REVOLUTIONIZING COLOIDAL SYSTEMS: UNVEILING THE POWER OF PALLET MEDIA IN FLIPPED LEARNING MODELS

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ABSTRACT

Aim: This study seeks to evaluate the academic progress of students at SMAN 7 Kendari by integrating two teaching approaches: the Flipped Learning method using Padlet media and the Discovery Learning model, focusing on colloid systems. Additionally, it aims to examine the specific impact of employing the Flipped Learning method with Padlet media on students' cognitive development within the same subject area.

Method: The research methodology adopted is quasi-experimental, incorporating pretest and posttest evaluations. Data collection involved administering pretest-posttest assessments and distributing questionnaires.

Results: Analysis of the data indicates a notable increase in cognitive learning results among students in the intervention group who were exposed to the Flipped Learning method assisted Padlet media. Specifically, their average pretest score improved from 25 to 75, contrasting with the control group's increase from 21 to 65.

Conclusion: The statistical analysis, employing an independent sample T-test, demonstrates a significant enhancement in students' understanding of colloid systems at SMAN 7 Kendari through the application of the Flipped Learning method assisted Padlet media, as indicated by a significance level of 0.001.

Keywords: Flipped Learning Model, Padlet Media, Cognitive.

REVOLUCIONANDO SISTEMAS COLOIDAIS: REVELANDO O PODER DA MÍDIA PADLET EM MODELOS DE APRENDIZAGEM INVERSOS

RESUMO

Objetivo: Este estudo busca avaliar o progresso acadêmico dos alunos do SMAN 7 Kendari integrando duas abordagens de ensino: o método Flipped Learning utilizando mídia Padlet e o modelo Discovery Learning, com foco em sistemas coloidais. Além disso, visa examinar o impacto específico do emprego do método Flipped Learning com mídia Padlet no desenvolvimento cognitivo dos alunos dentro da mesma área disciplinar.

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Método: A metodologia de pesquisa adotada é quase-experimental, incorporando avaliações de pré e pós-teste. A coleta de dados envolveu a administração de avaliações pré-teste e pós-teste e a distribuição de questionários.

Resultados: A análise dos dados indica um aumento notável no resultado da aprendizagem cognitiva entre os alunos do grupo de intervenção que foram revelados ao método Flipped Learning assistido pela mídia Padlet. Especificamente, a pontuação média do pré-teste melhorou de 25 para 75, contrastando com o aumento do grupo de controle de 21 para 65.

Conclusão: A análise estatística, empregando um teste T de amostra independente, demonstra uma melhoria significativa na compreensão dos alunos sobre sistemas coloidais no SMAN 7 Kendari através da aplicação do método Flipped Learning assistido por mídia Padlet, conforme indicado por um nível de significância de 0,001.

Palavras-chave: Modelo de Aprendizagem Invertida, Padlet Media, Cognitivo.

REVOLUCIONANDO LOS SISTEMAS COLOIDALES: REVELANDO EL PODER DE LOS MEDIOS PADLET EN MODELOS DE APRENDIZAJE INVERTIDODA AUTOEFICÁCIA COM O CONHECIMIENTO DE ÚTERO

RESUMEN

Objetivo: Este estudio busca evaluar el progreso académico de los estudiantes de SMAN 7 Kendari integrando dos enfoques de enseñanza: el método Flipped Learning utilizando medios Padlet y el modelo Discovery Learning, enfocándose en sistemas coloidales. Además, tiene como objetivo examinar el impacto específico del empleo del método Flipped Learning con medios Padlet en el desarrollo cognitivo de los estudiantes dentro de la misma área temática.

Método: La metodología de investigación adoptada es cuasiexperimental, incorporando evaluaciones pretest y postest. La recopilación de datos implicó la administración de evaluaciones previas y posteriores a la prueba y la distribución de cuestionarios.

Resultados: El análisis de los datos indica un aumento notable en el resultado del aprendizaje cognitivo entre los estudiantes del grupo de intervención que fueron revelados al método de aprendizaje invertido asistido por medios Padlet. Específicamente, su puntaje promedio previo a la prueba mejoró de 25 a 75, en contraste con el aumento del grupo de control de 21 a 65.

Conclusión: El análisis estadístico, que emplea una prueba T de muestra independiente, demuestra una mejora significativa en la comprensión de los estudiantes de los sistemas coloides en SMAN 7 Kendari mediante la aplicación del método de aprendizaje invertido asistido por medios Padlet, como lo indica un nivel de significancia de 0,001.

Palabras clave: Modelo de Aprendizaje Invertido, Padlet Media, Cognitivo.

1 INTRODUCTION

Education is crucial for developing intelligence and skills, improving character, enhancing personality (Suhifatullah et al., 2021), and fostering a sense of unity, enabling personal growth and national development (Andika et al., 2017). Chemistry falls within the category of natural sciences. As one of the groups of Natural Sciences, chemistry is seen as a process and product (Syafi’ah et al., 2021). As a process, it can be interpreted as a scientific
activity to perfect knowledge or to discover new knowledge. As a product, it is defined as the result of a process in the form of concepts, facts, principles, and laws as well as theories discovered by chemical experts (Hemayanti et al., 2020).

Chemistry subjects are very useful in everyday life because they can form scientific traits (Duay, 2017), namely objective, tenacious, honest, critical, open, and able to work together with other people, gain experience in applying scientific methods through trials or experiments (Ananda et al., 2022), as well as the application of chemistry as well. can help solve problems in everyday life (Muntari et al., 2018). However, in reality, high school students are generally less interested in chemistry lessons. Previous research conducted by [8], not every high school student possesses a strong inclination toward learning. The level of interest in learning significantly affects students' academic performance. When the study material doesn't align with students' interests, their learning potential may not be fully realized (Anggraini et al., 2023), which results in students being reluctant to study and will not get good results (Rozikin et al., 2018).

After conducting observations and interviews with chemistry teachers at SMA Negeri 7 Kendari, researchers identified challenges in teaching chemistry, particularly regarding colloid system content. Various factors contribute to poor performance in this area, such as a lack of student engagement, the perceived complexity of colloid system concepts, and the presence of technical terminology within the material (Wulan Sadewi & Kamaludin, 2023). Drawing from the outcomes of interviews conducted with educators, the learning model applied at SMA Negeri 7 is the Discovery Learning model which should be effective and meaningful. The application of the Discovery Learning model has an impact on the quality of learning due to its structured and meaningful nature (Maysara et al., 2023). However, the facts show that student learning outcomes on colloid material in the previous academic year, namely 2021/2022, show that the percentage of students who met the KKM was 39% with an average score of 67.6 or 11 out of 28 people who got a score above the KKM applied by the school 75.00.

One effort to increase students' interest and motivation in learning is using good, correct, and interesting learning models and media. Flipped Learning is a learning model that is carried out by carrying out learning independently outside the classroom, and then continuing with a face-to-face learning system. The Flipped Learning method is an effective learning method that can be used by teachers to support the implementation of an active learning process (Hadijah & Shalawati, 2021).

Flipped Learning aims to utilize this pre-learning preparation to further change the format of learning time, from activities that are mostly passive to activities that primarily focus
on student activity (Omarchevska et al., 2024). Padlet is an online learning tool frequently referred to as an online whiteboard or an online synchronous platform (Friska & Sembiring, 2022). The Padlet application has many features that can simplify the learning process. This application is often used by teachers to make group presentations or can also be used as a tool for teachers and students to express their thoughts or creative ideas through the Padlet wall (Villanueva et al., 2023). Padlets can be utilized on computers, laptops, tablets, or smartphones (Ramadhani et al., 2023). Based on observations and evaluations from ISTE Standards (The International Society for Technology in Education) it is stated that the Padlet Application meets international educational application standards. This organization examines and evaluates the practicality of an educational tool (Fransiska & Hertiki, 2023).

Based on the research results of Afifah et al., (2021), the Padlet application can support learning, this is proven by the increase in Pre-test and Post-test results after going through the learning process using Padlet media. The presentation results also showed that students' responses were considered good for the learning that took place using Padlet learning media. This is in line with research conducted by Utomo & Nofrion (2022), that learning using Padlet media shows higher learning outcomes in terms of critical thinking skills, communication skills, and creativity skills compared to control classes that do not use Padlet media.

Based on the background above, the application of the Flipped Learning Model Assisted by Padlet Media on Colloidal System Material can improve Student Cognitive Learning Outcomes.

2 PARTICIPANTS & METHODS

The investigation took place during the academic year of 2022/2023 on students in grade XI MIPA 1 as a control group and XI MIPA 2 as an experimental group at SMA Negeri 7 Kendari. This type of research uses quantitative research and a quasi-experimental approach with the research design used as a Pre-test-Post-test control group design. The pre-test aims to determine students' initial abilities, while the post-test aims to determine students' abilities after being given treatment (Loppies et al., 2021).

The research instrument used was Pre-test-Post-test questions in the form of multiple-choice questions with 20 numbers which had been validated and then assigned to students in Eleventh grade MIPA 1 and Eleventh grade MIPA 2 at SMAN 7 Kendari before and after the entire series of teaching and learning processes about colloidal materials. The student response questionnaire instrument is designed to gauge student reactions to the application of the Flipped
Learning method assisted Padlet media in the experimental class. Students complete the questionnaire after completing the post-test at the end of the lesson.

Data analysis techniques use descriptive statistical analysis and inferential analysis. Descriptive statistical analysis includes the average value of student learning outcomes, standard deviation, calculation of n-gain data, and analysis of student responses after learning (Delucchi, 2014). The inferential analysis comprises tests for normality, homogeneity, and hypothesis testing, employing the independent sample T-test (Gunn Hee Kim, 2019). Its objective is to assess whether the utilization of the Flipped Learning method assisted Padlet media has a substantial impact on increasing students' cognitive learning results concerning colloid system material.

Descriptive statistical analysis includes average value, standard deviation, increase in N-gain, and student questionnaire responses (Juita & M, 2020). The categorization of the gain index values obtained by students is processed to determine the criteria for the level of N-gain index values as in Table 1.

**Tabel 1**

*Kriteria Interpretasi Skor N-gain*

<table>
<thead>
<tr>
<th>N-gain</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-gain &gt; 0,7</td>
<td>High</td>
</tr>
<tr>
<td>0,3 &lt; N-gain ≤ 0,7</td>
<td>Enough</td>
</tr>
<tr>
<td>N-gain ≤ 0,3</td>
<td>Low</td>
</tr>
</tbody>
</table>

In this study, specifically in class XI MIPA 2, questionnaires were employed to assess students' reactions to the application of the Flipped Learning method assisted with Padlet media. Students completed these questionnaires after finishing the post-test at the end of the lesson. The student response data obtained was then processed using a Likert scale. Each answer choice is given a certain score with the provisions according to Joshi et al., (2015) which are shown in Table 2.
Table 2
Statement Questionnaire Processing Guide

<table>
<thead>
<tr>
<th>Positive Statement</th>
<th>Score</th>
<th>Negative Statement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>4</td>
<td>Strongly Agree</td>
<td>1</td>
</tr>
<tr>
<td>Agree</td>
<td>3</td>
<td>Agree</td>
<td>2</td>
</tr>
<tr>
<td>Don't Agree</td>
<td>2</td>
<td>Don't Agree</td>
<td>3</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>Strongly disagree</td>
<td>4</td>
</tr>
</tbody>
</table>

The analysis of classroom processing carried out by researchers utilizing the Flipped Learning approach with Padlet media as indicated by the student questionnaire forms is as follows:

\[ P(\%) = \frac{\text{The total score obtained from the data}}{\text{maximum total score}} \times 100\% \]  

Information:

\[ P(\%) = \text{Percentage amount} \]

After analyzing the class processing using the formula above, it will then be identified based on the score interpretation criteria based on intervals which can be seen in Table 3.

Table 3
Criteria for interpreting scores according to predefined intervals

<table>
<thead>
<tr>
<th>Score</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% - 25%</td>
<td>Not enough</td>
</tr>
<tr>
<td>26% - 50%</td>
<td>Enough</td>
</tr>
<tr>
<td>51% - 75%</td>
<td>Good</td>
</tr>
<tr>
<td>76% - 100%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

3 FINDINGS

3.1 DESCRIPTION OF STUDENT COGNITIVE LEARNING RESULTS

Descriptive analysis was carried out using quantitative data on pre-test and post-test scores from the experimental class and control class. Descriptive analysis aims to determine
students’ cognitive learning outcomes before and after learning (Antony Sami & Arumugam, 2020). The statistical parameter data that has been analyzed can be seen in Table 4.

Table 4
Description of Cognitive Learning Results for Experiment Class and Control Class Students

<table>
<thead>
<tr>
<th>Statistics Parameter</th>
<th>(Discovery Learning)</th>
<th>(Flipped Learning assisted by Padlet media)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
</tr>
<tr>
<td>Number of samples</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Average</td>
<td>21</td>
<td>65</td>
</tr>
<tr>
<td>Deviation</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>89</td>
<td>122</td>
</tr>
<tr>
<td>Minimum</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>Maximum</td>
<td>45</td>
<td>85</td>
</tr>
</tbody>
</table>

According to Table 4, it can be seen that the control group that uses the discovery learning model has a lower average Pre-test score compared to the Pre-test score for the experimental class. The same thing happened to the Post-test scores where the experimental class that used the Flipped Learning method had higher scores compared to the control group. In general, it can be said that this value shows that students in the experimental group that used the Flipped Learning method achieved better improvements in their learning outcomes compared to students in the control group implementing the Discovery Learning approach. The frequency distribution of Post-test data and colloid system material for control group and intervention group students can be displayed in Table 5.

Table 5
Percentage Distribution of Students in Each Category of Cognitive Learning Outcomes

<table>
<thead>
<tr>
<th>No</th>
<th>Interval</th>
<th>Predicate</th>
<th>(Discovery Learning)</th>
<th>(Flipped Learning assisted by Padlet media)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td></td>
<td>Frequency</td>
<td>Percentage (%)</td>
</tr>
<tr>
<td>1</td>
<td>93 ≤ A ≤ 100</td>
<td>Very good</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>84 ≤ B &lt; 92</td>
<td>Good</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>3</td>
<td>75 ≤ C &lt; 83</td>
<td>Enough</td>
<td>5</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>D ≤ 75</td>
<td>Bad</td>
<td>18</td>
<td>72%</td>
</tr>
</tbody>
</table>

The data in Table 5 shows the distribution of student scores in the form of categories based on the predetermined score range. In the control class, the frequency of students getting
scores above the KKM which has been set at 75 is relatively small when compared to the intervention group. The difference in the percentage of students who passed the two classes was up to 40%. This data indicates a significant variance in the achievement of minimum completion criteria between the control group employing the Discovery Learning model and the experimental group utilizing the Flipped Learning model with Padlet media support. From these distinctions, it can be deduced that the application of Flipped Learning, supported by Padlet media has a more favorable impact on learning outcomes compared to the control group employing the Discovery Learning model. However, the percentage of students meeting the minimum completion criteria in the experimental group falls short of the conventional standard, with only 68% of students completing the requirements in the class using the Flipped Learning technique with Padlet media assistance.

The description of the increase in N-gain is used to determine the normalized gain between the Pre-test and Post-test scores from the experimental class and control class and to ascertain the enhancement in students' cognitive learning achievements following the completion of the learning process. The average N-gain score attained by students can be seen in Table 6.

### Table 6

**Description of N-gain Data Categories**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Category</th>
<th>Discovery Learning</th>
<th>Flipped Learning assisted by Padlet media</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount</td>
<td>Percentage</td>
</tr>
<tr>
<td>(N-g &gt; 0.7)</td>
<td>High</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>(0.3 \leq N-g \leq 0.7)</td>
<td>Enough</td>
<td>23</td>
<td>92%</td>
</tr>
<tr>
<td>(N-g &lt; 0.3)</td>
<td>Low</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Average N-gain</td>
<td></td>
<td>25</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on Table 6, shows that the control class with the Discovery Learning model achieved a relatively moderate learning increase, namely 23 people with a percentage of 92%, showing that the average N-gain value obtained by students was 0.7, according to (Hake, 1999) included in the medium category. In the high category, there were 2 students with a percentage of 8%, which means that only 2 students were able to achieve better learning outcomes than the total students. On the other hand, the experimental group, which employed the Flipped Learning technique supported by Padlet media, experienced diverse improvements in learning results. Specifically, 11 students demonstrated a significant enhancement in high-level learning outcomes, accounting for 39% of the group, while 15 students exhibited a boost in medium-
level learning outcomes, representing 54%. Nevertheless, two students still showed an improvement in low-level learning outcomes, constituting 7% of the total.

From the findings of this analysis, it can be inferred that, in terms of descriptive statistics, students in the experimental class, who were exposed to the Flipped Learning technique, achieved higher cognitive scores in the study of colloid systems compared to the control group, which employed the Discovery Learning model. Table 7 presents a breakdown of the outcomes from the student response questionnaire regarding the effectiveness of the Flipped Learning technique with Padlet media in enhancing learning outcomes.

**Table 7**

*Description of Student Responses to the Flipped Learning Method Supported by Padlet Media*

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very Good</td>
<td>11</td>
<td>39.28</td>
</tr>
<tr>
<td>2</td>
<td>Good</td>
<td>17</td>
<td>60.72</td>
</tr>
<tr>
<td>3</td>
<td>Enough</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Low</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Amount</td>
<td>28</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on the results of the student response questionnaire on colloid system material using the Flipped Learning model, 11 students stated "very good" and 17 students stated "good". These results indicate a high level of satisfaction from students with the use of the Flipped Learning method colloid systems material. This assumption is in line with the data in the table which shows that 28 experimental class students stated that learning using the Flipped Learning method supported by Padlet media was good and very good, there were no students who said it was fair or low.

This data response suggests that employing the Flipped Learning model with Padlet media support effectively conveyed the material, facilitating students' comprehension. The outcomes of the questionnaire show that students feel more involved in learning using the Flipped Learning model. They can access previous materials independently, which helps them to better prepare before class sessions and actively participate in discussions and learning activities. Positive responses from students regarding understanding of the material indicate that the Flipped Learning model is successful in providing students with the opportunity to learn at their own pace and repeat difficult material as many times as necessary (Montenegro-Rueda et al., 2023). The high number of positive responses may also reflect increased student participation in class discussions and collaboration with classmates in learning colloidal systems material.
3.2 INFERENTIAL ANALYSIS

The inferential analysis aims to test whether the application of the Flipped Learning technique supported by Padlet media has a meaningful influence on improving students' cognitive learning outcomes in colloid system material. The statistical tests used are according to the results of data prerequisite tests, namely the normality test and homogeneity test. Hypothesis test results using the IBM SPSS Statistics 24 application can be seen in Table 8.

Table 8

Inferential Analysis Results

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Independent Sample Test</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test</td>
<td>0.004</td>
<td>Reject</td>
</tr>
</tbody>
</table>

Table 8 shows the results of the independent sample T-Test on post-test data showing a significant value, amounting to $0.004 < 0.05$, which means there is a difference in the average student cognitive learning result between the experimental group and the control group.

This data serves as a basis for concluding the substantial impact of the employed learning technique on increasing students' cognitive learning results. Therefore, it can be inferred that the application of the Flipped Learning technique, supported by the Padlet medium, significantly contributes to the improvement of students' cognitive learning outcomes in the colloid system material at SMAN 7 Kendari.

4 DISCUSSION

The Flipped Learning model assisted by Padlet media applied to the experimental class in this research is assumed to be able to improve students' cognitive learning outcomes as evidenced by the fulfillment of the significance level requirements in hypothesis testing. Even though the average score for experimental class students' learning outcomes is only 75, this score is higher compared to the average score obtained in the control class which uses the Discovery Learning model, with the resulting score being only 65.80, which is assumed to be true. In this research, the Flipped Learning technique supported by Padlet media provides better student learning outcomes in colloid system material compared to the Discovery Learning approach. The effectiveness of implementing the Flipped Learning model assisted by Padlet media is also supported by the statement of Wijaya, (2023), which states that Flipped Learning
can increase learning motivation, where this study motivation can improve students' cognitive learning outcomes with a significant value (2-tailed) $0.001 < 0.05$ (Damayanti et al., 2023) which means there is an influence of the application of the Flipped Learning model based on the Android application on learning outcomes.

Table 5 indicates that nine students have not fulfilled the Minimum completeness criteria according to the school; however, when juxtaposed with the rise in normalized student learning outcomes (N-gain), only 2 students got a low increase. This proves that even though some of these students have not received scores above the KKM, they have been able to improve their learning outcomes compared to their previous scores. The same table also shows that 2 students received very good grades, namely scores in the range of 93 to 100, this score could not be achieved by students from the control class so it can strengthen the presumption that employing the Flipped Learning model supported by Padlet media is superior to utilizing the Discovery Learning model in the control group (Mai et al., 2022).

Based on table 6, shows that there are still students who get a low increase in learning outcomes, or 7% of the total students. These two students have not met the KKM of 75, but if you look further at the student response questionnaire, these two students think that the Flipped Learning model is assisted by Padlet media influences their learning attitudes. This statement is in the attachment on page 96 where students answered in the affirmative to question 8 which says "The Flipped Learning Method supported by Padlet media influences my learning attitude". However, in reality, the two students still got low scores on their learning outcomes, so it can be concluded that the students’ difficulties in understanding the material were caused by other factors.

Apart from learning outcomes, researchers also know that implementing the Flipped Learning model can make students more prepared to take part in learning. When learning colloid system material in class is about to begin, students have prepared themselves by studying the learning material that has been distributed in Padlet media, and watching the learning videos that have been prepared to facilitate students' comprehension of the subject matter before starting learning in class (Kasih et al., 2022). This makes the discussion process run smoothly and centered on students. The findings of this study align with research conducted by Rusnawati (2020), namely, the application of the Flipped Learning model can improve learning outcomes and students' learning motivation. Another researcher has implemented the Flipped Learning technique (Ubaidillah, 2019) and the results of his research show that this model is effective in improving learning outcomes and students' self-confidence. Research
results (Ishak et al., 2019) show that students have positive perceptions in all interaction components when the Flipped Learning model is applied (Chiang, 2017).

5 CONCLUSION

Researchers discovered a strong correlation between the self-efficacy of women of reproductive age and their awareness of the early cervical cancer detection capabilities of the VIA method.

Drawing from the problem statement and the analysis of research data, the following conclusions can be drawn:

1. The cognitive learning outcomes of students on colloid system material who gained learning experience utilizing the Flipped Learning technique assisted by Padlet media in the intervention group obtained an average score of 75, while the average score for control group students with the application of the Discovery Learning model in the control group obtained a score amounting to 65. This shows that students' cognitive learning results with the Flipped Learning technique are higher than those with Discovery Learning;

2. The Flipped Learning technique assisted by Padlet media has a meaningful influence on improving students' cognitive learning outcomes in colloid system material at SMAN 7 Kendari. This is proven by the hypothesis test accepting H1 with the results of the independent sample T-test analysis meeting the significance level with a significant value of 0.01.

The research results have several implications for academic professionals in the field of education:

1) Adoption of Flipped Learning Models: Academic professionals can consider incorporating Flipped Learning models assisted by Padlet media into their teaching practices. The study demonstrates the effectiveness of this approach in improving students' cognitive learning results, particularly in complex topics like colloid systems;

2) Enhancing Student Engagement: The use of Padlet media in the Flipped Learning technique can enhance student involvement and motivation. Academic professionals can leverage digital tools like Padlet to create interactive and collaborative learning experiences for students, leading to better learning outcomes;

3) Personalized Learning: The Flipped Learning model allows for personalized learning experiences, enabling students to learn at their own pace and revisit materials as needed.
Academic professionals can tailor their teaching strategies to meet the diverse learning needs of students, promoting a more inclusive and effective learning environment;

4) Continuous Assessment and Feedback: Academic professionals can utilize the insights from this research to implement continuous assessment and feedback mechanisms in their teaching practices. Monitoring student progress and providing timely feedback can help improve learning outcomes and student performance;

5) Professional Development: Academic professionals can engage in professional development activities to enhance their digital literacy skills and pedagogical knowledge. Training on how to effectively integrate technology tools like Padlet into teaching practices can lead to more innovative and engaging classroom experiences.

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