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The Impact of Discovery Learning Model with Lumio by SMART on High School Students' Engagement and Learning Outcomes in Static Fluids

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Abstract

This study examines the impact of the Discovery Learning model assisted by Lumio by SMART on high school students' learning activities and outcomes in a static fluid material, which is difficult to understand without experiments. Discovery Learning encourages students to discover concepts independently, enhancing comprehension and retention, while Lumio provides interactive media, such as simulations and animations, to support active learning. This experimental research used a post-test-only control group design with a randomly selected sample from 142 students in grade XI science. Data were collected through multiple-choice tests, observations, interviews, and documentation and analyzed using normality tests and statistical tests with SPSS V25. Results showed that the experimental class had higher learning activity (83.571) than the control class (69.028), with an independent sample T-test yielding a significance value of 0.000 ≤ 0.05. Learning outcomes were also higher in the experimental class (83.43) than in the control class (68.33), analyzed using the Mann-Whitney U-Test due to non-normal data distribution, with a significance value of 0.000 ≤ 0.05. These findings indicate that the Discovery Learning model assisted by Lumio by SMART positively affects students' learning activities and outcomes, suggesting its potential integration with other interactive media or learning models for future research.

INTRODUCTION

Physics is a natural science that examines parts of nature and its interactions, which require understanding basic concepts [1]. Physics learning consists of processes, scientific attitudes, and products and students are required to understand how natural phenomena occur [2]. Therefore, physics learning activities need to involve students actively. However, students are passive because teachers apply one-way learning [3]. Physics is still considered difficult and threatening for students. Students' lack of interest in learning physics leads to low scores in physics learning outcomes.[4]

Based on the interviews with physics teachers in one of the high schools in the Jember district, the evaluation results of class XI students are in the low category, with student learning completeness below the KKM by 75%. In learning, the teacher emphasizes theory rather than giving problems. If the teacher gives problems in learning, students are not allowed to solve problems in their own way, so student enthusiasm is still in the low category. This is in line with research [5], which states that physics learning that is less than optimal and the application of learning models that are not under the criteria will affect learning activeness so that students are passive during learning and are not interested in participating in learning. [6]

Activity is needed in 21st-century learning, especially active thinking and doing that can improve understanding of physics [7]. Learning activities are all students carry out during learning [8]. Discussing, responding to the teacher, cooperating, and speaking up can be observed directly. However, students are still passive in physics lessons because teachers apply one-way learning, so students have difficulty understanding the material [1]. This aligns with research by Tyas (2024), which explains that less innovative learning models and media influence low learning activity, so students are less interested in participating in learning [9] Romadhon (2024) states that low student learning activity can affect the decline in the quality of education and student learning outcomes.[10] This is in line with Beauty's research, et al. (2021), which states that student learning activity in physics learning is due to lack of readiness to take part in learning and impacts physics learning outcomes [11]

The low student learning outcomes are due to physics learning still using printed book learning resources that focus on materials and LKS [12]. In addition, applying a teacher-centred learning model causes students to lack understanding of the material. It can only memorize physics formulas, which causes learning outcomes to be less than optimal [13]. This is evidenced in research by Pratiwi et al., (2022), which shows that the learning outcomes of SMAN 5 Jember, which applies conventional models in learning, are still relatively low, namely 36%. [14]

The independent curriculum provides opportunities for teachers to design engaging learning and apply technology and teachers as facilitators to shape 21st-century skills. One of the learning models that can shape 21st-century skills is discovery learning [15]. Discovery learning is a model that encourages students to discover, explore and discuss in the context of learning [16]. From these activities, students actively participate and fully interact during the learning process [17]. This is proven in research [18], which states that student activeness has increased significantly after implementing the discovery learning model [19]. Applying the discovery learning model in physics learning still has weaknesses, requiring a long time and lacking student understanding of the material. However, these weaknesses can be overcome with an assessment approach, especially formative assessments, that can improve student understanding [20]

Mujiburrahman *et al*.,(2023) state that Assessment and learning are intertwined and cannot be separated. Regarding students, Assessment can be done with three approaches: Assessment of learning, Assessment for learning, and Assessment as learning [21]. Assessment as learning is done more in the independent curriculum than Assessment of learning [22]. The assessment process can be integrated with technology, including Lumio by Smart. Lumio by Smart is considered an effective and efficient technology that assists teachers in creating student-centred learning and helping students be more active [23]. This aligns with research by Wirda *et al*., (2023) showing that applying interactive multimedia Lumio by smart can make it easier for students to understand the material to support improving learning outcomes [24].

This research focuses on and innovates to implement the discovery learning model integrated with Lumio by Smart assessment of static fluid material. Lumio by smart Assessment has never been explored by other studies that implement the discovery learning model, especially in physics materials. This research provides a new approach to examine how implementing discovery-based learning that emphasizes student-centred learning and the teacher as a facilitator integrated with interactive media can affect student activeness during learning and student ability in a static fluid material.

Based on the problems written, the researcher chose the discovery learning model to examine the activities and learning outcomes with the help of Lumio by Smart-based assessments because the assessments can trigger student activeness and learning outcomes. So, applying the discovery learning model with Lumio by smart Assessment is expected to better affect student learning activities and outcomes. Based on the explanation above, this study aims to examine "The Effect of Discovery Learning Model Assisted by Lumio by Smart Assessment on Activity and Learning Outcomes of High School Students".

RESEARCH METHODS

The research is an *experimental* study with a *Posttest Only-Control Group* design. The following is the *Posttest Only-Control Group* research design.

Table 1. Posttest Only-Control Group *research design*

Group	Treatment	***Post-test***
Experiment	X	O_1
Control	-	O_2

Description:

O_1 : Experimental class *posttest*

O_2 : Control class *posttest*

X: Treatment given to the experimental group (Application of the influence model of *discovery learning* model assisted *by lumio by smart* assessment).

The population in this study were all students of class XI SAINTEKS SMA Negeri Jenggawah with a total of 142 students. The sample used in this study used *a random sampling* technique by doing a spin on the computer. This study requires two classes, namely class XI-3 as a control class with a sample size of 36 students and class XI-2 as an *experiment* class with a sample size of 36 students. The stages of this research can be seen in Figure 1 as follows:

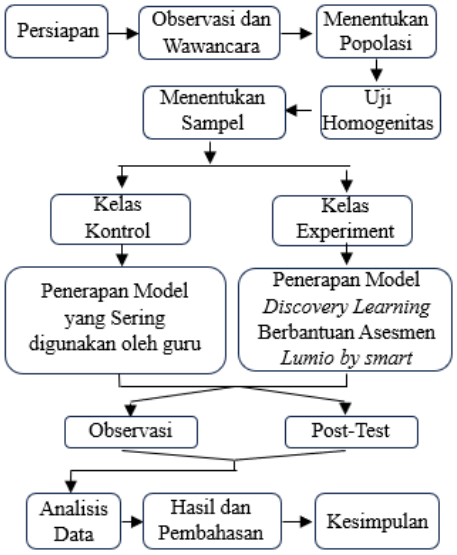


Figure 1: Research flow chart

Data collection techniques in this study include: 1) Written test, conducted once *post-test* given the form of multiple choice questions as many as 10 questions with the level of cognitive domain C4-C6. The written test in this study was given to the control class *by* applying the *paper-based* method and the experimental class utilised *lumio by smart* media. 2) Observation, carried out to monitor student activities during the learning process assisted by 5 observers. Learning activities seen in the study used learning activity indicators according to Irawati, 2023 and Sugiman, 2023, researchers integrated learning activity indicators from two experts including asking and answering questions, expressing opinions, actively discussing in groups, presenting discussion results, and paying attention to teacher explanations [25][26]. 3) Interviews, conducted with physics subject teachers to find an answer related to the existing problems 4) Documentation, conducted to obtain data and visual evidence of research. After obtaining data from observation sheets and *post-tests*, data analysis was carried out using SPSS V25, namely statistical tests. This research aims to assess the effect using the *Independent Sample T-Test* test and the *Mann-Whitney U-Test* test to determine whether the *discovery learning* model assisted by the *Lumio by smart* assessment has a significant effect on the activities and learning outcomes of high school students on static fluid material. The features of the *Lumio by smart* assessment that can support activities and learning outcomes during *discovery learning* model *learning* can be seen in the figure below:

Figure 2. *Shout it Out Activities* feature

Figure 2 features shout-it-out activities that can encourage students to express their opinions actively when stimulated by the first and second syntax of the discovery learning model.

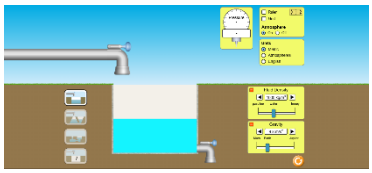


Figure 3. *PhET Stimulation* features

Figure 3 shows the PhET Stimulation feature, which can support the syntax of the third discovery learning model, namely, students collecting data. This feature is effective and efficient in the discovery process.

Figure 4. Interactive Quiz Feature

Figure 4 features an interactive quiz feature, which can help students actively answer questions without boredom and make them excited to work on them.

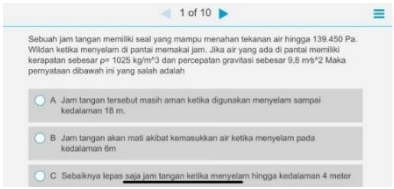


Figure 5. Response Feature

The Figure 5 response feature can support the implementation of post-tests, which can prevent students from being bored while taking them. This feature is effective and efficient for carrying out post-tests.

RESULTS AND DISCUSSION

This study examines the effect of the recovery learning model assisted by Lumio by smart Assessment on high school students activities and learning outcomes on static fluid material. Based on the research, the learning activity value is obtained from the observation sheet, and the learning outcome value is obtained from the post-test value.

This research was conducted at SMA Negeri Jenggawah, Kec Jenggawah, Kab Jember, in the odd semester of the academic year 2024/2025, which coincided with November. The research sample was selected using the Random Sampling technique through the Homogeneity test of the population data of the previous material test scores, which were analyzed using the Levene Statistical test assisted by SPSS 25. The results of the homogeneity test can be shown in Table 2.

Table 2. Results of the Homogeneity Test

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Sig.
Physics Learning Outcomes	1.475	3	138	.224

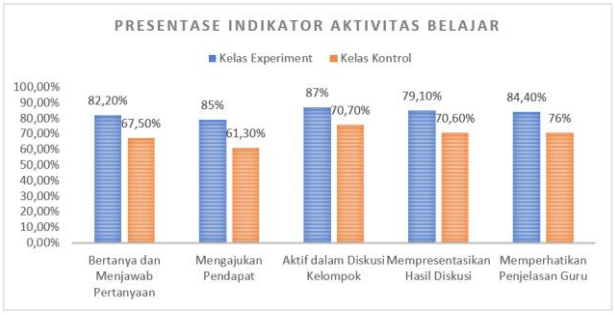
Based on Table 2. above, the homogeneity test results were obtained with a Sig value. 0.224 ≥ 0.05, so that the data can be declared homogeneous. If the data is declared homogeneous, then sample determination can be done using a random sampling technique to determine the experiment class and control class. The sample set as an experimental class is XI-2 class of 35 students who are given the treatment of applying the discovery learning model assisted by lumio by smart Assessment, and the control class is XI-3 class of 36 students who are given the treatment of applying learning that is usually used in SMA Negeri Jenggawah with static fluid material.

The Effect of *Discovery Learning* Model Assisted *by Lumio by Smart* Assessment on Student *Learning* Activity

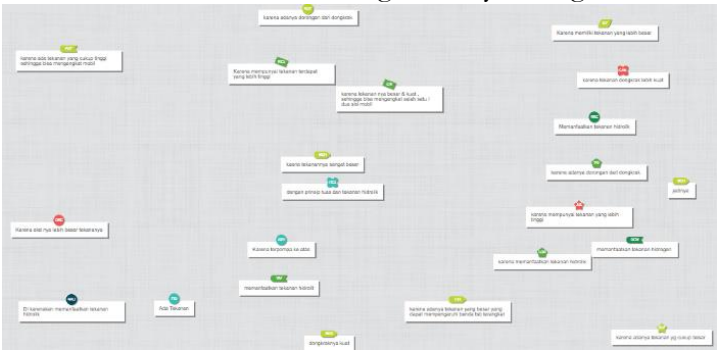
The first objective of this study is to examine the effect of the recovery learning model assisted by lumio by smart Assessment on the learning activities of high school students on static fluid material. Learning activities were seen during three face-to-face meetings. The indicators of learning activity assessment are asking and answering questions, expressing opinions, actively discussing in groups, presenting discussion results, and paying attention to teacher explanations. The following is data on the learning activities of experimental and control class students on static fluid material seen from Table 3 and Figure 5 as follows:

Table 3. Student Learning Activity Data

Class	N	Maximum Value	Minimum Value	Average
Experiment	35	95,0	75,0	83,571
Control	36	80,8	53,3	69,028



Average of Each Indicator of Learning Activity of High School Students



Student activity through *Lumio by Smart* assessment on the shot-it-out feature

Table 3 and Figure 6 show that the learning activity of the experimental class is superior to that of the control class, with an average learning activity of 83.571 and 69.028. For the average percentage of learning activity indicators in the experimental class, the highest score in the indicator active in group discussions was 87%, and the lowest score in the indicator presenting the discussion results was 79.10%. The control class got the highest score in the indicator of paying attention to the teacher by 76% and the lowest score in submitting an opinion by 61.30%. Figure 7 is evidence of student activeness in the experimental class.

The results of hypothesis testing using the independent sample T-test test obtained a Sig value. (2-tailed) of 0.000, where the significance value is smaller than 0.05. Suppose it is connected to the decision of the independent T-test test data. In that case, the learning activity data shows that the A statistical hypothesis is accepted, namely the sig value of 0.000 <0.05. The accepted A statistical hypothesis shows an effect of the discovery learning model assisted by lumio by smart Assessment on the learning activities of grade XI high school students on static fluid material. Activity data is declared normally distributed to determine how much influence the discovery learning model assisted by Assessment on learning activities can be used to use Cohen's d. The calculation results of Cohen's d show that d = 2.03, which is included in the large influence category.

Based on the description above, it can be concluded that there is a significant difference in Based on the description above, it can be concluded that there is a significant difference in student learning activities in the experimental class by applying the discovery learning model with Lumio by smart Assessment and the control class that applies the conventional model with PowerPoint assistance. This finding aligns with Jerome Brunner's theory that the model has an active learning style accompanied by learning by doing [27]. This theory encourages students to identify what they want to know by finding information and organizing what they want to know [28]. *The discovery learning model positively impacts participants and learning activities during learning* [29]. Through the application of this model, students are trained to dare to express opinions, be active in discussions, and present the results of discussions. Students are encouraged to discover knowledge through exploration and experiences actively [30][31]. Students are more enthusiastic when allowed to seek knowledge independently through exploration, which can increase their participation and curiosity [32]

The application of the discovery learning model, assisted by Lumio and smart Assessment, showed significant differences. Assessment and learning are interrelated and inseparable components [21]. Lumio, by smart Assessment, can create interactive, fun, and non-saturated learning and increase student participation. The learning in this study uses three approaches, namely Assessment as learning is used during learning and students play an active role, such as submitting opinions through the shout it out activities feature. Assessment for learning is used to provide feedback during learning, such as giving interactive quizzes. Assessment of learning is used to determine learning achievements, such as students presenting and concluding discussion results [33]. Learning integrated with Lumio by smart, the discovery process is more interesting because there are supporting features such as virtual laboratories that can streamline time during discovery, and there is feedback that helps students gain new knowledge. Lumio by Smart is an effective and efficient technology that creates student-centred and fun learning to help students become more active [23], [34].

This study integrates learning activity indicators according to Irawati (2023) and Sugiman (2023), which consist of asking and answering questions, expressing opinions, being active in group discussions, presenting discussion results, and paying attention to teacher explanations [25][26]. The observation results showed that the activity of asking and answering questions obtained a percentage of 82.20%, indicating that students actively asked and answered questions during the discovery process. This activity not only improves critical thinking skills but deepens their understanding. This finding is in line with the research of Yulia, A. W., *et al.*, (2023) and Firdaus *et al.*, (2022) which shows that applying the discovery learning model can improve the skills of asking and answering [35][36]. The stimulation stage in the model can encourage students to actively ask questions to encourage curiosity and critical thinking and bring out their creativity [37].

The observation results show that expressing opinions obtained a percentage of 85%, indicating that students can express opinions during the learning process. This finding is in line with research by Firdaus *et al*., (2022) and Khomsatun & Winanto, (2024) which shows that applying the discovery learning model can increase student activeness in expressing opinions [36][38]. The application of the model allows students to discuss in groups so that students can motivate each other to express opinions. In addition to communicating their ideas, this activity helps students build their deeper understanding [39]. The better the understanding of students' concepts, the better the students' confidence to express their opinions [40].

The observation results show that activity in group discussions was 87%, indicating that students actively participate in group discussions during learning. This finding aligns with research by Cahyaningsih & Assidik, K. G., (2021) and Yulia, A. W., *et al*., (2023) which shows that applying the discovery learning model can increase student activeness in group discussions. Students become more active and responsible in their groups [41],[35]. The indicator of being active in group discussions has the highest value because students are required to find concepts in the material studied during learning. Discussion is not only exchanging ideas about what is discussed but can also improve students' understanding, collaboration, and communication. This activity can unconsciously train students to solve problems and think critically [42], [43].

The observation results show that presenting the discussion results obtained a percentage of 79.10%, indicating that students can express their findings in front of the class. This finding is in line with research by Prasetyo & Abduh, (2021) and Fitnanto & Dewi, (2024) which shows that applying the discovery learning model can increase student activeness in presenting discussion results [44][45]. Students are highly willing to discuss the results of the discussion in front of the class. Presentation of discussion results can show how deeply students understand the concepts they discover. The indicator of presenting the discussion results in this study has the lowest score because students do not dare to speak in front of the class. This finding is in line with research which states that the indicator of presenting the discussion results is still in the low category because students do not have the confidence to present. This is because students are not used to presenting in front of the class.

The observation results showed that paying attention to the teacher's explanation obtained a percentage of 84.40%, indicating that students were enthusiastic and responsive in paying attention to the teacher's explanation. This finding is in line with research *by Hajrah et al*., (2021) and Prasetyo & Abduh, (2021) which shows that applying the discovery learning model can increase student activeness in paying attention to the teacher's explanation [47][44]. This is evidenced by students being able to respond to questions given by the teacher. The application of the discovery learning model focuses on students discovering a new concept. However, the teacher is a facilitator and directs the discovery process. Structured teacher explanations and students paying attention to the explanation can be used to connect their concept discovery with broader theory to give students a deeper understanding of the material being studied [48].

The Effect of *Discovery Learning* Model Assisted with *Lumio by Smart* Assessment on Student *Learning* Outcomes

The second objective of this study is to examine the effect of the discovery learning model assisted by lumio by smart Assessment on the learning outcomes of high school students on static fluid material. The learning outcomes instrument was designed based on the cognitive domain of static fluid material consisting of 10 questions with difficulty levels C4 (Analyse), C5 (Evaluate), and C6 (Analyse) using Lumio by smart media for the experimental class. In contrast, the control class used a written test. The following is data on the learning outcomes of experimental and control class students on static fluid material seen from Table 4 and Figure 7 as follows:

Table 3. Student Learning Activity Data

Class	N	Maximum Value	Minimum Value	Average
Experiment	35	100	60	83,43
Control	36	90	30	68,33

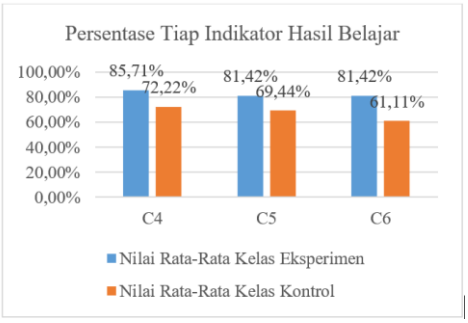
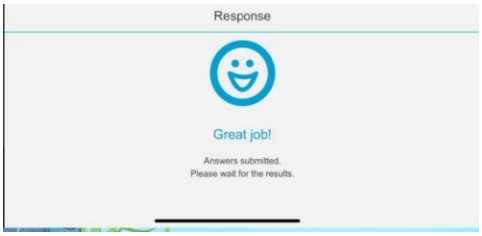
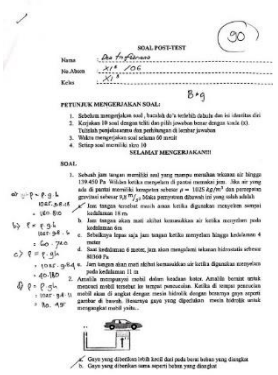


Figure 8: Average of Each Indicator of Learning Outcomes of High School Students



a) Post Test results using *lumio by smart* assessment



b) Post Test Results using *paper-based*

Table 4 and Figure 8 show that the learning outcomes of the experimental class are superior to those of the control class, with an average learning outcome of 83.43 and 68.33. For the average percentage of learning outcome indicators in the experiment and control classes, the highest scores in the C4 indicator were 85.71% and 72.22%. The lowest scores for the C6 indicator were 81.42% and 61.11%. Figure 9 shows the difference in learning outcomes obtained in the experimental class using the Lumio by Smart assessment with the control class using paper-based. It can be concluded that the learning outcomes in the experimental class are superior to those in the control class.

The results of the hypothesis using the Non-Paramentric Man- Whitney U-Test test obtained a Sig value. (2-tailed) of 0.000, where the significance value is smaller than 0.05. If it is related to the hypothesis test decision, namely if the sig.<0.05 value, then it is rejected and Is accepted and if the sig. value> 0.05 thenHa is rejected andH0 is accepted. So, the results of the Non-Parametric Man-Whitney U-Test test of learning outcomes data show that the statistical hypothesis H0 is accepted, namely the sig value of 0.000 <0.05. The statistical hypothesis Is accepted, indicating an effect of the discovery learning model assisted by Lumio by Smart assessment on the learning outcomes of grade XI high school students on static fluid material. Data on learning outcomes are not normally distributed, so to determine how much influence the discovery learning model assisted by assessments on learning activities can use Rank-Basireal Correlation. Based on the results of the calculation of Rank-Basireal Correlation, it shows d = 0.54, which is included in the large influence category.

Based on the description above, it can be concluded that there is a significant difference in student learning activities in the experimental class by applying the discovery learning model with Lumio by smart Assessment and the control class that applies the conventional model with PowerPoint assistance. This finding aligns with Jerome's theory that the discovery learning model

encourages students to independently find, search, and discuss something related to learning. From these activities, students can understand concepts maximally, improve critical thinking, and remember longer the concepts that they have discovered, which causes the resulting learning outcomes satisfactory [49]. The results showed that student learning outcomes in the experiment class were superior to those in the control class, as the average post-test results indicated. This finding aligns with other research stating that the discovery learning model positively impacts student learning outcomes [50]. Through the application of this model, students are informed independently so that it is easy to understand and can be applied in everyday life. In addition, problem-solving activities, practicum, and discussion in the stages of discovery learning help students focus more, think critically, and easily understand the material, causing an increase in student learning outcomes [29], [44].

The application of the discovery learning model assisted by lumio by smart Assessment showed significant differences. Assessment and learning are components bound together and cannot be separated [21]. Lumio, by smart Assessment, can create interactive, fun, and not saturated learning and increase student participation so students do not feel afraid to do the questions. Learning in this study uses three approaches, namely Assessment as learning is used during learning and students play an active role, such as expressing opinions through the shout it out activities feature. Assessment for learning is used to provide feedback during learning, such as by giving interactive quizzes, and Assessment of learning is used to determine learning achievements, such as post-tests [33]. Learning integrated with Lumio by Smart can make it easier for students to understand the material [24] Research states that the application of Lumio by Smart in learning can improve student learning outcomes. This is because in Lumio by Smart many features can explain abstract things so that it can help students deepen the material [51].

According to Bloom's Taxonomy revised in Anderson, L. W. and Krathwohl, this research applies learning outcome indicators D. R. (2015) in the C4-C6 cognitive domain. The application of the discovery learning model in the experiment class contained thinking processes in the cognitive domain, namely C4 (Analyse), C5 (Evaluate), and C6 (Create). The C4 (Analyse) cognitive domain aligns with the syntax of the discovery learning model, where students are allowed to discover new concepts through experimental activities. The results showed that the cognitive domain C4 had the highest value of 85.71%, including in the good category. This finding aligns with research by Patmawati, S., *et al.*, (2023) which states that the C4 cognitive domain has the highest value than C5 and C6. This is because C5 and C6 have higher levels, and students are less familiar with these domains [52]. In the syntax of stimulation, problem identification, collection, data management, and conclusions can improve students' analytical skills. C4 cognitive domain students are asked to decipher information, distinguish facts and opinions, identify assumptions, and identify cause-and-effect relationships. The ability to analyze can help students to solve problems that exist in everyday life [53]. Students have difficulty solving C4 cognitive domain problems because students do not understand the concepts and solve problems, and the strategies used to analyze are wrong so they cannot solve the problem [54].

C5 cognitive domain (Evaluate) is in line with the syntax of the discovery learning model, where students are allowed to discover new concepts independently through investigations, experiments, and various references so that students can conclude the data that has been obtained. The results showed that the C5 cognitive domain had a percentage of 81.42, which was included in the good category as evidenced by students being able to evaluate by verifying their findings given an argument and references from various sources. This finding aligns with research by Jariyah & Efendi, (2024), which shows that implementing the discovery learning model can improve learning outcomes in the C5 cognitive domain. In the syntax of concluding, students evaluate whether the conclusions drawn from data analysis are based on the available evidence [55]. The data verification stage also trains students to present the evaluation results drawn from data analysis to friends and teachers by providing proof and reasons for the discovery. C5 cognitive domain, students are asked to provide judgement and can make decisions to create solutions to problems [56]. Students are said to have the

ability to evaluate if they can understand the problem, solve the problem, and provide reasons for the answers that have been chosen [56].

The C6 cognitive domain (Creating) aligns with the application of the discovery learning model, where students are required to discover new concepts through experiments. The results showed students' ability to find new concepts in the good category as evidenced by the results of their discoveries through experiments following the theory. In addition, students can connect various information to create solutions to problems through discussing and expressing opinions. This happens because before experimenting there is a stimulation syntax and problem identification where students can solve problems independently supported by references from various sources. Through these activities, students are more creative to create problem solutions. C6 cognitive domain in learning outcomes students are asked to find solutions to problems related to their creativity. Nuraini and Julianto (2022) stated that students still have difficulty solving HOTS-based questions because students are not used to working on these questions. Bloom's Taxonomy Theory states that students can fulfil the ability in the cognitive domain of C6 (Creating) if they have fulfilled the cognitive domain abilities of C4 (Analysing) and C5 (Evaluating) [57].

This study has constraints and limitations when applying the discovery learning model assisted by Lumio by Smart Assessment. The first obstacle is conditioning learning at the first meeting using Lumio by Smart because students are not used to using Lumio by Smart in learning. The solution to this obstacle is that the researcher becomes a facilitator to provide information on how Lumio by smart works. The second obstacle is that some students have difficulty accessing Lumio by Smart due to problems in the internet network so researchers provide internet network facilities to students who experience problems. The third obstacle is that some students in the experiment and control classes cannot take the post-test when it is time for the post-test, so some do the post-test outside of class hours.

Based on the description above, it can be concluded that implementing the discovery learning model assisted by Lumio by Smart Assessment significantly affects the activities and learning outcomes of high school students on static fluid material. Thus, the discovery learning model assisted by lumio by Smart Assessment can be a reference for teachers as an appropriate learning model and media to improve the quality of physics learning. Further research is needed to explore integrating the discovery learning model with other interactive media or using other learning models integrated with Lumio by Smart on materials other than static fluid or subjects other than physics to provide greater insight into the effectiveness of the discovery learning model and lumio by Smart Assessment in various educational contexts.

CONCLUSIONS

Based on the results of the research and discussion that has been described, it can be concluded that applying the discovery learning model assisted by Lumio by Smart Assessment has a significant effect on the activities and learning outcomes of high school students on static fluid material as evidenced by the results of the Independent Sample- T- Test on learning activity data obtained Sig value. 0.000 and Cohen's d value of 2.003 means it has a significant influence, and the Mann Whitney U-Test on learning outcomes data obtained a Sig value. 0.000 has a Rank-Biserial Correlation value of 0.54, meaning it has a significant influence. The limitation of this study is that the use of Lumio by Smart Assessment needs access from the internet and limited time for students to adapt to the discovery learning model and Lumio by Smart Assessment. The suggestions that can be given are for schools that can facilitate infrastructure to support learning, such as internet access, for teachers can be applied in other lessons by applying the discovery learning model assisted by Lumio by Smart to increase student activeness and learning outcomes and make sure in advance to monitor the internet before learning starts so that it runs smoothly and for other researchers, it can be used as input for further research so that it can be continued by integrating the discovery learning model with other interactive media or using other learning models integrated with Lumio by Smart in subjects other than physics.

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