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Sharing and Jumping Based Didactical Design In Collaborative Learning on the topic of Covalent Bonding

Ermila Gustina[1*], Sumar Hendayana[1], Asep Supriatna[1]
[1]Universitas Pendidikan Indonesia, Bandung, Indonesia
*Corresponding author, e-mail: tinaozy2015@gmail.com

Abstract
The effectiveness of sharing and jumping based didactical design of covalent bonding has been studied at chemistry senior high school. Learning based sharing task is a learning that deals to cover content of text book. Sharing task facilitate jumping process for the low achiever students. The challenging problems are given in jumping tasks activity to challenge the high achiever students. The purpose of this study was to obtain the didactical design of covalent bondings and their implementation.The research method applied is Didactical Design Research (DDR) with following stages: analysis of didactic situation before learning, metapedadidactical analysis, and retrospective analysis. Implementation of lesson design on the topic of covalent bonding were recorded and analyzed, from the analysis result obtained the collaboration between students and between students and teachers.

Keywords: Didactical design, sharing, jumping, collaborative

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Introduction

Education is the main thing that will sustain the progress of a nation. Students graduating from high school are very lacking in some basic skills and a large number of applied skills, such as some skills that are less controlled by the learners are: (a) oral and written; (b) critical thinking and problem solving; (c) teamwork and collaboration; (d) working in a diverse team (Trilling and Fadel, 2009).

Student learning is increased (a) when teachers believe their major role is to evaluate their impact and (b) when teachers work together to know and evaluate their impact (Hattie, 2015). Collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product (Marjan and Mozhgan, 2012). Sharing ideas and knowledge to alert the quality of shared learning is the essence of collaborative learning (Priyatmojo, A. et al, 2010).

Teachers in learning should design learning so that knowledge can be given to students. Rpp (lesson plan) developed by teacher still has weakness that is still not have prediction of student response and teacher anticipation. Preparation of anticipation in the planning of learning can optimize the learning process of students because of learning difficulties that appear can be responded by teachers appropriately. Help in the form of guidance on the child to make the knowledge that children get will exceed the achievement itself (Fania and Farid, 2011).

One of the teacher's efforts to improve learning is through reflection on the relevance of the design and learning process that has been done. According to Maasaki (2014) one of the three factors that determine the learning quality is the lesson plan (RPP), ranging from creative apersepsi, core activities that begin with sharing tasks and in the end is jumping tasks for learning to appeal to both low and high-ability students. One alternative that teachers can do is by designing learning through didactical design. Didactical design is a learning design with attention to student responses to the material submitted by the teacher (Suryadi, 2010). Didactical design in collaborative learning uses two types of material, namely "shared matter/sharing tasks"

or the level of textbooks that all students must understand, then based on that understanding the teacher presents the challenge of "leap material/jumping tasks" or beyond the textbook level(Sato, 2014).

Didactical design research has been done on chemistry learning, such as research that conducted Zainal (2014) with the title of didactical design with the help of lesson analysis as self reflection on the application of colloid concepts in daily life shows that didactical design can minimize students' learning difficulties on the concept of colloid properties and responses that occur beyond predictions can be anticipated by teachers when learning process, Jayatri (2017) with the title Collaborative learning sharing tasks and jumping tasks on the concept of electrolyte and non-electrolyte solutions based on student learning obstacle and teacher reflection shows that can reduce the barriers to learning epistemology in students.

This study deals with three phases of teacher thinking that were introduced as Didactical Design Research/DDR (Suryadi, 2010).

Vikstrom, A, et al (2013) can identify important aspects in teaching chemistry that is using varied learning, which can significantly improve student learning. Chemical learning is a complex process by combining three different levels of chemical concepts (macroscopic, submicroscopic, and symbolic. Coll and Taylor (in Vladusic, R, et al., 2016) argued that chemical bonding is one of the most important topics and is a key concept in schools and universities. Based on the analysis of national exam questions for the last five years from 2012-2017, one of the subjects that always appears and is considered difficult by the students is the covalent bonding.

Based on the background, researchers are interested in conducting research by designing learning through sharing and jumping tasks based didactical design in collaborative learning on the topic of covalent bonding. The problem in this research is how didactical design based sharing and jumping tasks in collaborative learning on covalent bonding topic as innovative design solution with attention to student learning obstacle, student prediction response, and teacher anticipation and the implementation?

The objectives to be achieved from this research are as input for the teacher in order to design the learning by considering the student's prediction response, the didactical design based sharing and jumping tasks and the implementation on the topic of covalent bonding.

Method

The design used is didactical design research (DDR). Suryadi (2010) suggests that research relating to the three phases of teacher thinking consists of three stages namely: (1) analysis of didactic situation before learning (prospective analysis), (2) analysis of didactic situations during learning (metapedadidactical analysis), dan (3) analysis of didactic situation after learning (retrospective analysis).

This research will be conducted at SMA Labschool in Bandung. The population of the research is the students of class X IPA of SMA Labschool with 67 students.

Table1 Popolation of research at SMA Labschool

Class	Male	Female	Total
X MIPA 4	16	17	33
X MIPA 2	17	17	34
Total	33	34	67

Type of the instrument used is non test instrument. The type of non-test instrument that used is interviews, observation sheets and documentation. Validation of instrument content is conducted by chemistry teachers and lecturers.

Interviews with teachers were conducted to obtain student learning obstacle on the topic covalent bonding. Observations are selected as data collection because this technique is best for answering the focus of research on how a process occurs (Frankel, 2012). Observation is done to obtain a direct description of student activities during the learning process and to know the implementation of didactical design that has been made, and get the picture of "sharing" and "jumping" that occurs in students. The observation instrument is an observation sheet and during observation, assisted by recorder and handycam.

The procedure of this study was conducted through three phases associated with the thinking process of the teacher in three phases, is (1) analysis of didactic situation before learning; analyzing teacher learning tools, conducting teacher interviews, constructing didactical designs based on repersonalization and

recontextualization of covalent bondings, then defining sharing and jumping tasks as well as making predictions of student responses and teacher anticipation, and didactical design validation by teachers and lecturers; (2) analysis of didactic situations during learning, implements didactic design on covalent bonding material that has been compiled in the classroom X MIPA, anticipate the unpredictable student response that occurs when the didactical design is implemented, self-reflect when the implementation of didactical design to know the lack of learning; (3) analysis of didactic situation after learning, reflecting student responses and teacher anticipation before and during the implementation of didactical design, analyzing the interaction between teacher-students and among fellow students during the implementation of didactical design through learning recording transcripts to know sharing and jumping task, and identify collaborations that occur in learning.

Analysis of learning data are as follows: (1) Analysis of didactic situation before learning in the form of analysis of UN, RPP and teacher interview; (2) Analysis of didactic situations during the learning process, the analysis of the learning process identified the students 'responses and teachers' anticipation during the implementation of didactical design on covalent bonding material; (3) Analysis after learning, the result of learning video and recorder transcript were analyzed.

Results and Discussion

The basic competence of covalent bonding

Basic competencies	Subject matter
Compare ionic bondings, covalent bondings, coordination covalent bondings, and metal bondings and their relation to the properties of substances; **Design and conduct experiments to demonstrate the characteristics of ionic compounds or covalent compounds (based on melting point, boiling point, electrical conductivity, or other properties)**	Covalent Bonding - Single covalent bonding - Double covalent bonding - Triple covalent bonding The properties of covalent bonding

The results of this study were conducted through three stages associated with the thinking process of teachers in three phases, as follows:

Analysis of didactic situation before learning, based on teacher interview and RPP analysis it was found that teacher's RPP still did not have prediction of student's response and teacher's anticipation so that the researcher made lesson design in the form of didactical design based sharing and jumping tasks on covalent bonding with respect to students' prediction response.

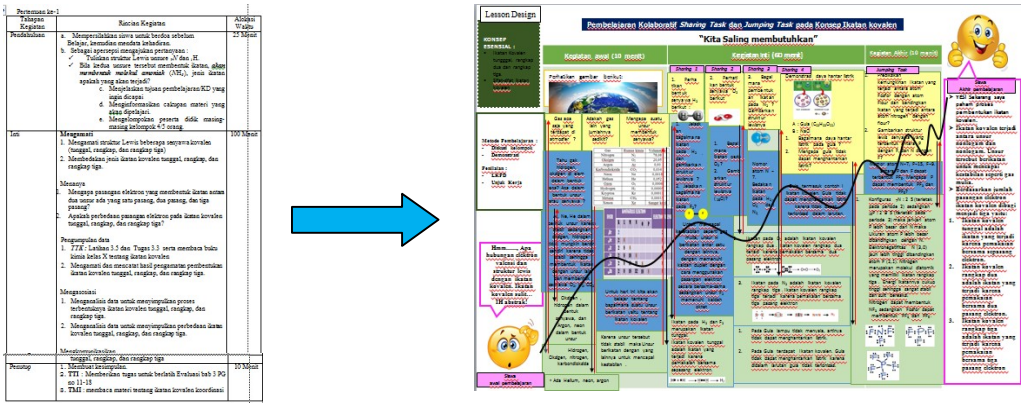

Figure 1 Picture Teacher's RPP and Didactical design of Covalent bonding.

Analysis of didactic situations during the learning process, implementation of the lesson design on the topic of covalent bonding and self-reflection. From self-reflection it is found that need for emphasis on electron configuration and the lewis structure in learning. Whereas students should have understood the material, because it has been studied before.

Analysis of didactic situation after learning, from the recording and video analysis obtained that collaboration between students and students as well as students and teachers where the teacher as a facilitator. Development of children cognitive can be done through adult guidance or peer collaboration (Warford, 2011). Assistance can be a guide, encouragement, example, or anything that allows students to grow independently as a learner (Woolfolk, 2009). Collaboration in the learning process is a form of cooperation with each other to help each other and complete to perform certain tasks in order to obtain a predetermined goal. Skills related to collaboration in learning such as: (a) Having ability in group collaboration; (b) adapt in roles and responsibilities, work productively with others; (c) Having empathy and respect for different perspectives; (d) Be able to compromise with other members in the group for the achievement of the intended purpose (Directorate of High School Development, 2017). Here is the documentation during the implementation:

Figure 2 Pictures of learning process at class X MIPA 2

Figure 3 Pictures of learning process at class X MIPA 4

From video analysis and recorded transcripts, collaboration takes place between students and students, and students and teachers, even students boldly stepping forward in class expresses their learning arguments. Therefore, through small group collaborative learning (sharing) with high-level issues, students are expected to experience "jumping" not only at the cognitive level (knowledge) of the students, but also the affective level (attitude) of the students (Sato, 2014). Examples of the occurrence of "jumping" at the affective level is a change in the attitude of students who were previously passive in learning to be more active and dare to express their understanding in front of the class. The change of attitude of this student can be a motivation for himself to be ready and confident in learning the next material. The high student's intrinsic motivation can be a supporting factor for developing students' cognitive level.

The higher the level of problems given to jumping tasks the better (Sato, 2014). The level of student achievement in this activity is that half or one-third of the class is a reasonable situation. Skip learning (jumping) is not only beneficial for students with high academic ability, but actually also provides great benefits for students with low academic ability (Sato, 2014).

Conclusion

Didactical design is a design of learning by paying attention to students' predictive responses to the material presented by the teacher, in the presence of students' predictive responses so the teacher prepares his anticipation. The didactical design in collaborative learning on the topic of covalent bonding uses two types of material: "shared materials/sharing tasks" or textbook level and "jumping task material" or beyond the textbook level. Based on video analysis and transcript of learning implementation recording there is collaboration between students and students, and students and teachers. One that must be prepared by a teacher before teaching is lesson plan or didactical design based sharing and jumping tasks for the realization of 21st century learning especially the ability of collaboration between students and between

students and teachers so that students become more active in learning or students centered so that learning becomes more meaningful.

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