Level of Skill Argued Students on Physics Material

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Abstract. This study aims to analyze the prior knowledge of students to map the level of skills to argue floating and sinking material. Prior knowledge is the process of concept formation in cognitive processes spontaneously or based on student experience. The study population is high school students of class XI. The sample selection using cluster random sampling, obtained the number of sampel as many as 50 student. The research used descriptive survey method. The data were obtained through a multiple choice test both grounded and interviewed. The data analyzed refers to: alignment the concept and the activity of developing the skill of the argument. The result obtained by the average level of skill argue in terms of the prior knowladge of on "Level 2". The data show that students have difficulty expressing simple arguments consisting of only one statement. This indicates a lack of student experience in cultivating argumentative skills in their learning. The skill level mapping argued in this study to be a reference for researchers to provide feedback measures to obtain positive change in cognitive conflict argued.

1. Introduction

Learning will work if the teacher realizes that the prior knowledge of the students' influences the learning process, and how the teacher packs the prior knowledge in their learning as well. The role of prior knowledge in learning is considered as a basis for learning and evaluating learning barriers. Prior knowledge as a tool to analyzing knowledge and overcome student barriers in learning [1,2]. The statement is supported by the opinion of some expert, that prior knowledge students build concepts and improving student performance [3,4]. Prior knowledge can actively achieves learning outcomes and growing high level cognitive skills.

High-level cognitive skills in physics learning can begin with the involvement of learners providing a simple explanation of everyday phenomena. This is related to the practice of solving the problem of phenomena that exist around the learner. This activity helps learners to overcome their problems to understand concepts as a high-level thinking. High-level thinking can be familiarized through guiding learners to develop the necessary argumentation skills, to integrate and apply concepts and to build and refine conceptual and operational understanding of science [5]. This is supported by the expert's

opinion that learning guides learners toward the growth of arguing skills can: 1) provide learners with opportunities to think and talk about phenomena [6]); 2) share, discuss, and criticize the statement of other learners [7]; 3) reflects on the understanding of learners [8]; Developing, evaluating, and refining scientific theories about natural phenomena [9]; 4) as a vehicle for learners expressing opinions on questions, methods of inquiry, nature and sources of evidence, and drawing conclusions [10]; 5) help build knowledge, respond to questions asked, collectively challenge the validity of responses to questions, and support knowledge claims with data [11]. Argumenting skills require learners who can collect and understand data, produce and articulate an explanation of a phenomenon, justify explanations with appropriate data and reasoning, and criticism from one or more points of view. In the expert opinion that: 1). When learners engage in activities to grow the skill of arguing regularly learners can learn the concepts of science [12], 2) argument skills can develop reasoning and critical thinking skills [13], 3) understand how knowledge is generated and validated In science [14], and 4) improve the communication skills of learners [15].

Although theoretical support for fostering the skill level of arguing can be analyzed through the prior knowledge of students, but prior knowledge has practical limitations that may influence the level of skill in arguing students. In addition, argumentation skills are rarely used in science learning [16]. Whereas there is a large amount of research on the positive effects of growing arguing skills in the development of science, research that explores the relationship between prior knowledge and argumentation skills. Therefore, the researchers conducted a study tracing the relationship between student involvement with the level of argumentation skill and their prior knowledge during the argumentation process. This study begins by analyzing the prior knowledge of students to map out the skill level of arguing the floating and drowning material. Based on the study of theories and problems of a field, researchers have map the skill level of the material floating and sinking argued student. The formulation of the problem in this research is how is the prior knowledge of students to map the level of skills argue floating and sinking material?

2. Method

Prior knowledge analysis of students to map the skill of arguing floating and sinking materials is a preliminary study to design an assessment-oriented framework of assessment needs. The broader objective of producing a useful and practical argumentation valuation tool for teachers. The study population is high school students. The sample of research is class XI amounted to 50 people. Data analysis using qualitative descriptive is based on the structure of the component supporting the argumentation skill. The test instrument for measuring argument was developed using a key component of the modified Toulmin scheme argument [17]. The framework for assessing the skill level argues in this study refers to: level 1, a simple statement; level 2 if the argument consisting of claim supported by data / warrant / backing but not containing rebuttal; level 3, if arguments has an argument with a set of claim with data, warrant or backing with weak rebuttal; level 4, if arguments show arguments with clear and rebuttal claim can be identified; level 5, if arguments show arguments with more than one rebuttal. [14].

3. Result and Discussion

3.1. Conducting Disclaimer With Statements Having By Participants

Most learners assume that objects made of the same material and their mass are bigger than fluid, then they will sink. The simple statement expressed by learners illustrates the strength of the prior knowledge that the learners have. The prior learner knowledge is not entirely complete with regard to the concept of floating and drowning. This prior knowledge will be eroded by other statements. Figure 1 presents the statement of learners related to the alignment of concepts and statements that the learners have.

The alignment of learners' concepts and statements begins with the learner's ability to conceptualize argumentation as a process of proposing, supporting, evaluating, and pure statements in an attempt to

construct new knowledge. Student A composed the statement "if it is made of the same material then has the same and heavier mass of water, drowns" as for the chosen answer d drowned, with the position Y = X.

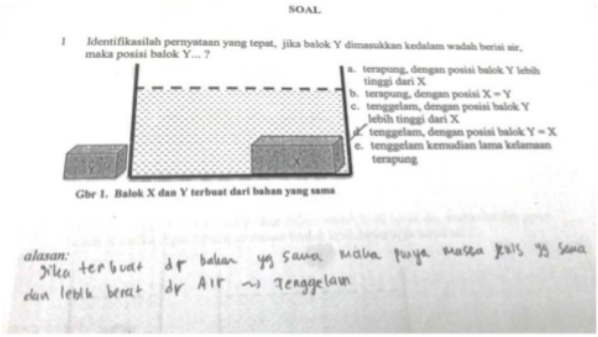

Figure 1. Figure Statement of the Student A

Effort A discloses his statement supporting and promoting argumentation skills because it has been focused on the development of the concept that has been owned by students. Prior concepts allow students to produce statements related to a particular phenomenon, and then give the student an opportunity to examine, and evaluate the explanation of his statement. The selection of statements using [17] is to investigate the arguments arising from the learners' statement. The Toulmin argument scheme is a qualitative indicator of teaching and learning taking place in the classroom

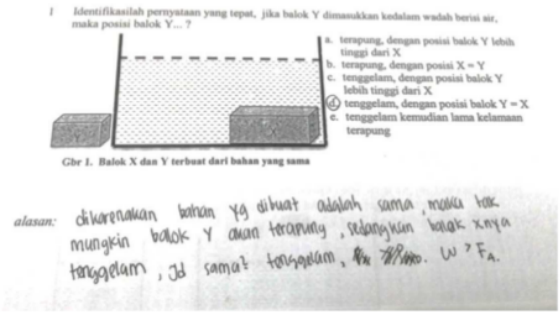

Figure 2. Figure Statement of the Students B

Student B in figure 2 makes the statement "because the material made is the same then it does not allow the Y-beam to float while the X beam sinks so both sink, w>Fa" as for the chosen answer "d" sinks, with the position Y = X. Slight difference from exposure of the statement given by student B this. The tendency of the statement presented indicates that student B has been critical of understanding the given problem. Even student B has been able to write his statements related to the physics equation but have not been able to expose the physical meaning of the written equation. Students have done a check on the problems presented and evaluated the explanation until finally aligning the concept that has been owned with the idea as outlined in the statement.

The activity of students A and B at Figure 1, 2 in order to align concepts and statements allows students to produce statements based on observable phenomena from the problem. The students start with the observation of how the various behaviors of the object when put in a container of water. In the minds of learners begin to design, perform, and interpret to identify the variables that determine

whether the object is drowned or floating in water. These activities help develop skills in controlling variables. Students observe that objects of the same volume but different masses may behave differently and objects of the same mass but different volumes behave differently. They conclude that both mass and volume are the variables that influence whether the object is drowned or floating. The students then observed that objects of the same type of mass behave similarly (mass or volume ignored). Consequently, they conclude that the density of the object determines whether the object is drowning or floating in water. Explicitly the teacher can embed the concept of floating and sinking contained in the problem given to the problem that is related to the fluid type and the object, the volume of fluid and the volume of objects and the surface area of an object that affects drowning or floating objects. The planting of floating and sinking concepts structurally provided by the teacher can be added to the deeper content of which students can be given examples of how forces work due to the presence of floating and drowning objects. Teachers can also provide feedback by giving a new statement of the position of objects placed on fluids that have a greater density of objects. The concept given at the time of feedback by gradual planting leads to the activity of growing students' argumentation skills and increasing the level of student argumentation skills. The results of this data analysis are in line with the statement of several experts: 1) In practice, the strict application of the pattern of Toulmin's argument is difficult but remains a popular approach to the characterization of argument structures [18]; 2) that the implementation of Toulmin's pattern in science learning has ignored Toulmin's point. Where the quality of a particular argument that argument structure itself is alone. It can't grasp the extent to which warrant is the correct claim of justification or rebuttal. The assessment can only be done in the field and the rest of the content analysis of substantive arguments [19]. A logical explanation and the relationship between the stated statement sometimes raises predictions. Therefore, some actions can be taken to successfully reconstruct the student's alternative conceptions: the teaching of physics must provide a more concrete learning experience, related to the interactive situation; the teacher should provide feedback to avoid misconceptions. That is, determining the various concept situations to be "true." [20].

3.2. Activity Which Growing Argument Skills

The use of Toulmin's argumentation scheme in this study concentrated on the description of the ability of learners to write statements on the given problem. Student's A and B (fig 1 & 2) provide the same but different statements in giving reasons for the given statement. The student's A statement indicates that a good prior ability is evident from: having an interrelated argument structure of the claim; Able to uncover the implicit data in the problem to support the claim; Claim is built capable of providing connection between data and claim but still weak, because it is not affirmed in the form of warrant statement. The data obtained leads to the ability to connect between data and claims so as to have a good prior knowledge. Based on analysis of argument skills using argument skill rubric, skill level argue student A is at Level 1 where argumentation only consists of argument with simple statement. The level of arguing skill becomes the basis for the teacher to provide feedback on the weaknesses of Student a statement so as to raise the level of his argument skill.

The statement of Student B, presented in Figure 2, indicates that the students' prior ability is well proven from: having an interrelated argument structure of the claim; Able to uncover the implicit data in the problem to support the claim; The claim built begins with the ability to identify the density of iron types greater than the density of the water type, the two cubes are made of iron; alternative claim has been produced to elaborate that there is a difference of surface area between object A and B, but it does not affect the object will be drowned in this contest the object remains drowned; Claim that was built has provided a connection between data and claim but still weak, because it is not affirmed in the form of warrant statement. The data obtained leads to the ability to connect between data and claims so as to have a good prior knowledge. Based on the argument skill analysis using the argument skill rubric, the skill level argues Learners B is at Level 2 where arguments have arguments consisting of claims supported by data, warrant or backing but not rebuttal.

Other than that, the statement's grid can begin with: the nature of an object that will determine whether the object will float or drown; materials of constituents; what kind of object is made of material that absorbs fluid or not; the geometry of the object; the fluid in which the object is placed; the density of objects and fluids; surface area of the object; the volume of objects; fluid volume; position of the object after being on the surface / fluid base; forces acting on an object; write down the condition of a floating object or sink; write down the magnitude of the density of objects and fluids. The relevant statements each learner discloses in the prior knowledge disclosure activities help the teacher establish a connection to help identify the relevance of the prior knowledge with the new knowledge they will have. Related to that, knowledge has a logical and psychological connection, the possibility of sequential and vertical transfer of learning will be enhanced by appropriate arrangement. [21], reveals that without prior knowledge new knowledge can not occur or takes much time to make some connection between existing cognitive structures and new information.

4. Conclusion

Prior knowledge of floating material learners as a practical assessment is in order to map the skill of arguing. The results of the mapping obtained are used as the foundation for the researcher to conduct the feedback in order to improve the developed test instruments and improve the level of students' argumentation skills. Information and statements presented by learners in prior knowledge disclosure activities indicate that learners have preparations for making connections to the material they will be studying. Based on data analysis of skill mapping results through the prior disclosure activities, learners are at level 2 where arguments have arguments consisting of claims supported by data, warrant or backing but do not contain rebuttal.

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