THE EFFECT OF USING CHEMDROID (CHEMISTRY ON ANDROID) MEDIA ON STUDENTS' SELF-EFFICACY IN THERMOCHEMISTRY MATERIAL

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Abstract. *This study aims to see the effect of using Chemdroid media on students' self-efficacy in a thermochemistry topic. Chemdroid is Chemistry on Android. Self-efficacy is related to students' beliefs in activities in the classroom. This type of research is quasi-experimental using post-test only control group design. In this study, two different classes were used which were declared to be normalyy distributed and homogeneous. The first class is the control class (CC-Class) which conducts conventional learning media as usual. The second class is the experimental class (EC-Class) which uses Chemdroid media for thermochemistry topic as a learning media in the classroom. Both classes have the same learning time, teacher and learning model. The instrument used in this study is a self-efficacy questionnaire that has been developed in previous studies but has been adapted to current research. The statement items used in this measuring instrument are 22 statements with 6 aspects. The test used is the Mann Whitney with the help os the SPSS program. The result of the analysis state that the significance is smaller than level of conficence. This proves that there is a significant difference with the use of Chemdroid media for a thermochemistry topic on the self-efficacy of the control class and experimental class students.*

Keywords: *android, chemdroid-media, self-efficacy, thermochemistry*

INTRODUCTION

Education is the main foundation in forming one's personality. Education is divided into formal education and non-formal education. Non-formal education has taken place since the person was born and occurs in the family and society. While formal education itself takes place when someone has entered the school. Education in Indonesia has tried to be developed and improved by changing existing policies. Although there are still some problems that make the quality of education in Indonesia still low [1]. The main problem is the lack of focus on student character development [2]. Education in Indonesia is more focused on delivering material to students at school. However, this has now been reduced. Character education must be taught to all students in the school. It has been incorporated into the current curriculum.

The curriculum should be a reference that can encourage learning that can be done independently [3]. Curriculum development provides opportunities for teachers to conduct their creativity and innovation through classroom learning. The successful implementation of the curriculum can be seen from the people involved, the programs being run, and the process [4]. Teachers become people who are directly involved in implementing the curriculum in schools. The curriculum in Indonesia currently adheres to student-centered, meaning that learning is centered on students. Student-centered learning has a good impact on students in learning [5]. Currently, students must actively participate in classroom learning. For this reason, teachers need to provide methods or media that can make students active in learning in the classroom. Innovations made by teachers are usually by using the latest methods or media.

This is to attract students' interest in learning in the classroom. Innovative learning methods are usually carried out using interesting learning models, such as problem-based learning, discovery learning, or cooperative learning models that have many types. Meanwhile, innovation in learning media can be done by implementing technology in learning. This innovation can improve student learning achievement [6].

Technology is currently an area of concern in the world. The development of this technology affects people's lives. One of them is influencing the education sector. A significant influence in this area is the implementation of technology in classroom learning. Learning that involves technology has now been developed in every educational institution. The goal is to make learning easier and more interesting. The attractiveness of learning can be increased from the use of technology-based learning media. Things like this have a good influence on students [7]. Technology-based learning media have been widely developed. This learning media is a media that can be accessed anywhere and anytime without being constrained by distance and time. Effective learning is learning that can involve well-planned learning media [8]. This media can be used as a tool to achieve the goal at the end [9]. One technology-based media that is still being developed is android-based learning media. Media like this is used specifically for smartphones with the Android operating system. The majority of high school students have this type of smartphone.

Chemistry is one of the fields of science that is taught from junior high school. This subject is feared by students because the topic taught is abstract and difficult to understand. The topic in chemistry consists of rote and computational topics which have almost the same proportions. One of the chemistry topics that have such proportions is a thermochemistry. Thermochemistry is the study of chemical reactions and their heat. This topic is taught in eleventh class, high school. This topic has its level of difficulty. Thermochemistry is a practicum-based material that requires media in its delivery [10].

Self-efficacy is a person's belief in doing something. This self-efficacy is an intrinsic element in humans [11]. Sources of self-efficacy are divided into 3, namely level, generality, and strength [12]. In terms of learning, self-efficacy is very influential on learning outcomes [13]. This is because students with high self-efficacy will have high expectations of learning outcomes [14]. For this reason, self-efficacy assessments for students are considered important [15].On the other hand, students with low self-efficacy will not be able to manage the activities they choose [11], [16]. They will delay to do activities in class [17]. Students like this usually choose activities that they think are easy to complete without using more effort [16]. Meanwhile, students with high self-efficacy always use the experience to carry out their activities. This experience becomes the strongest source for student self-efficacy [18]. Successful experience can make a person able to increase his self-efficacy, while the experience of failure can make a person have low self-efficacy [19].

This study aims to see the effect of the use of Chemdroid on thermochemistry topic on students' self-efficacy. This media was chosen because this media is a technology-based media that is currently being developed. The novelty of this media that makes this media different from the others is that it has a combination of text, pictures, videos, and adequate practice questions that can be used as media for independent study at home.

METHOD

This research is quasi-experimental research using a post-test-only design. The class used in this study amounted to 2 classes. The first class is the control class (CC) which conducts learning using media as usual, while the second class is the experimental class (EC) which uses Chemdroid media as its learning medium. Both classes have the same learning time and teacher. CC-Class consists of 28 students and EC-Class consists of 30 students. The experimental design used can be seen in Table 1.

Table 1. The Experimental Design [20]

Class	Treatment	Post Treatment
Control Class (CC-Class)	X0	P1
Experimental Class (EC-Class)	X1	P1

With description:
X0 = learning with conventional methods
X1 = learning with Chemdroid media
P1 = giving a self-efficacy scale

The variable that was measured from this study was the self-efficacy of students in learning chemistry. The measurement of this variable uses a self-efficacy scale that has been developed in previous research [21] and has been adapted to current research. The measuring instrument used consists of 6 main aspects with 22 statement items. Aspects that are measured from this measuring instrument are aspects of activity choice, effort, persistence, learning, achievement, strategy-oriented [11, 16, 22. 23, 24]. It scale uses a modified Likert scale, starting form 1 (very unsure) to 4 (very sure). This measuring tool is given to students in the two different classes at the end of the meeting after the implementation of learning. The results of this study were then processed using a nonparametric test, namely the Mann Whitney Test with the help of SPSS program.

RESULT AND DISCUSSION

This research is part of a previous study regarding the implementation of android-based learning media (Chemdroid) on Thermochemistry material. This research has been conducted for 3 face-to-face meetings and added 1 meeting to provide a self-efficacy measurement tool for students. The results of the study can be seen in Table 2.

Table 2. The Results of Analyze in SPSS Program

Results	Score
Mean Rank of CC-Class	22.34
Mean Rank of EC-Class	36.18
Asymp. Sig. (2-tailed)	0.002

From the table 2 above, it can be seen that the significance resulting from the analysis (0.002) is smaller than the confidence level used (0.05). This means that the self-efficacy of students in the two classes has a significant difference.

CC-Class students use PowerPoint as usual when they study chemistry. Students of this class are only presented with topic in the form of text and occasionally supporting images are shown. This media is displayed in front of the class. While the EC-Class uses Chemdroid media as an introduction to the topic presented. This media contains material, illustration images, practicum videos, and practice questions. These components are presented with attractive color and font combinations. In addition, this media can also be installed on students' smartphones with the Android operating system. This makes students more interested in participating in learning with this Chemdroid media. This media consists of 6 sub-topics, each of which has practice questions. The existence of these exercises is useful for making the media developed to have educational value. Students are not only presented with the topic but there are also practice questions. In addition, this media also has video demonstrations instead of practicum activities on this topic. Practical activities in some schools are minimized due to many obstacles, for example, the absence of laboratory assistants, inadequate tools and materials, and limited learning time [10]. With this practicum video, students EC-Class is more understand about how to find enthalpy from a calorimeter.

The development of material in this media is adjusted to the current curriculum, namely the revised 2013 curriculum. The use of sentences in this media uses sentences that are easy for students and teachers to understand as the main users of this media. The use of media turned out to influence the self-efficacy of students. This is supported by previous research that the use of Android-based learning media has a positive effect on students' self-efficacy [17, 25, 26]. Teachers must continue to improve the implementation of technology in chemistry learning to increase students' self-efficacy [27]. This can also be done by developing technology skills when they are in college [28].

Learning meetings are conducted face-to-face as usual. At this meeting, CC-Class students found it more difficult to organize the activities they did that day. Many students in this class only pay attention to the teacher who explains in front. Even when giving assignments, students in this class have poor confidence. This can be seen from the completion of the tasks given by the teacher. The tasks they complete are tasks that they find easy, for difficult tasks, they are more likely to avoid. This result is much different from the EC-Class students. Students in EC-Class prefer challenging tasks. They can complete these

tasks with confidence. EC-Class student will not give up when given any assignment. According to them, the task can be completed well with great effort. Students of this class can take advantage of the time allotted to do assignments. They use the maximum time to complete the tasks given by the teacher. This is very different from the CC-Class which each does the task as it is and without great effort. In addition, students in this class easily give up when there are difficulties in the middle of doing their assignments. When studying or doing assignments, the students in CC-Class has never used previous experience. They are only doing their job as a waiver of obligations.

The Chemdroid media developed is media that is connected to the internet. To access all the features of this media can be done online. The use of the internet in learning has a very good effect on students' self-efficacy. This is following previous research that students' self-efficacy and internet use in learning has a positive relationship [29, 30]. In this study, students were also asked to study at home independently by using this Chemdroid media. Chemdroid media can be used in hybrid learning. This learning mode is learning that combines face-to-face and online learning [31]. Hybrid learning can lower the cost of education [32]. When Chemdroid media is used in hybrid learning, students only need to access this media as an independent learning resource. This is because hybrid learning makes it easier for students to do learning [33].

The self-efficacy of these students is different. When compared between two students with the same academic achievement, they do not necessarily have the same self-efficacy. Students with high self-efficacy will have a better level of achievement than those with low self-efficacy. It can be seen in EC-Class. Because of every activity they take, they will do it with confidence and believe they can complete it. This does not apply to students with low self-efficacy. Previous research stated that this self-efficacy influences student achievement and achievement [34]. In addition, in completing assignments, EC-class students use strategies that they think can be applied to the activity. This supports them in completing their activities well.

CONCLUSION

From the results and discussion, it can be concluded that there are significant differences in the use of Chemdroid media on the students' self-efficacy of CC-Class and EC-Class. The average score obtained also shows that the EC-Class is better than the CC-Class. In future research is expected to measure other variables derived from students' intrinsic. In addition, these variables that affect student learning outcomes. That way, we can overcome student difficulties that come from within the student.

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