Profile of Students' Self-Efficacy in Using Chemdroid Media in Thermochemistry Learning

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Abstract

Self-efficacy is one of the factors that affect learning achievement. This study has the aim of analyzing the self-efficacy profile of students in learning using Chemdroid (Chemistry on Android) media. This media is an android-based media for Thermochemical material. This research is descriptive research with a quantitative approach. The classes used in this study were 2 classes with 60 students. Both are randomly selected. The first class is the control class (C-Class) which carries out hybrid learning, as usual, namely face-to-face in class and online learning using WhatsApp groups. The second class is the experimental class (E-Class) with face-to-face in class and using Chemdroid media. The learning time and the teacher in this study were the same. The instrument used is a self-efficacy measuring instrument consisting of 3 main aspects with 22 statements adapted from previous research. The results of the study were then analyzed and categorized into 5 categories. The results obtained indicate that the profile of students' self-efficacy of E-Class students is higher than other class.

Keywords: chemdroid media; self-efficacy; thermochemistry

Abstrak

Efikasi diri menjadi salah satu faktor yang mempengaruhi prestasi belajar. Penelitian ini memiliki tujuan yaitu menganalisis profil efikasi diri peserta didik dalam pembelajaran menggunakan media Chemdroid (Chemistry on Android). Media ini merupakan media berbasis android untuk materi Termokimia. Penelitian ini adalah penelitian deskriptif dengan pendekatan kuantitatif. Kelas yang digunakan dalam penelitian ini adalah sebanyak 2 kelas dengan 60 peserta didik. Kelas pertama adalah kelas kontrol (Kelas C) yang melakukan pembelajaran hibrid seperti biasa, yaitu dengan tatap muka di kelas dan pembelajaran online menggunakan grup whatsapp. Kelas kedua adalah kelas eksperimen (Kelas E) dengan tatap muka di kelas dan menggunakan media Chemdroid. Waktu pembelajaran dan guru dalam penelitian ini adalah sama. Instrumen yang digunakan adalah alat ukur efikasi diri yang terdiri dari 3 aspek utama dengan 22 butir pernyataan yang diadaptasi dari penelitian sebelumnya. Hasil penelitian kemudian dianalisis dan dikategorikan dalam 5 kategori. Hasil yang didapatkan menunjukkan bahwa profil efikasi diri peserta didik kelas E lebih tinggi daripada kelas lainnya.

Keywords: media chemdroid; efikasi diri; termokimia

Introduction

Currently, information and communication technology (ICT) has developed rapidly. This technology can help anyone to make activities easier. The impact of this technological development has also penetrated various components of human life. Humans are facilitated in doing things. One of them whose development is very pronounced is in the field of education. Education is something that cannot be

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separated from human life. The process of education in humans occurs from the human being is born until he dies. This education can be formal or non-formal. The use of technology as a learning medium can assist students in achieving learning goals (Anderson, 1994). One of the learning objectives is to understand the material discussed by the teacher. The use of technology has a good effect on students (Al-Hariri & Al-Hattami, 2017).

In Indonesia, a hybrid learning mode is being developed. This mode is a combination of online learning and face-to-face learning in the classroom (Buzzetto-More & Sweat-Guy, 2006). This kind of learning changes conventional learning into more modern learning (Meydanlioglu & Arikan, 2014). Conventional learning is learning that only depends on one place and one time. In hybrid learning, learning can be done anywhere and anytime. Of course with the help of the internet as a supporter.

In hybrid learning or fully online learning, students and teachers must use gadgets that can be connected to the internet, be it a computer, laptop or smartphone as a means of learning. The use of gadgets in this learning makes students more interested in learning (Chigeza & Halbert, 2014). This is due to the implementation of technology in learning. This student interest will increase student performance in the classroom, especially learning outcomes (Johnson & Mckenzie, 2013). The hybrid learning mode can facilitate students who are constrained by distance and time. Online learning in this mode can be used remotely, using the internet network (Heirdsfield et al., 2011). In addition, this mode can save education costs (Hew & Cheung, 2014).

Chemistry learning cannot be separated from the use of media in learning in the classroom. In the all-digital era, there have been many researchers or academics who have developed technology-based learning media. One of them is android-based learning media. This media prioritizes one of the operating systems on smartphones, namely Android. This operating system is mostly used in students'

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smartphones in schools, so it is easier to implement it in the classroom. In online and face-to-face learning, learning media is still needed that can attract students' attention to study the material. Media like this is a technology-based media that can be accessed anywhere and anytime. Media like this can explain concepts simply by combining visual and audio so that they can support independent learning activities (Daryanto, 2013).

Self-efficacy is a person's belief in making a choice. Self-efficacy in education is very important because it can affect the behavior of teachers or students (Cheung, 2014). Students' self-efficacy in learning can influence them in determining what activities will be chosen to be completed. The selection of challenging tasks is usually done by students with high self-efficacy (Santrock, 2011). This kind of student believes that the task he chooses is a task that he can complete according to his abilities (Ormrod, 2003). In doing assignments, students like this try as much as possible until the task is completed properly (Dinther et al., 2011). They will persevere with all their might in accomplishing what they have chosen. The results they get will also be better when compared to students with the same knowledge but different levels of self-efficacy.

In addition to influencing behavior, self-efficacy also affects the learning outcomes they will achieve at the end of learning. This self-efficacy has a significant relationship with learning outcomes (Schunk et al., 2010; Yusuf, 2011). In other words, increasing self-efficacy will be able to improve learning outcomes (Boz et al., 2016). One way to increase self-efficacy can be done by using technology-based learning (Julius et al., 2018).

Individual self-efficacy is divided into three dimensions, namely level, generality, and strength. The three are believed to exist in every human being but have different levels. Meanwhile, the source of a person's self-efficacy can be obtained from the experience of achievement, the experience of others, verbal persuasion, and affective physiological states (Bandura, 1997).

The purpose of this study was to analyze the self-efficacy profile of students in the use of android-based learning media. The android-based learning media (Chemdroid) used is believed to be able to increase students' self-efficacy compared to using other methods.

Research Method

This study aims to analyze the profile of students' self-efficacy in using technology in hybrid learning, especially Chemdroid learning media. This media has been developed and validated by material experts and media experts. This research is a descriptive study with a quantitative approach with a research subject of 60 students from 2 different classes. They come from SMA Negeri 4 Bengkulu City. These two classes were selected by cluster random sampling from 5 XI MIPA classes at the school. The first class is the control class (C-Class) which uses hybrid learning with the help of PowerPoint media like learning in general, while the second class is the experimental class (E-Class) using the help of Chemdroid media. The teacher and the

learning time used are the same, both face-to-face learning and online learning. Online learning is done outside school hours. The research design used was a post-test-only control group with the provision of self-efficacy instruments at the end of the lesson.

Measurement of self-efficacy is carried out using a self-efficacy instrument with 22 questions that have been developed in previous research (Solikhin, 2020). The instrument used has been adapted to the circumstances in this study. This instrument has been validated by experts from psychology and empirically validated. Aspects in this instrument are divided into Achievement, Effort, and activity choices (Dinther et al., 2011; Ormrod, 2003; Santrock, 2011). The scale in this instrument is 4 scale, modified from the Likert scale.

The data obtained were then analyzed in two parts. The first part is the overall self-efficacy profile, while the second part is the student's self-efficacy profile in each aspect. The resulting average score is then categorized into very high, high, sufficient, low, and quite low categories with the criteria in Table 1 (Azwar, 2015).

Table 1.
The Guideline to Convert the Average Score

Score Range	Category
X ≥ 3,25	Very High
3,25 ≤ X < 2,75	High
2,75 ≤ X < 2,25	Fair
2,25 ≤ X < 1,75	Low
X < 1,75	Very Low

Results and Discussion

Students' self-efficacy profile in using Chemdroid media was analyzed. This analysis consists of 2 parts, namely the overall self-efficacy profile and the efficacy profile in each aspect. The first part is the student's overall self-efficacy profile. The results of the analysis can be seen in Figure 1.

Overall, E-Class students dominate the very high and high criteria. Although the criteria are high, the two classes have a percentage that is not much different. For

very high criteria, students in E-Class have a percentage of 6 times more than students in C-Class. As for the sufficient criteria, students in C-Class are more dominant. From these results, overall, the self-efficacy of E-Class students is better than the self-efficacy of C-Class students.
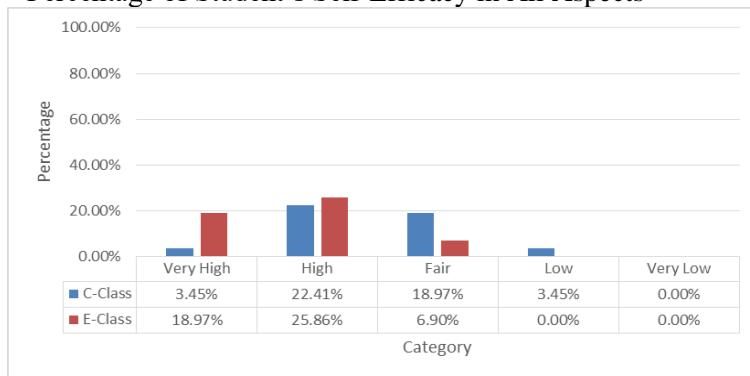
The second part is the student's self-efficacy profile in every aspect. Aspects analyzed are aspects of achievement, aspects of effort, and aspects of the choice of activities.

The first aspect is the aspect of achievement. This aspect consists of learning

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sub-aspects and achievement sub-aspects. The learning sub-aspect is an assessment item for the learning process of students from 2 different classes. While the sub-aspect of achievement is an assessment item on the results obtained by these students. E-Class students dominate on very high criteria. The percentage on this criterion is almost 4 times the percentage of C-Class. For students, C-Class dominates on the high criteria. This percentage is still smaller than the percentage of domination of E-Class students on very high criteria. The percentage of students in E-Class on the high criteria is half of the percentage of students in C-Class. For the sufficient criteria, the two classes have almost the same percentage and on the low criteria, C-Class dominates. Overall in this aspect, E-Class students have higher self-efficacy than C-Class students.

Figure 1.
Percentage of Student's Self-Efficacy in All Aspects

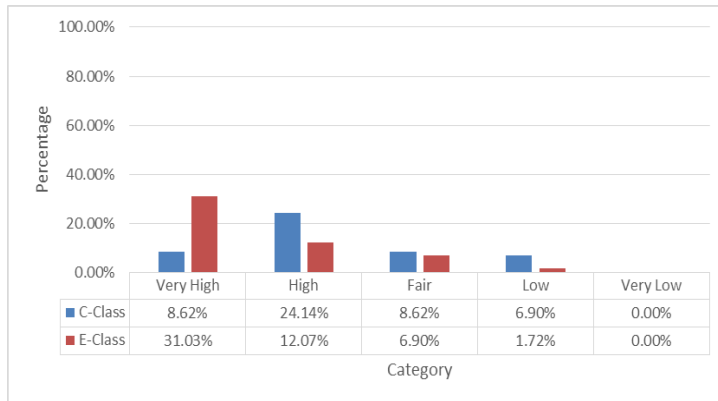|	Very High	High	Fair	Low	Very Low
C-Class	3.45%	22.41%	18.97%	3.45%	0.00%
E-Class	18.97%	25.86%	6.90%	0.00%	0.00%

In learning, students who use Chemdroid or E-Class students with high self-efficacy always connect the activities they are experiencing with previous experiences (Santrock, 2011). This experience is a lesson for them in learning in the future, both good experiences and bad experiences. This experience is used as a guide for better learning activities. Students like this will also be more diligent in studying in preparing everything (Ormrod, 2003). The preparation of students with high self-efficacy is more mature than students with low self-efficacy. One of them is to be diligent and enterprising in completing tasks successfully.

Students with high self-efficacy have better achievement than students with low self-efficacy. Even though they both have the same level of knowledge. E-Class students have better learning outcomes than C-Class students. E-Class students can do assignments successfully and get better results, while C-Class students feel doubtful in completing their assignments (Ormrod, 2003). As the result, students with high self-efficacy will have satisfactory achievements.

Next is the effort aspect. The results of the analysis on this aspect can be seen in Figure 2. The second aspect is the effort aspect. This aspect has the scope of a person's resilience in trying to achieve something. E-Class students dominate the very high category with a percentage of 3 times that of C-Class students. In the high category, K students dominate, although the difference is not too far off. Likewise in the sufficient category, the percentage of students in C-Class is 2 times the percentage of students in E-Class. When compared between the two, in this aspect, students in E-Class have better self-efficacy than students in C-Class.

Figure 2.
Percentage of Student's Self-Efficacy in Achievement Aspect

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Category	Very High	High	Fair	Low	Very Low
C-Class	8.62%	24.14%	8.62%	6.90%	0.00%
E-Class	31.03%	12.07%	6.90%	1.72%	0.00%

Students with high self-efficacy have an advantage. One of them is to have great effort and perseverance in every learning activity in the classroom. This effort makes them not easily give up in every condition, even though there are difficulties on the way to getting things done (Dinther et al., 2011). Unlike students who have low self-efficacy, who easily give up when they get into trouble (Ormrod, 2003; Santrock, 2011).

In learning there is an influence from the use of Chemdroid, some students in E-Class try to be stronger and not easily give up in completing the tasks given by the teacher. They can't wait to use this Chemdroid application further. This is different from C-Class students who are easy to give up. When given a task, they immediately finished it by not checking first about the correctness of the answer. This difference is very strongly felt when learning in the classroom.

Figure 3.

Percentage of Student's Self-Efficacy in Effort Aspect

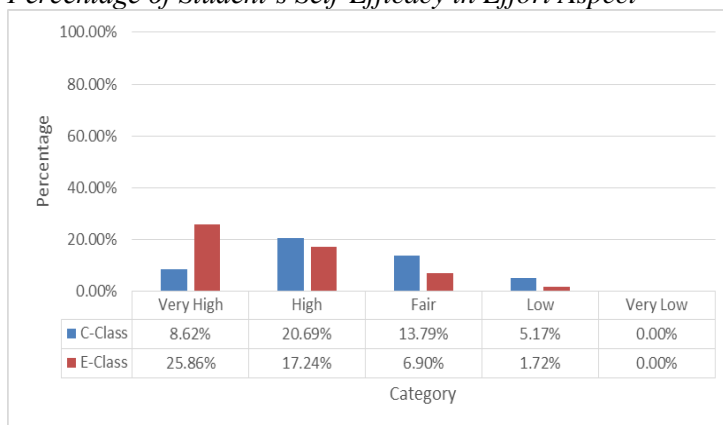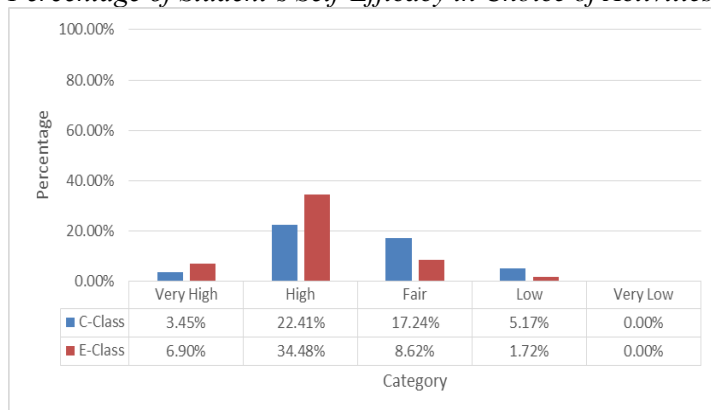| Category	Very High	High	Fair	Low	Very Low
C-Class	8.62%	20.69%	13.79%	5.17%	0.00%
E-Class	25.86%	17.24%	6.90%	1.72%	0.00%

Figure 3 is the result of the analysis of the third aspect, namely the aspect of choosing activities. This aspect consists of 2 sub-aspects, namely the selection of activities and the use of strategies. The aspect of activity selection is related to the way they organize their activities in learning activities, while the use of strategies is related to the selection of strategies they use during these activities. The figure shows that the very high and high criteria are dominated by students from E-Class. In the very high criteria, the percentage of students in E-Class is 2 times the percentage of students in C-Class. As for the high criteria, the percentage of students in E-Class is 1,5 times more than the other class. From these results, it can be concluded that in this aspect, the self-efficacy of E-Class students is higher than the percentage of C-Class students.

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Figure 4.
Percentage of Student's Self-Efficacy in Choice of Activities Aspect

Category	Very High	High	Fair	Low	Very Low
C-Class	3.45%	22.41%	17.24%	5.17%	0.00%
E-Class	6.90%	34.48%	8.62%	1.72%	0.00%

Students with low self-efficacy usually have difficulty in managing their activities. In addition, they also often avoid tasks that are many and challenging and are considered difficult (Ormrod, 2003; Santrock, 2011). The tasks they choose are usually low in difficulty and not challenging. In completing their tasks and activities, they never use a separate strategy. They just use the same strategy as the others. Their orientation is only to complete the task, without thinking about what the result will be. This is not the same as students with high levels of efficacy. Learners with a high level of efficacy usually use the right strategy in completing their activities (Santrock, 2011). The activities they choose are usually challenging activities and they consider difficult but easy to complete (Ormrod, 2003; Santrock, 2011).

In learning activities using Chemdroid media, E-Class students are students who can manage their activities. Which activities they can complete they will choose. They always feel challenged by these difficult tasks (Dinther et al., 2011).

The results of this study are following previous research that the way to improve students' self-efficacy is to optimally implement technology in learning, one of which is by using android-based media (Calik, 2013; Fitriyana et al., 2018, 2020; Solikhin et al., 2018). Teachers play an important role in improving students' self-efficacy. This is useful so that student achievement can also increase (Oyelekan et al., 2019).

Conclusion

From the results of the analysis and discussion, it can be concluded that the self-efficacy profile of students who use Chemdroid media is higher than other class. Overall or in every aspect, the students of E-Class are superior to those of the first class. This is a sign that in the future, technology-based learning media should be developed as an effort to increase students' self-efficacy in learning.

Acknowledgment

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