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IMPLEMENTATION OF DISCOVERY LEARNING USING INTERACTIVE FLIPBOOK MEDIA IN CHEMISTRY TO IMPROVE MOTIVATION AND LEARNING OUTCOMES IN SENIOR HIGH SCHOOL

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Abstract

This study is a Classroom Action Research (CAR) aimed to measuring the improvement in students' motivation and learning outcomes through the implementation of the Discovery Learning model using interactive flipbook media on acid-base material. The sample used consisted of 30 students from class XI-3 at SMA Negeri 14 Surabaya. The research consisted of four stages: planning, implementation, observation, and reflection. The instruments used were pre-test and post-test to assess the improvement in cognitive learning outcomes, and a learning motivation questionnaire to measure students' affective aspects. The results showed that the average N-Gain score increased from 0.61 (moderate category) in the first cycle to 0.76 (high category) in the second cycle. A significant improvement was also observed in students' learning motivation, increasing from an average percentage of 52.26% in the first cycle to 84.03% in the second cycle after the learning process was carried out. Based on these data, it can be concluded that the application of the discovery learning model using interactive flipbook media is effective in enhancing students' motivation and learning outcomes in chemistry learning, particularly in acid-base material. The results also indicate that this model and media can serve as an innovative and engaging alternative strategy for future chemistry education.

Keywords: Discovery Learning, interactive flipbook, learning motivation, learning outcomes, classroom action research

INTRODUCTION

In general, high school students tend to show relatively low interest in chemistry subjects [1]. At the senior high school level, chemistry subject frequently encounters challenges in fostering students' motivation and improving their academic outcomes [2]. Chemistry lesson is considered difficult, abstract, and full of symbols, equations, and microscopic concepts that are not easily understood directly by students. This has an impact on low learning outcomes, even making chemistry one of the subjects that is often avoided by some students[3].

Based on interviews with the chemistry teacher and homeroom teacher of Class XI-3 at SMA Negeri 14 Surabaya, classroom observations conducted between September and November 2024, and the results of a non-cognitive diagnostic assessment, several learning-related issues were identified. These include limited student ability to comprehend and internalize chemical concepts, low literacy achievement in chemistry, and insufficient learning motivation, all of which adversely affect academic performance. Moreover, these challenges are compounded by the fact that the predominant learning style among students in Class XI-3 is visual, thereby necessitating innovative and accessible learning strategies that align with their preferences and easy to access.

One of the relevant approaches to improving student motivation and learning outcomes in Chemistry is Discovery Learning, which is learning that involves students to discover new concepts or principles that have been established so as to encourage students to be active in learning [4]. With this approach, a creative and innovative learning atmosphere will be created so students can be actively involved in responding to learning in order to improve their learning outcomes [5].

In addition to utilizing innovative learning models, a creative idea in learning can be realized through the usage of digital learning media that accommodates students' learning styles [6]. One of the learning media that can be used is a flipbook. Flipbook learning media is an effective alternative [7].

Flipbook is a digital learning media that looks like a book with a display of illustrated text that can be turned on each page [8]. Flipbooks are generally equipped with instructions and various colorful images so that they can steal the attention of students. Some of the advantages of flipbooks are can contain hyperlinks, videos, moving animations, and sounds that can support the learning process to be more interactive and enjoyable. This learning media can increase students' learning motivation with these advantages. Based on the literature [9] conducted by Awwaliyah, et al. (2021) showed that flipbook based e-modules have been proven to increase students' learning motivation according to their development objectives.

Based on the results of research [10] by Dheandra Tsabitha Ylsan & Rahmat Kamal (2022), showed that an increase in students' learning motivation by 42% from pre-test to post-test after learning using flipbook learning media [10]. This shows that flipbook learning media is effective in increasing students' learning motivation for the subjects taught. Interactive flipbooks have been proven effective in increasing students' learning motivation because they are equipped with interactive features that support student involvement in the learning process [11]. In addition, the use of flipbook based e-modules can also improve student learning outcomes, such as in the study by Vikiantika et al. (2022) which increased the percentage of learning completion from the initial 56% to 86%.

However, in general most previous studies have only examined the usage of flipbooks in the form of independent e-modules, not as part of the implementation of active learning strategies such as Discovery Learning in a direct classroom context. This is where the research gap lies, where there are not many studies that specifically examine the integration of the Discovery Learning model with interactive flipbook media in increasing student motivation and learning outcomes in acid-base material at the high school level. Based on the background of the problems above, the researcher is interested in conducting research related to "Implementation of Discovery Learning Using Interactive Flipbook Media in Chemistry to Improve Motivation and Learning Outcomes In Senior High School".

METHODS

This research is in the form of Classroom Action Research (PTK) with the research subject of class XI-3 SMA Negeri 14 Surabaya students totaling 30 students. This research was conducted in February 2025. The object of this research is the results and motivation of students to learn Chemistry subjects through the Discovery Learning model assisted by flipbook learning media. This research was conducted in 2 cycles with the implementation procedure consisting of 4 main components, 1) Planning stage, 2) Implementation, 3) Observation, and 4) Reflecting [12]. The following is a research flow chart shown in Figure 1.

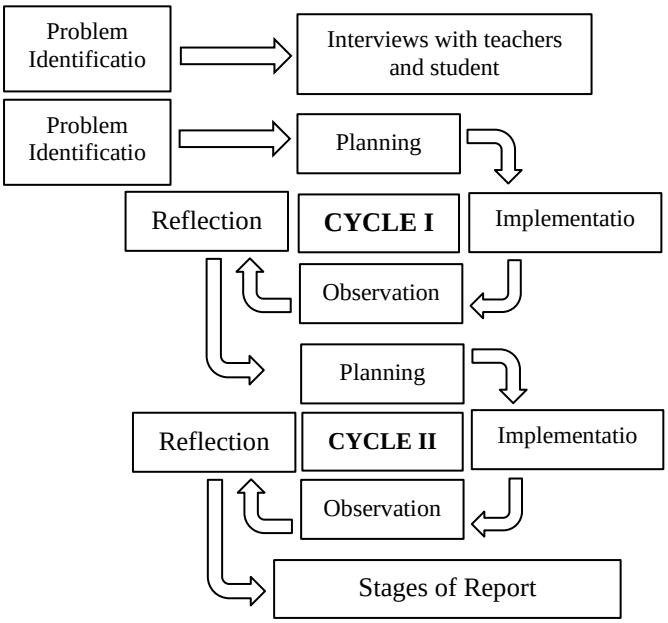

Figure 1. Research Flow Chart

The explanation of this research flow is as follows:

1. Cycle I

a. Planning

At this stage the researcher/teacher makes a design about the focus of the problem that needs attention, namely:

1) Arranging the completeness of teacher administration including teaching modules for chemistry and other subjects,
2) Prepare research instruments for teachers and students,
3) Prepare a learning motivation evaluation format,
4) Prepare learning resources in the form of material on chemistry subjects in the form of flipbooks and LAPD (Student Activity Sheet) to support learning.
5) Develop learning scenarios and coordinate with other chemistry teachers.

b. Implementation

1) Teachers carry out apperceptions to direct students into chemistry subject matter in a coordinative and applicative manner by applying the Discovery Learning model using flipbook learning media, to improve learning outcomes and student motivation.
2) The teacher explains the learning objectives to improve the learning outcomes, as well as the ability to interpret chemical material about acids and bases.
3) Students work on pre-test questions given by the teacher.
4) The teacher follows the flow of activities that have been designed in the teaching module in accordance with the syntax of the Discovery Learning model using Flipbook learning media.
5) The teacher discusses again with all students, if necessary the teacher explains to students that the ability to interpret the concepts of chemistry subjects requires perseverance and foresight so that being able to apply them in daily life. This ability will be an important asset for their future lives.
6) The teacher gives post-test questions after the lesson.
7) Teacher gives motivation questionnaire before and after learning.

c. Observation

Observing the implementation of the Discovery learning model using flipbook learning media in learning is carried out by observers through observing the attitudes and behavior of students using observation instruments that have been prepared by the teacher. The observer compares the results of his observations by looking at the development of students towards their learning motivation after the implementation of learning activities effectively.

d. Refleksi

1) The teacher reflects on the results of the students' questionnaire related to learning motivation before and after learning.
2) The teacher reflects on the learning outcomes of students before and after learning.

2. Cycle II

The stages in cycle II are the same as the series of activities carried out in cycle I, however, there are several learning methods that are carried out differently at the implementation stage, namely:

a. Implementation

1) Teachers carry out apperceptions to direct students into chemistry subject matter in a coordinative and applicative manner by

applying the Discovery Learning model using interactive flipbook learning media, to improve student learning outcomes and motivation.

2) The teacher explains the learning objectives to improve the learning outcomes that will be achieved.
3) Students work on pre-test questions given by the teacher.
4) The teacher follows the flow of activities that have been designed in the teaching module in accordance with the syntax of the Discovery Learning model using interactive Flipbook learning media.
8) The teacher discusses again with all students, if necessary the teacher explains to students that the ability to interpret the concepts of chemistry subjects requires perseverance and foresight so that being able to apply them in daily life. This ability will be an important asset for their future lives.
5) Teacher gives post-test questions after the lesson
6) The teacher gives a motivation questionnaire before and after learning.

The following is a descriptive explanation of each research instrument.

1. Data Collection Technique

Data collection techniques in this study include questionnaires, observations, and tests.

a. The learning motivation questionnaire was used to measure changes in student motivation before and after learning. The questionnaire consists of 12 positive statement items that reflect four indicators of learning motivation, namely: interest, perseverance, goal orientation, and learning value.
b. Observation is used to observe students' responses and behavior during learning.
c. Learning outcome tests are used to determine the improvement of concept mastery through pre- test and post-test scores.

2. Instrument Validity Test

a. Content validity, learning motivation questionnaire was developed based on the theory of learning motivation and has been tested by three experts, namely one chemistry education lecturer and two chemistry teachers. The experts assessed the suitability of the content, the clarity of the wording, and the measurability of the items against the intended indicators. Based on the experts' input, revisions were made to several editorial statements to improve readability and accuracy of meaning.
b. Empirical test (Cronbach alpha reliability), empirical test was conducted by distributing questionnaires to 30 students outside the research class. The data were analyzed using SPSS to determine the reliability of the instrument. The Cronbach Alpha value obtained is 0.82, indicating that the questionnaire has high reliability and is suitable for use in research.

3. Learning Motivation Questionnaire Grid

Table 1 below is the Learning Motivation Questionnaire used by the researcher:

Table 1. Learning Motivation Questionnaire Grid

Model	No	Indicator Description	Score
Attention	1	What I learned in this lesson is useful to me	4
	2	The teacher does things that are different from usual and very interesting	4
	3	In this teaching and learning activity, I seem to always want to know about the learning material discussed	4
Relevance	4	The tasks given in this lesson make the subject matter important.	4
	5	I have to work hard to succeed in this learning	4
	6	In learning activities, I try to keep up and try to get good grades.	4
Confidence	7	I am confident that I can follow this lesson	4
	8	I am confident that I will succeed in participating in this learning activity if I work hard.	4
	9	I feel that success and failure depend on me alone	4
Satisfaction	10	I enjoy following this lesson	4
	11	The content of this lesson met my expectations and goals	4
	12	I feel well rewarded for any effort I put into this learning whether in the form of marks, comments or feedback.	4

4. Questionnaire Rating Scale and Questionnaire Score Interpretation

Students' response data was obtained after the limited trial to determine the learning motivation of the developed students. The percentage of questionnaire data is calculated using the Likert scale guidelines in Table 2 below:

Table 2. Likert Scale

Likert Scale	Category
4	Strongly Agree
3	Agree
2	Disagree
1	Strongly Disagree

[13]

The formula for calculating the percentage of student response questionnaires is as follows:

$$Final\ Score = \frac{Sum\ Score}{Total} \times 100\%$$

The percentage results are interpreted into the criteria in Table 3 below:

Table 3. Students Response Interpretation

Percentage	Criteria
20% - 36%	Very Low
37% - 52%	Low
53% - 68%	Medium
69% - 84%	High
85% - 100%	Very High

[13]

Based on these categories, learning motivation can be said to be high if the percentage of student responses is > 68% with high or very high criteria [13] This study measures the increase in learning motivation after the implementation of learning in each cycle.

5. *N-Gain* Score Analysis (Descriptive)

The success of learning comes from the data from the pre-test and post-test results of learning outcomes that have increased. The resulting data were analyzed descriptively quantitatively using *N- Gain* score analysis.

$$N\text{-}Gain = \frac{(Posttest\ Score - Pretest\ Score)}{(Maximum\ Score - Pretest\ Score)} \times 100\%$$

N-Gain results are interpreted into the categories in Table 4 below:

Table 4. *N-Gain* Score Interpretation

Value	Category
$g > 0{,}7$	High
$0{,}3 \leq g \leq 0{,}7$	Medium
$g < 0{,}3$	Low

[14]

Based on these criteria, the application of the learning model is considered effective in improving student learning outcomes if the N-

Gain score reaches >0.30 with medium or high category. [13].

RESULTS AND DISCUSSION

This classroom action research was carried out in two cycles, each cycle includes four stages, namely planning, implementation, observation, and reflection. Research activities took place during two learning cycles. In cycles 1 and 2 the Discovery Learning model with usage flipbook learning media, the difference was the usage of interactive flipbooks in cycle 2. In cycle 1 the material presented was acid-base theory, while in cycle 2 the material presented was acid-base identification. The Student Activity Sheet was also prepared using the Discovery Learning syntax.

In the initial condition, the learning outcomes of students in class XI-3 were low, with a lack of motivation to learn. This can be seen from the lack of interest of students to learn, students do not seem to see the direct benefits of the subject matter provided. When the material is discussed, students do not show high curiosity, indicated by the low level of activeness during learning and students seem reluctant to express opinions. In addition, students did not appear to be trying their best in participating in learning activities, which was shown by several students who did not bring chemistry notebooks and were busy with their own activities. This condition is used as a basis for improving the motivation and learning outcomes of students, with the hope of improving the learning process and results, especially in improving Chemistry scores and learning motivation questionnaire scores.

Before learning process began which was carried out in cycle I, students took a pre-test and filled out a questionnaire regarding learning motivation. The pre-test was arranged in the form of essay questions, while the learning motivation questionnaire consisted of 12 statement items. After the learning process was complete, students took the post-test. In cycle 2, students also worked on pre-test questions before learning began. Then, at the end of the learning process, students were given post-test questions and questionnaires about learning motivation again. Data from the pre-test and post-test in cycles 1 and 2 are shown in Table 5 as descriptive statistical results of students' learning achievements.

Table 5. Descriptive Statistical Data of Students' Learning Outcomes

	Cycle I		**Cycle II**	
	Pre-Test	*Post-Test*	*Pre-Test*	*Post-Test*
N	30	30	30	30
Min	0,0	30,0	0,0	47,5
Max	35,0	100,0	47,5	100,0
X	10,17	65,67	14,50	79,21

The graph Average score of Pretest and Posttest Cycle 1 and Cycle 2 is presented in Figure 3 below:

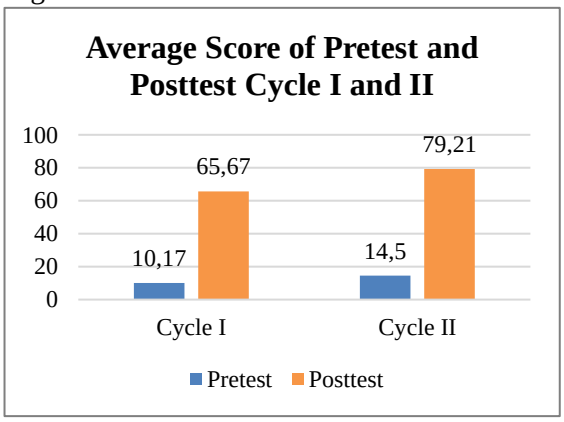

Figure 2. Graph Average Score of Pretest and Posttest Cycle I and II

In addition, one indicator of the success of this study can also be shown through the calculation of the N-Gain value, which indicates an increase in learning outcomes after implementation of the Discovery Learning model using flipbook learning media. Based on the data obtained, Table 6 below presents an analysis of the N-Gain value achieved by students.

Table 6. Students *N-Gain* Data

	Range *N-Gain*	Frequency	Percentage	Category
Cycle I	g > 0,7	17	56,67%	High
	0,3 ≤ g ≤ 0,7	9	30,00%	Medium
	g < 0,3	4	13,33%	Low
	Average *N-Gain* Score	0,61		Medium
	Range *N-Gain*	**Frequency**	**Percentage**	**Category**
Cycle II	g > 0,7	19	63,33%	High
	0,3 ≤ g ≤ 0,7	11	36,67%	Medium
	g < 0,3	0	0,00%	Low
	Average *N-Gain* Score	0,76		High

The graph of the average N-Gain score in cycle 1 and 2 is presented in Figure 3 below:

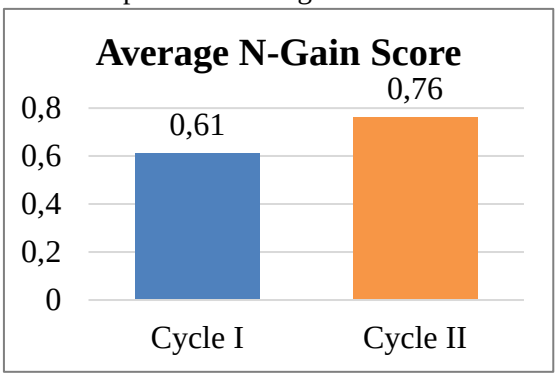

Figure 3. Graph of the Average N-Gain Score of Cycle I and II

In the application of the *Discovery Learning* model using interactive *flip book* media in cycle 2, it also has a positive impact on increasing students' learning motivation. The effectiveness of the application of the *Discovery Learning* model using interactive *flipbook* media can be seen from the results of the questionnaire of students' learning motivation in cycle 1 and cycle 2. The results of the questionnaire are shown in Table 7.

Table 7. The results of students' responses to learning motivation

No	Statement	Cycle I		Cycle II	
		Average	Percentage (%)	Average	Percentage (%)
1	What I learned in this lesson is useful for me	1,97	49,31	3,47	86,81
2	The teacher does things that are different from usual and very interesting	2,22	55,56	3,22	80,56
3	In this teaching and learning activity, I always seem to want to know about the learning material discussed.	2,06	51,39	3,19	79,86
4	The tasks given in this lesson make the subject matter important	2,25	56,25	3,25	81,25
5	I have to work hard to succeed in this learning	2,14	53,47	3,67	91,67
6	In learning activities, I try to follow and try to get good grades	2,00	50,00	3,50	87,50
7	I am confident that I can	2,25	56,25	3,33	83,33

No	Statement	Cycle I		Cycle II	
		Average	Percentage (%)	Average	Percentage (%)
	follow this lesson				
8	I am confident that I will succeed in participating in this teaching and learning activity if I work earnestly	2,17	54,17	3,58	89,58
9	I feel that success and failure depend on me alone	2,17	54,17	3,64	90,97
10	I am happy to follow this Lesson	2,08	52,08	3,25	81,25
11	The content of this lesson meets my expectations and goals	1,92	47,92	3,08	77,08
12	I feel that I get a lot of credit for any effort I put into this learning whether in the form of grades, comments or feedback	1,86	46,53	3,14	78,47
Average Percentage			52,26		84,03

The graph showing changes in student motivation in cycle 1 and cycle 2 is presented in Figure 4 as follows:

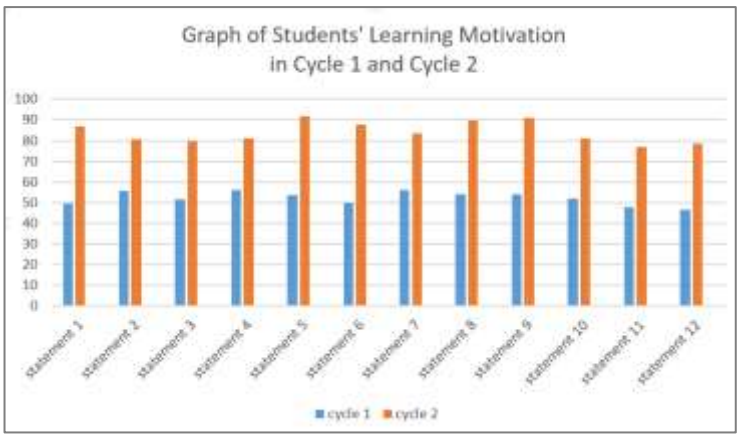

Figure 4. Graph of Changes in Student Motivation in Cycle 1 and Cycle 2

1. Cycle I

a. Planning

In the planning stage the researcher compiles and plans what will be done. Based on the pre-cycle, the researcher compiled a learning plan using a student-centered learning model, namely the Discovery Learning model using flipbook learning media. The Discovery Learning model was chosen in this class action research because the approach encourages students to actively discover concepts through the process of exploration, observation, and problem solving [4]. This model not only increases conceptual understanding in depth, but also fosters independence, curiosity, and motivation to learn. In addition, to support an interesting learning process, flipbook media is used as a visual tool that makes it easier for students to understand the material [8]. Flipbooks present information systematically and interestingly through digital displays that can be accessed easily, thus helping students in connecting the concepts found during the learning process on acid-base materials.

b. Implementation

At the stage of implementation, what has been planned is implemented in learning to students. The learning that is carried out is learning using the Discovery Learning model using flipbook learning media. At this stage students are divided into 5 groups of 6 students heterogeneously based on their initial abilities. Then each group is given a Discovery Learning-based Student Activity Sheet (LAPD). In the LAPD, the teacher presents a stimulus that can encourage students to be able to think critically in identifying problems and solving them, so that students can actively find concepts in acid-base material independently.

c. Observation

Based on the data in Table 4 shows that in cycle I the lowest average pre-test score was 10.17; while the average post-test score reached 64.67. This shows that after being given learning media in the form of flipbooks in the Discovery Learning learning model there is an increase in student learning outcomes. The results of analyzing students' pre-test and post-test data measured using the N-Gain value also show an increase in students' learning outcomes. In cycle 1, the average N-Gain value of students was 0.61, which was included in the medium category. The distribution of categories shows that 17 students (56.67%) are in the high category, 9 students (30.00%) are in the medium category, and 4 students (13.33%) are still in the low category. This data shows that although most students have improved learning outcomes, there are still a number of students who have not achieved optimal improvement. This is likely due to the initial adaptation process of students to new learning methods and the use of flipbook media which may still not be fully understood how to use it optimally.

The result of learning motivation in the first cycle show that are still classified as low to moderate, with percentages ranging from 46.53% to 56.25%. Indicators that showed the highest response were in the statements "The tasks given in this learning make the subject matter important" and "I am sure I can follow this learning" which each reached a percentage of 56.25%. However, the indicator "I feel I get a lot of rewards for all the efforts I make in this learning" only reached 46.53%. Overall, the average score of students' responses is still below 2.5 on a scale of 4, which indicates that students' motivation is still low and not fully motivated. This could be due to the students' adaptation process to the Discovery Learning model and the use of flipbook media which is still new to them, so they are not fully involved and active in learning.

d. Reflection

The improvement that occurred in cycle I on students' learning outcomes was quite satisfactory, it can be seen from the increase in students' learning outcomes. The average N-Gain value of students is at 0.61, which is included in the medium category[14]. However, for student learning motivation needs to be improved. This is because in cycle 1 the average percentage value of learning motivation of students in class XI-3 is only 52.26% which is included in the low category. The weaknesses of cycle I were the limited learning time of 3 class period (3 x 38 minutes), and the learning methods and media used did not facilitate the learning styles of students. The flipbook used is only in the form of text, data tables, and images, so it is less interactive and students' understanding becomes less thorough.

2. Cycle II

a. Planning

In the planning stage the researcher compiles and plans what will be done. Based on the pre-cycle and reflection of cycle I, researchers designed the learning process using a learning model oriented towards the active involvement of students, namely Discovery Learning supported by interactive flipbook learning media. The selection of the Discovery Learning model is based on its ability to encourage students to discover concepts through exploratory activities, observation, and independent problem solving. This approach

not only deepens understanding of concepts, but also develops learning independence, curiosity, and increases student motivation. To strengthen the effectiveness of learning, interactive flipbooks are used as visual media that present material in an interactive, interesting and structured manner. Through a digital display that is easily accessible and by combining text, data tables, images, video and audio, the interactive flipbook can help students understand and relate the concepts found during learning, especially on the topic of acid-base.

b. Implementation

At the action implementation stage, all plans that have been prepared previously are applied in the learning process to students. Learning is carried out by applying the Discovery Learning model which is supported by the use of interactive flipbook learning media. In this stage, students were divided into five heterogeneous groups of six people each, based on their initial abilities. Each group was then given a Student Activity Sheet (LAPD) designed based on the Discovery Learning syntax. In the LAPD, the teacher provides stimulus in the form of problems that encourage students to think critically, identify problems and solve them. Through LAPD guidance and visual support from interactive flipbooks, students can actively and independently find important concepts in acid-base material, so that the learning process becomes more meaningful and participatory.

c. Observation

In cycle II, the average pre-test score was 14.50; while the average post-test score was 79.21. This shows an increase in learning outcomes after applying the Discovery Learning model with the help of interactive flipbook learning media. In addition, there was a significant increase both in terms of the average N-Gain score and its frequency distribution. The average N-Gain rose to 0.76, which is already in the high category. A total of 19 students (63.33%) managed to reach the high category, and 11 students (36.67%) were in the medium category. There are no more students who are in the low category. This shows that after adjustments in cycle I, students are getting used to and able to follow the learning process more effectively. The material presented through the Discovery Learning model and supported by interactive flipbook media encourages students to be more active, understand concepts in depth, and be motivated to achieve better learning outcomes.

The results of this study indicate that the application of the Discovery Learning model can gradually improve the learning outcomes and motivation of students. This is in line with Bruner's Theory which emphasizes the importance of learning through discovery learning, where students actively build knowledge through direct involvement in the learning process. In this research, students not only receive information, but also explore, analyze and discover concepts themselves through stimulus and questions in the Student Activity Sheet (LAPD). This activity increases deep cognitive engagement and strengthens understanding of acid-base concepts.

The increase that occurred from cycle I to cycle II reflects that the combination of the Discovery Learning model and interactive flipbooks has high effectiveness in improving student learning outcomes [12]. The presentation of material that is visual, interactive, and allows independent exploration proved to be able to help students understand chemical concepts better. With no students in the low category in the second cycle, it can be concluded that the applied learning strategy succeeded in minimizing the gap in learning outcomes between students and improving overall achievement.

In cycle II, there was a significant increase in all indicators of student motivation. The percentage of students' responses increased to a range between 77.08% to 91.67%, indicating that the majority of students showed high learning motivation. The indicators with the highest percentages were found in the statements "I have to work hard to succeed in this learning" (91.67%) and "I feel that success

and failure depend on myself" (90.97%), indicating that students increasingly realize the importance of personal effort in achieving learning success. The average score per indicator also increased significantly, with values reaching 3.2 to 3.6, which is in the high category. This increase indicates that the application of the Discovery Learning model combined with interactive flipbook media has effectively increased students engagement and motivation. Interactive flipbook media allows students to more easily understand the material in an interesting and fun way, and fosters a sense of responsibility in learning [11].

Overall, the comparison between cycle I and II shows that the application of the Discovery Learning model with interactive flipbook media is significantly able to increase students' learning motivation. There was a clear increase in all motivation indicators, which reflects that the use of this media has succeeded in creating a learning environment that is more interesting, challenging, and motivates students to be more active and responsible for their learning process.

The increase in student motivation from cycle I to cycle II can be explained through Deci & Ryan's Self-Determination Theory [15] This theory states that intrinsic motivation develops when individuals have three basic psychological needs: autonomy, competence and social relations. In this learning, students are given space to think independently (autonomy), given challenges that match their ability level (competence), and work together in groups (social relations). This is reflected in the increase in learning motivation scores which include statements such as "I must work hard to succeed" and "I feel that success depends on my efforts".

The results of this study are also in line with several previous studies. Based on the literature [9], the results showed that flipbook-based e-modules were proven to be able to increase students' learning motivation in accordance with their development objectives. Dheandra Tsabitha Ylsan & Rahmat Kamal (2022) also mentioned in their research that there was an increase in student learning motivation by 42% from pre-test to post-test after learning using flipbook learning media [10]. Rizki Nur Wijayanti & Isnawati (2023) also mentioned that interactive flipbooks proved effective in increasing student learning motivation [11].

d. Reflection

Based on the results of implementation and observation in cycle II, it can be concluded that the learning strategy applied, namely the Discovery Learning model supported by interactive flipbook media, succeeded in improving various weaknesses found in cycle I. Students showed a significant increase in aspects of motivation and learning outcomes. Not only did the average N-Gain score increase to 0.76 which is in the high category, but there were also no more students in the low category. This shows that the learning approach used is able to improve conceptual understanding evenly.

Reflection from the implementation of Cycle II showed that the improvement of actions taken after cycle I through strengthening the active involvement of students, more optimal use of flipbooks, and more structured classroom management had a positive impact on the learning process and results. The flipbook media proved to be able to attract the attention of students, present the material in an interesting way, and support the process of exploration and discovery of chemical concepts, especially on the topic of acid-base.

Thus, it can be concluded that the actions taken in cycle II were optimal and did not require further improvement. The learning model used is in accordance with the needs of students and is able to improve both motivation and learning outcomes. Therefore, the class action research can be stopped in cycle II, because the learning objectives have been maximally achieved.

Some weaknesses and obstacles found in the implementation of this research include:

1. Slow adaptation of students to the Discovery Learning model and flipbook media in cycle I. This can be seen from the low motivation and learning outcomes. This can be seen from the low motivation and learning activeness.
2. The limited learning time that only lasts for 3x38 minutes per meeting makes the concept exploration process cannot be done in depth.
3. The flipbook in cycle I was less interactive, only displaying text, images and tables, so it was not interesting enough to activate an optimal learning process.
4. Variations in students' learning styles have not been fully accommodated, especially for students with visual-auditory preferences, which can only be maximally accommodated in cycle II after the addition of video and audio features.
5. Network constraints related to downloading flipbooks through barcode scans.

The results of this study provide several important implications for the practice of chemistry learning, among others:

1. The Discovery Learning model is proven effective in improving the understanding of abstract chemical concepts, such as the concept of acids and bases.
2. The use of interactive flipbook media can enrich learning with interesting visualizations and multimedia support, so that students more easily understand the material.
3. The increase in students' learning motivation shows that student-centered learning models such as
4. Discovery Learning can create a more conducive and meaningful learning environment.
5. Teachers are advised to integrate educational technology creatively to expand access to materials, facilitate understanding, and increase students' engagement in learning.
6. This strategy also minimizes gaps in learning outcomes, as it helps students with different starting abilities to develop equally.

CONCLUSION

The results showed that the application of the Discovery Learning model using interactive flipbook media can increase students' learning motivation and learning outcomes on acid-base material in class XI SMA Negeri 14 Surabaya. The increase is indicated by an increase in the average N-Gain value from 0.61 in cycle I to 0.76 in cycle II. In addition, students' learning motivation also increased from 52.26% to 84.03%. Learning with interactive flipbooks has a positive impact on students' active involvement and better understanding of concepts.

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