions in each card so students cannot cheat.

Indicator 6 is the suitability of students' needs. This is evidenced by the results of the questionnaire sheet responses to use by students and teachers in table 4. Results of initial observations at a junior high school in Semarang, Indonesia show that students are less active and do not understand the material. Students need learning media that are able to stimulate activity and increase students' conceptual understanding. The teacher in the usage response questionnaire stated 100% strongly agreed that the use of Ludo-science game media made learning centered on students. Students as much as 85.16% expressed strongly agree thatLudo-science game media can be used to convey material. The media chosen, developed, and utilized must be in accordance with the conditions, time, cost and desired learning objectives. Each type of media has certain characteristics that we must understand, so that we can choose the media that suits the needs and conditions that exist in the field (Sasonohardjo, 2002). The results of preliminary observations indicate that students need learning media that are able to stimulate activity and increase students' conceptual understanding. Teacher use responses questionnaire sheet which states that SAVI-ludo-science media can make learning activities student-centered

Indicator 7 is a language that is simple and easy to understand. This is indicated by the results in the usage response questionnaire. The language used is simple and easy to understand by obtaining an average of 93.75% in table 4. This is in accordance with the opinion of Ashyar (2012) which states that the use of language in the media must be in accordance with the rules of Indonesian language that is good and right. So that its use does not cause multiple interpretations and easy to understand.

Indicator 8 is the ability of the media to encourage activeness. This is because the media is adapted from a game. Learning to use ludo-science media makes active students learn. The average percentage obtained was 85.16% in table 4. Ludo-science is a fun

media, because students are invited to play while learning to answer various questions presented by the teacher. For some people, learning is more effective and useful if it is done by playing with questions (Suprayogo, 2009). This is evidenced by the results of the usage response questionnaire sheet. On the questionnaire sheet responses to the use of the media ludo-science by students stated that they strongly agreed thatlearning to use Ludo-science media makes active students to learn.

Indicator 9 is the ability of the media to practice understanding concepts.Learning to use ludo-science media makes students better understand concepts.This is evidenced by the increase in the results of the pretest and posttest scores. Percentage average understand the concept which is obtained When *pretest* at 37.27% while at the posttest at 63.59%. This is because ludo-science is an educational game media. Sriwahyuni & Mardono, (2016) state that the use of educational game media can improve learning outcomes so as to achieve completeness standards. Understanding the concept makes it easy for students to work on problems even though they have varied. This is evidenced by the results of the posttest score which is better than the pretest value.

The results of the small-scale trial were obtained that the media was ready to be used for large-scale trials based on the responses of students who had used SAVI-approached ludo-science. Large-scale trials were then carried out on 32 students of Class VIII F. In the large-scale trials there was input on the time of using this SAVI-approached ludo-science. Large-scale trials carried out within 20 minutes. But apparently the time is not enough to complete a set of cards containing 20 questions. Therefore, during implementation in the classroom the use of SAVI-ludo-science media is done within 30 minutes. During the implementation, the students seemed enthusiastic and active in conducting learning with the SAVI ludo-science media. Students can correctly answer the questions on the question card even though they still have to open the book. The process of finding this information is also one of the expected attitudes in the use of SAVI-ludo-science media so that students are able to get a good understanding of concepts. Thus the activeness and conceptual understanding of students have been honed through the SAVI-approached ludicultural media that they use.

The implementation of the problem encountered was that there were students who could not answer the question because they did not get the

dice number 6. The students had to wait long enough to get the dice number 6. The observer had difficulty assessing the activeness of the students. Another obstacle regarding the implementation of the pretest and posttest is only 30 minutes. That is because the time of the study coincided with the time of trying out the national exam so that students in class VII and VIII started the first hour at 09:00 WIB Each meeting hour has a duration of only 30 minutes. But overall, students are able to complete the pretest and posttest well.

Students' Activeness Profile

Students' Activeness are measured through an observation sheet filled by 4 observers. Each observer observes 8 students. This is done so that the observer is more focused on observing every action taken by these students. In the room there is a camera that records the state of the class and can be played back. This can help the observer in observing if something is missed. Observation sheets of students' activeness are prepared by consulting and constructing validation by experts. Data on observations of students' activeness can be seen in Figure 3.

Based on figure 3, the average activeness of students by 82.94% and included in the category of active and very active. Analysis of student activity is measured through observations made by observers with an observation sheet guide which contains six indicators of activeness according (Sudjana, 2010).

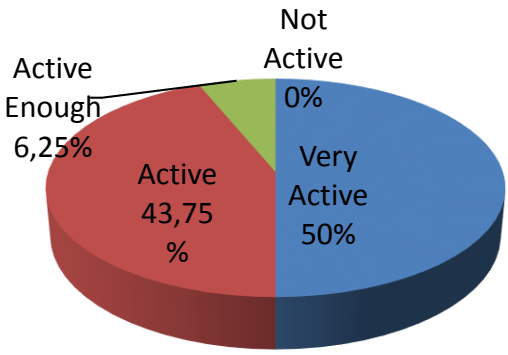

Figure 3. Students' Activeness Profile

The activeness of students in participating in learning can be seen in the following indicators: 1) participating in carrying out their learning tasks 2) engaging in problem solving 3) asking other students or teachers if they do not understand the problems they face 4) trying to find various information needed to solve problems 5) train yourself in solving problems or problems 6) assessing his ability and the results obtained. The SAVI-approached ludo-science media developed can be used as a means to train the activeness of students through the games presented. Where in the implementation the majority of students actively answer questions contained in the media. Based on these facts, indicators one, second and fifth have been trained so that they are getting better. The third indicator can be trained when students have

discussions with teammates to determine the right answer. The fourth indicator can be trained when students open their textbooks to find the right answers. The sixth indicator can be trained when students get an assessment of the opponent after answering questions. Thus the activeness indicator has been trained. Recapitulation of the score in Figure 3 can be seen that students have had a good activeness. With these achievements it can be said that the research conducted has been successful. The second and fifth have been trained so that they are getting better. The third indicator can be trained when students have discussions with teammates to determine the right answer. The fourth indicator can be trained when students open their textbooks to find the right answers. The sixth indicator can be trained when students get an assessment of the opponent after answering questions. Thus the activeness indicator has been trained. Recapitulation of the score in Figure 3 can be seen that students have had a good activity. With these achievements it can be said that the research conducted has been successful. The second and fifth have been trained so that they are getting better. The third indicator can be trained when students have discussions with teammates to determine the right answer. The fourth indicator can be trained when students open their textbooks to find the right answers. The sixth indicator can be trained when students get an assessment of the opponent after answering questions. Thus the activity indicator has been trained. Recapitulation of the score in Figure 3 can be seen that students have had a good activeness. With these achievements it can be said that the research conducted has been successful. The fourth indicator can be trained when students open their textbooks to find the right answers. The sixth indicator can be trained when students get an assessment of the opponent after answering questions. Thus the activeness indicator has been trained. Recapitulation of the score in Figure 3 can be seen that students have had a good activeness. With these achievements it can be said that the research conducted has been successful. The fourth indicator can be trained when students open their textbooks to find the right answers. The sixth indicator can be trained when students get an assessment of the opponent after answering questions. Thus the activeness indicator has been trained. Recapitulation of the score in Figure 3 can be seen that students have had a good activeness. With these achievements it can be said that the research conducted has been successful.

The first indicator of activeness is participating in carrying out their learning tasks. Activities that fit the first activeness indicator are really listening to opinions and explanations. Students perform activities to pay attention to any information or material submitted by teachers or other students. By actively paying attention, students get a lot of information and knowledge that make students better understand the concepts being learned. In line with the results of Nugrahani's research (2011), if the lack of student attention to the material presented causes the transfer process of material that is not optimal, so that it can affect the students' understanding of the material not optimal.

The second indicator of activeness is to be actively involved in problem solving. Students actively respond to questions or because of understanding the concepts that students have. Because with the understanding of the concepts possessed, students have the preparation of answers to actively respond to questions or commands quickly, responsively and confidently. The third and fourth indicators of activity are asking other students or teachers and trying to find various information needed to solve the problem. With the innovative media, which is SAVI-approached ludo-science media, students' sense of curiosity increases, so the desire of students to ask questions is high. Questioning skills are closely related to students' knowledge. The more questions, the more knowledge is gained.

The fifth indicator is training yourself in solving problems or problems. Learners conduct activities to solve challenges / problems in the SAVI ludo-science media and actively look for the most appropriate answers. The process of completion requires activities such as observing, reading, writing, discussing so students can find answers to these problems and understand concepts that are discovered by themselves through the activities carried out.

The sixth indicator of activeness is to assess the ability of himself and the results obtained. This can be seen in the discussion process when using SAVI-ludo-science media. In discussing students doing collaborative activities that is exchanging the knowledge possessed by each individual so that students can compare their abilities with other students. With the activity of expressing opinions in groups can train students to conclude a concept that is obtained.

The indicator of activeness that gets the highest score is indicator 1, which is participating in carrying out its learning tasks. This proves that SAVI's

ludo-science media has the advantage of stimulating students to be more active in carrying out their learning tasks. The activity indicator that gets the lowest score is indicator 4, which is trying to find various information needed to solve the problem. This is because students have limited time in finding information due to the rules of the game media. So this indicator is less visible.

Profile of Students' Conceptual Understanding

The implementation phase obtained data about the profile of students' conceptual understanding before carrying out learning using ludo-science *(pretest)* and after using ludo-science *(posttest)*. The data can be seen in Figure 4.

Results of *pretest* and *posttest* shows an increase in students' understanding of the concept. The classical calculation results state that at the moment*pretest* the concept of understanding the concept of 37.27% while the posttest of 63.59%.

Analysis of students' conceptual understanding is done by analyzing the results of the answers to the questions in the form of two tier multiple choices. Dewi, et.al (2020) state that two-level diagnostic tests can be used as an effective way to measure student concepts. Students can be said to have a good understanding of the concept if they get a value above the minimum completeness criteria of science subjects that have been determined by the school that is 70 with the terms of the questions arranged have been adjusted to the learning indicators.

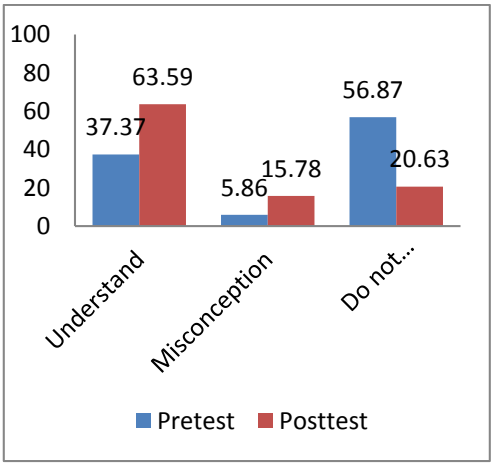

Figure 4. Profile of Students' Conceptual Understanding

Based on the values that have been obtained, it is known that both students of class VIII E have increased the profile of concept understanding after using SAVI-approached ludo-science media. This can be seen from the results of the pretest and posttest that have been analyzed. Figure 4 shows an increase in students' conceptual understanding. The calculation results classically state that at the time of the pretest the concept of understanding the concept has increased. Learning media can be said to be suitable for use in learning if it is able to improve the ability of students from before and after the use of media (Rasiman & Rachmawati, 2014). With these achievements it can be said that the research conducted has been successful.

Data obtained from the results of the analysis of the combination of students' answers can be seen that the level of understanding of the concepts students have on the material excretion system of each indicator is different. Learners are said to understand the concept of the excretory system material if the students' answers at level one are correct and choose reasons at level two correctly. The profile of students' conceptual understanding classically refers to Figure 4. Pretest results are included in the low category based on the data description in Figure 4 about the percentage of students' conceptual understanding. Posttest results are included in the high category based on the data description in Figure 4.

Nisrina et al. (2016) states that the low mastery of students' concepts in the field of science is most likely due to the assumptions in students that science lessons are difficult, complicated, and require higher reasoning power. Research conducted by Jumadin et al. (2017) states that science is considered difficult by students because it is abstract. SAVI's ludo-science media can help students improve their reasoning power through a media game.

Learners find it difficult to understand the material because the learning methods used in group discussions and practicum. Students do not apply the discussion process correctly. The discussion process is only dominated by a few students. Other students become less enthusiastic in learning and passive in discussions. Learners are accustomed to conventional methods, namely the teacher explains the material and writes the material on the board, then the students copy the material in a notebook. The learning process on the material excretion system that is less than the maximum also affects students' conceptual understanding. These results are consistent with research conducted by Yohanes and Sutriyono (2018), which states that the poor conceptual understanding of students is caused by internal and external factors. One external factor that influences conceptual understanding of students are the teacher and the way teacher teaches. The use of ludo-science media can help teachers to provide innovative and fun learning.

The low motivation to learn students because they consider the material science is less interesting so that their desire to learn is almost non-existent. The low conceptual understanding of students in the excretory system material is also caused by students learning the excretory system material by rote learning. Memorization is something that has

been learned and stored in memory, memorization is a cognitive domain that is easier than other cognitive domains (Alawiyah et al., 2016). The process of rote learning tends to make students easily forget the material they have memorized, so students cannot do the test correctly.

The post-test results in Figure 4 show an increase in the percentage of students' conceptual understanding using Ludo-science Media with SAVI Approach. This Learning media effective to increase students' conceptual understanding. Media in learning is one important component in supporting the success of learning. This is in line with Arsyad (2013) which suggests that learning media function as tools for teaching and learning to influence the conditions and learning environment. From this function, learning media can be used as a generator of desires, interests, and motivations and stimuli to be more active in learning activities. The function of this media is very much in harmony with the function of the game which has many enthusiasts and active stimulants. Sriwahyuni & Mardono (2016) state that the use of educational game media can improve learning outcomes so as to achieve completeness standards. The use of the SAVI approach also influences understanding concepts. Shoimin (2014) states that the SAVI learning approach can arouse students' integrated intelligence fully because there are activities that combine physical motion with intellectual activity.

Effectiveness and Response to the Use of Ludo-science Media with SAVI Approach

The gain test calculation shows that the N-gain profile understands the concept of 0.42 and is included in the medium category. The N-gain profile of misconception was 0.11 and included in the low category. N-gain profile does not understand the concept of -0.8 and is included in the low category.

Questionnaire of responses to the use of media by students and teachers are given during large-scale trials. The results of the media usage responses questionnaire are presented in Table 4.

The average results of responses to the use of ludo-science media approaching SAVI by students amounted to 86.79% and included in the excellent category. The average results of the questionnaire responses of the use of ludo-science media with SAVI approach by the teacher was 92.50% and included in the very good category.

Table 4. Questionnaire data responses to the use of ludo-science media by students and teachers

No.	Assessed Media Aspects of Ludo-science	Learners		Teacher	
		(%)	Criteria	(%)	Criteria
1	Attractive design	92.19	Strongly agree	100	Strongly agree
2	A harmonious color mix	86.72	Strongly agree	100	Strongly agree
3	Language is easy to understand and unambiguous	85.94	Strongly agree	75.00	Agree
4	The use of media is not boring	91.41	Strongly agree	100	Strongly agree
5	Images and components with themes	90.63	Strongly agree	100	Strongly agree
6	Active students to learn	85.16	Strongly agree	75.00	Agree
7	Students better understand the material	85.94	Strongly agree	75.00	Agree
8	Can encourage students' curiosity	84.38	Strongly agree	-	-
9	Can encourage students to actively discuss	-	-	100	Strongly agree
10	Can be used to convey material	85.16	Strongly agree	-	-
11	Can encourage students to actively search for new information	-	-	100	Strongly agree
12	Can make learning conducive	80.47	Agree	-	-
13	Can make learning centered on students.	-	-	100	Strongly agree

Media *ludo-science* with SAVI received good responses from users. Media that have been made are used in learning activities for data collection at a junior high school in Semarang, Indonesia. The small-scale trial phase obtained the data readability questionnaire of SAVI ludo-science media. SAVI-supported ludo-science media are included in the excellent category. The developed media are SAVI-ludo-science media. This media contains a ludo board and also a card that contains multiple choice questions that are equipped with answers and reasons. The use of this media stimulates students to actively answer questions correctly to win the game.

This game is carried out in groups so as to be able to train students' cooperation in understanding the concept of the material. Learning with a pattern of discovery that is done with discussion and creative thinking can motivate students to increase their activity in solving problems (Marks & Eilks, 2009). Miri, *et. al*., (2007) states that the discussion process makes students a good analyst. This is evidenced by the increase in student learning outcomes and positive responses given by students.

Table 4 concludes that the average response of students to the SAVI-approached ludo-science media that has been developed gets a very good response. In its application the students were very enthusiastic when using the SAVI ludo-science media. SAVI-approached learning ludo-science media is a new medium that they are familiar with so students are interested in learning to use it.

The strengths of the ludo-science media in terms of the SAVI learning approach are: (1) generating full integrated intelligence of students through the incorporation of physical motion with intellectual activity, (2) fostering cooperation because students who are smarter are expected to help the less intelligent, (3) maximize the sharpness of the concentration of students, (4) train students to get used to thinking and expressing opinions and dare to explain the answers. This media is media that has never existed before. Ludo games are generally only equipped with pawns and dice. Ludo-science is equipped with a question card about the material of the excretion system. Another advantage is that the question card is equipped with answers and reasons for the answers at once, so students can improve their conceptual understanding.

CONCLUSION

Based on the discussion it can be concluded that the feasibility of Ludo-science media with SAVI approach by material experts obtained an average of 92.70% and was included in the very feasible category. The feasibility of Ludo-science media with SAVI approach by media experts obtained an average of 82.39% and was included in the very feasible category. The reading of Ludo-science media near SAVI obtained an average of 95.75% and was included in the excellent category. The SAVI-approached Ludo-media media has the following characteristics: (1) the use of media in accordance with the time allocation, (2) the SAVI approach (3) interesting media and practical (4) durable / can be used repeatedly, (5) conformity to the material and learning objectives, (6) conformity to needs, (7)

the language used is simple and easy to understand, (8) train activeness, (9) train concept understanding.

SAVI's ludo-science media is can used to train students' activeness with scores above 70%. The SAVI-ludo-science media is effectively used also to train students' understanding of concepts by increasing the value of the pretest and posttest. Profile of students 37.27% while at posttest 63.59%.

The gain test calculation shows that the N-gain profile understands the concept of 0.42 and is included in the medium category. The N-gain profile of misconception was 0.11 and included in the low category. N-gain profile does not understand the concept of -0.8 and is included in the low category. Usage response SAVI's Ludo-science media received an average of 86.79% and was included in the excellent category

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