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The Effect of Applying the Archerys ID Model Instructional Design and Learning Motivation on Physics Learning Outcomes at SMAN 4 Batam

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Abstract: This study aims to examine the effect of implementing the Archerys ID Model instructional design and student learning motivation on physics learning outcomes. The Archerys ID Model, developed from the ARCS motivational framework, incorporates reflection and the formation of learning habits to enhance both engagement and academic integrity. A quasi-experimental method with a 2×2 factorial design was employed, involving an experimental group taught using the Archerys ID Model and a control group using the TPACK model. Data were collected through learning motivation questionnaires and standardized physics tests, then analyzed using two-way ANOVA to assess main effects and interactions. The results showed that students taught with the Archerys ID Model achieved significantly higher learning outcomes than those in the TPACK group. Learning motivation also had a significant effect on student performance, while no interaction was found between the instructional model and motivation levels. These findings indicate that the Archerys ID Model is effective in improving learning outcomes, particularly when combined with strategies that promote intrinsic learning engagement.

Keywords: Archerys ID model; Instructional design; Learning motivation; Physics learning outcomes; SMAN 4 Batam

Introduction

Physics plays an important role in helping students understand the world around them and making everyday life easier. As a subject, physics systematically studies various natural phenomena, enabling students to interact with and analyse the properties and events occurring in their environment (Rahmita & Rosana, 2020). Mastery of physics not only involves understanding theoretical aspects but also the ability to apply these principles in daily activities, such as the use of electrical energy, measurement techniques, and the implementation of the laws of motion. According to Li & Singh (2022b), success in solving physics problems depends heavily on understanding and applying physics concepts and principles, as well as the ability to manage physics knowledge effectively, which is a crucial foundation for improving physics learning outcomes. This subject significantly contributes to the development of students' logical thinking and analytical skills. Achieving these learning objectives requires effective teaching strategies to optimise the learning process for students (Khaerani et al., 2023).

To improve physics learning outcomes, the application of an appropriate instructional design model is an important solution. An effectively designed instructional design can support teachers in delivering material systematically, creating a better learning

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environment, and adaptinglearning tailored to students' needs. Approaches such as project-based learning or experiments are considered to increase student engagement during the learning process. Furthermore, the use of interactive learning media, such as simulations or virtual laboratories, is considered to help students understand physics concepts more optimally (Adeoye et al., 2024). This approach is also said to enhance the learning experience, making it more enjoyable, thereby increasing student motivation to learn (Astuti, 2021).

Effective physics learning requires relevant and interesting media so that abstract concepts can be conveyed in a more concrete and easily understandable manner. In addition, teachers can relate physics material to students' daily activities to increase the relevance and appeal of learning. A contextual approach that links theory to real-world applications can increase student motivation and understanding (Octaviana et al., 2022). Appropriate learning media is one of the main factors in creating an optimal and effective learning process. By using an appropriate instructional design model and utilising engaging learning media, the physics learning process is expected to run optimally. A creative and interactive approach will make it easier for students to digest the material more deeply and apply it in real life. In addition, a pleasant learning atmosphere can increase student motivation and improve their learning outcomes. Effective physics learning not only deepens students' understanding of scientific concepts but also fosters their interest in towards science and technology. Therefore, well-designed physics learning can provide long-term benefits for students and the development of education (Habibillah & Muskhir, 2025).

Learning should be planned optimally. One of the keys to successful learning is closely related to the teacher's ability to plan lessons (Nadia et al., 2023) so that learning becomes effective. Learning must be well-designed, considering that in physics, it is not only about understanding concepts but also the ability to apply them in daily activities within procedural and conceptual knowledge (Banda & Nzabahimana, 2023). This is reinforced by the opinion of, who states that an individual's knowledge influences their understanding of concepts, thereby strengthening students' foundational knowledge (Widianita, 2023).

However, in reality, conditions in schools show that physics learning has not achieved the expected results. A lack of variety in approach and minimal interaction are considered to reduce students' interest in learning. In addition, the lack of connection between physics material and everyday life is cited as one of the factors that makes learning feel abstract and irrelevant. As a result, students face difficulties in understanding the material and experience a decline in motivation for learning. Motivation is also a crucial aspect in the success of learning. High motivation can enhance students' attention, perseverance, and enthusiasm in tackling the complex challenges of physics learning. According to the theory Self-Determination, intrinsic motivation has a stronger influence on learning outcomes than extrinsic motivation because it makes them more persistent, creative, and resilient in the learning process even when faced with difficulties. Unfortunately, many students experience a decline in learning motivation due to monotonous teaching methods that do not engage them emotionally or intellectually. Wider's research findings support this statement by revealing that students tend to avoid physics lessons because they consider the problems too difficult to solve, indicating that a lack of intrinsic motivation among students can be a major obstacle in physics learning (Jamil, 2019).

Teachers' creativity in delivering material is also considered limited, especially in exploring more innovative learning methods, such as project-based learning, interactive discussions, or the use of digital technology. The lack of interesting learning media and limited facilities are also cited as obstacles in creating a more enjoyable learning atmosphere. This situation then impacts students' difficulties in understanding physics concepts, which are known to be challenging to visualise and have a high level of complexity (Silitonga et al., 2022).

Low student achievement in physics is said to be a problem that is still faced in schools. Factors such as a lack of student motivation and ineffective learning methods are thought to be the main causes of this situation. This shows that the quality of physics teaching needs to be improved in order to achieve more optimal learning outcomes.

Table 1. Physics midterm exam scores for the odd semester of the 2024/2025 academic year SMAN 4 Batam

Class Name Phase E	Average Value	Highest Score	Lowest Value
XA	56	95	15
XB	65	90	25
XC	55	95	10
XD	55	85	10
XE	60	90	25
XF	56	85	20
XG	59	85	10
XH	54	90	15
XI	57	85	15
XJ	56	85	15
XK	52	95	10
XL	44	85	5

The table above shows that the average learning outcomes of students in the odd semester exam on Measurement for the 2024-2025 academic year are still not optimal. Based on interviews with physics teachers in grades X, XI, and XII, it is known that one of the challenges in improving student learning outcomes is their lack of understanding of the concepts taught. Learning tends to be teacher-centred, with a predominance of questions simple and less active discussions. In addition, many students feel anxious and hesitant to express their opinions for fear of making mistakes. This becomes an obstacle for students in developing their potential and abilities in learning (Chafri & Louiz, 2024).

This situation reflects the gap between expectations and reality in physics learning. The lack of student motivation to learn and low learning outcomes are indicators that the physics learning process in schools is not yet optimal. This highlights the need for improvements in teaching methods, learning strategies, and a more interactive approach to help students better understand physics concepts and increase their interest in the subject (Appiah-Twumasi et al., 2021).

Some of the factors causing these low learning outcomes include teacher-centred learning methods, a lack of contextual and interactive learning media, and low student motivation. Classroom observations also show that many students are passive during lessons, do not actively ask questions, and only take notes without truly understanding the material. Only a small number of students express enthusiasm for Physics lessons, while the rest exhibit indifference or even avoid the subject (Nadeem & Awan, 2022).

Poorly organised learning that is not tailored to students' needs can further reduce their motivation and learning outcomes. Therefore, it is necessary to change learning strategies, including the application of more effective instructional design models and the use of learning media more interesting. With this approach, physics learning can be more tailored to students' needs and achieve the desired goals (Setyawan et al., 2024). Learning outcomes are a reflection of the success of a learning process. In the context of physics learning, learning outcomes include mastery of concepts, scientific thinking skills, problem-solving skills, and scientific attitudes. Learning outcomes can be classified into cognitive, affective, and psychomotor domains. Efforts to improve physics learning outcomes cannot rely solely on mastery of the material but must also include learning strategies that can activate all these domains in an integrated manner (Harso & Merdja, 2019).

One of the main causes of low physics learning outcomes is the lack of student motivation. This can be observed through several indicators, such as delays in completing assignments, lack of seriousness in following lessons, and a tendency to be passive in discussions. learners with a strong level of learning motivation generally show more optimal academic achievement. The greater the motivation they have, the higher the effort they make to understand the material optimally (Muga et al., 2017). Meanwhile, according to Putri et al. (2025), motivation is awareness in a person that encourages him to act with certain goals, so that he can feel satisfaction from his actions.

Low learning motivation can result in decreased student participation in teaching and learning activities. Therefore, increasing the desire to learn is a crucial factor that needs to be considered in the learning process. physics. This is also reinforced by the results of interviews with Physics teachers, who stated that most students tend to study only to fulfill the demands of grades, not because of an intrinsic drive to understand Physics concepts thoroughly. This low learning motivation is a serious obstacle because it can affect students' concentration, perseverance, and endurance in facing learning challenges. In the long run, this condition can lead to low learning achievement and students' unpreparedness in facing complex science subjects at the next level of education.

However, its application is still not optimal in the utilization of technology. TPACK has not specifically accommodated the development of motivational, reflective, and habituation aspects of student learning. The approach is more teacher-oriented and how teachers develop technology-based learning strategies, not on how students experience the learning process deeply. This causes students' ability to connect physics concepts with real-life phenomena is less than optimal. In fact, if they are able to see directly the application of physics concepts in daily activities, learning will feel more interesting. According to, the use of learning media that is interesting and interactive can help deliver material more effectively and increase student interest in learning. Unfortunately, this modern learning media has not been maximally utilized in many schools. Therefore, it is necessary to innovate in the use of learning media in order to support students' understanding of physics (Zega et al., 2025).

The reality of physics learning that is still not optimal requires substantial methodological transformation. The implementation of instructional design ARCHERYS ID Model developed by Darmansyah offers a systematic approach to optimize learning outcomes through the integration of the context of the learner's environment and the use of adaptive learning media. This pedagogical model presents a learning structure that prioritizes the stimulation of attention, the relevance of material to daily experiences, and the strengthening of the psychological aspects of learners, so as to reduce the gap between expectations and the reality of learning (Asnur et al., 2025). This model is a development of Keller's ARCS (Attention, Relevance, Confidence, Satisfaction) model, with added reflective elements and the formation of constructive learning habits. ARCHERYS ID consists of seven main stages, namely: Attention (attracting students' attention), Relevance (emphasizing the relevance of the material), Confidence (fostering learning confidence), Habit Formation (forming learning habits), Evaluation (formative and summative assessment), Reflection (reflection on learning), and Synthesis (reinforcement and generalization of knowledge). The model is designed to not only facilitate students' cognitive understanding, but also support their affective and metacognitive development. The focus on habit formation and reflection makes ARCHERYS ID a model that is not only oriented towards immediate learning outcomes, but also towards a sustainable and meaningful learning process. The ARCHERYS ID Model offers a more holistic and student-centered approach, taking into account psychological, emotional, and behavioral aspects of learning (Taali et al., 2024).

The operationalization of the ARCHERYS ID Model begins with an initiation stage that utilizes various demonstrative and simulative strategies to arouse learners' curiosity. Learning is constructed by integrating everyday contexts, such as the implementation of Newton's laws in sports activities or transportation technology, which according to Budiman can create a more dynamic learning atmosphere. Januarypin argues that strengthening the element of confidence through providing measurable challenges and feedback is the most important element of learning (Li & Singh, 2022a).

Constructive feedback can facilitate more optimal learning interactions, leading to increased learner motivation and learning outcomes. The final stage in the ARCHERYS ID Model is to provide satisfaction through tangible learning outcomes. Teachers can provide appreciation for students' efforts, such as awards for their achievements or constructive feedback. By doing so, students feel valued and more encouraged to achieve higher success in learning (Agyei et al., 2023).

The application of ARCHERYS ID instructional design combined with increased student learning motivation is expected to have a positive impact on physics learning outcomes, because the learning process becomes more personalized, reflective, and meaningful. Furthermore, learning motivation acts as the main driver in the process of internalizing the material and forming a positive attitude towards physics lessons. The combination of appropriate instructional strategies and high learning motivation is a key determinant in achieving optimal academic performance. Within this framework, ARCHERYS ID provides a holistic approach that has the potential to significantly promote the achievement of learning outcomes. However, there is limited empirical research that comprehensively explores the relationship between these three variables in the context of high schools.

Research by Wike Farisa and Darmansyah shows that the application of ARCHERYS ID Model has a significant impact on learning outcomes and moral character of students (Asnur et al., 2025). With the ARCS Motivational-based model, learning becomes more effective and is able to overcome various obstacles in the learning process. Also emphasized that the ARCS approach has advantages in improving teachers' skills in motivating students as well as improving students' skills in the learning process. ARCHERYS ID Model is explicitly designed to build and strengthen students' learning motivation. The initial three stages in this model (Attention, Relevance, and Confidence) are directly related to the dimensions of motivation: attracting interest, building the relevance of the material to students' lives, and fostering confidence in learning. The Reflection and Synthesis stages also help students understand the value of their learning process as a whole, which ultimately strengthens their intrinsic motivation (Yanto et al., 2024).

Method

This study employs a quantitative approach with a quasi-experimental design. According to, quasi-experimental research resembles a true experiment but has limitations in fully controlling or manipulating all variables. To address this, adjustments are made to maintain a balance between internal and external validity within the constraints of the research context. The study aims to examine the effect of implementing the Archerys ID Model and learning motivation on physics learning outcomes at the X level in a high school in Batam, by comparing a group that received the treatment with a group that did not.

The research uses a nonequivalent control group posttest-only design, in which the experimental and control groups are not randomly assigned and are measured only after the treatment (Sukardi et al., 2024). The experimental group received instruction using the Archerys ID Model, while the control group was taught using the TPACK approach. Both groups completed a final posttest to assess learning outcomes, allowing the study to compare the effectiveness of the two instructional methods in improving student performance (Setyawan et al., 2024).

Result and Discussion

Result

This research was conducted from May 7 to June 8, 2025 at SMA Negeri 4 Batam. This research was conducted by applying the instructional design of Archerys ID Model to the experimental class and the application of TPACK Model to the control class. Before the implementation of learning, researchers distributed student motivation questionnaires, to find out students who have high and low learning motivation. The implementation of learning was carried out as many as 4 meetings, the details of the implementation can be seen in the table below. The research was conducted by using an experimental class and a control class. The number of class X or phase E in SMA Negeri 4 Batam is 12. Class XJ and XK were used as experimental and control class.

The study was conducted by applying learning between two instructional design models, namely the Archehrys ID Model applied in the experimental class and the TPACK Model applied in the control class. The study was conducted over four meetings, with the fourth meeting used for the posttest, while effective learning using each model only lasted for three meetings. Based on observations, students in the experimental class showed more enthusiasm than students in the control class. This is because the learning design in the experimental class is more interactive, allowing learners to concentrate but still feel relaxed in receiving the material provided. In contrast, in the control class, the learning method tended to use a conventional lecture approach, where the teacher explained more material and gave examples of problems and exercises, so that the learning experience of students was less contextual and interactive.

The results showed that students in the experimental class were more interested and actively involved, especially when learning material that was contextualized with daily life phenomena. This approach helped them understand the relevance of the material to real life, thus increasing their understanding and interest in learning. Nonetheless, this research has some limitations, especially in terms of the time needed to conduct the research short time, so changes that can be seen directly, especially related to the moral and ethical character of students, are less visible.

Learning outcome data is obtained by conducting a posttest of students on physics subjects with renewable energy material. The experimental class was 36 students and the control class was 35 students. Data on physics learning test results for experimental and control classes in full can be seen in the attachment. Description of data regarding student learning outcomes can be seen in the following table.

Table 2. Statistical description of postest data of experimental class and control class

Statistics Averages	Experiment Class	Control Class
Mean	73.47	64.43
Median	71.25	65
Modus	62.25	77.5
SD	14.03	12.02
Varians	196.88	144.52
Minimum	50	45
Maximum	97.5	82.5

The application of the Archerys ID Model instructional design model in physics learning has a significant effect on improving student learning outcomes. This model combines a systematic approach with motivational aspects based on ARCS (Attention, Relevance, Confidence, Satisfaction) and character strengthening through reflective learning habits. The results showed that students who learned using the Archerys ID Model obtained higher grades compared to students who learned using the TPACK model. This structured and contextualized approach encourages students to understand the material more deeply and increases their engagement in the learning process. In addition to the influence of learning design, learning motivation is also proven to be an important factor that influences students' academic achievement. Students with high motivation levels tend to be more active in the learning process, have a strong desire to understand the material, and show enthusiasm in completing learning tasks. In this study, although no significant interaction between instructional design and learning motivation was found, both still contributed positively separately to students' learning outcomes. This suggests that successful learning depends not only on the model used, but also on students' internal conditions, such as motivation and attitude towards learning.

Table 3. Normality test of pre-test and post-test data of experimental and control classes

Class	Treatment	Post-test
Experiment	X	R_{E2}
Control	-	R_{K2}

Table 4. Frequency distribution of posttest learning outcomes of experimental class

Class Interval	Absolute Frequency	Relative Frequency (%)	Cumulative Absolute Frequency	Cumulative Relative Frequency (%)
50–57.9	5	13.89	5	13.89
58–65.9	7	19.44	12	33.33
66–73.9	7	19.44	19	52.78
74–81.9	7	19.44	26	72.22
82–88.9	4	11.11	30	83.33
90–97.9	6	16.67	36	100.00

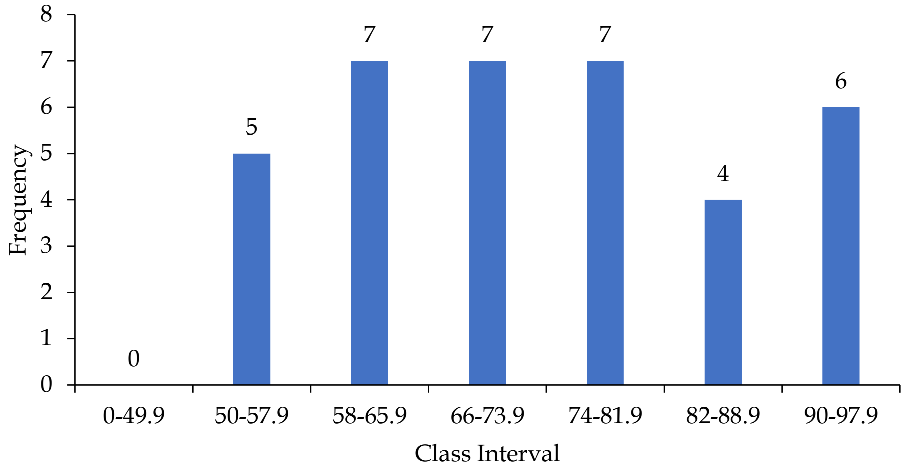

Figure 1. Histogram of experimental class learning outcomes

Based on the frequency distribution data, there are 10 learners who score above the average. Visualization in the form of a histogram describing the frequency distribution can be seen in the Figure 1.

The Archerys ID Model learning model is proven to have a significant effect on improving student learning outcomes in physics subjects. Through a structured approach, this model emphasizes student attention, relevance, confidence, and satisfaction. All these stages can create a more active, interesting and meaningful learning environment for students. Compared to the TPACK learning model which is more oriented towards technology integration, the Archerys ID Model provides a more thorough learning experience and encourages students to think reflectively, analytically and independently.

In addition to the learning model used, student learning motivation also plays an important role in the achievement of learning outcomes. In this study, students with high levels of learning motivation showed a tendency to be more enthusiastic in participating in learning, completing assignments in a timely manner, and showing better academic results compared to students with low motivation. Although there was no significant interaction between learning model and motivation level, both were found to have a positive effect separately on learning outcomes. This reinforces the notion that successful learning is the result of a combination of appropriate teaching strategies and students' internal readiness to learn.

The application of the Archerys ID Model instructional design in physics learning has proven to have a significant impact on improving student learning outcomes. The model is designed by integrating the motivational principles of ARCS (Attention, Relevance, Confidence, Satisfaction) developed by Keller, as well as promoting a reflective approach that is able to encourage students to think critically and build meaning from every learning process they go through. Learning is no longer simply oriented towards achieving grades, but transforms into a more contextual and meaningful experience. This is reflected in the increase in the average score of student learning outcomes in the experimental class compared to the control class using the TPACK model. Thus, the Archerys ID Model not only creates a more interesting and interactive learning atmosphere, but is also able to shape students' mindsets that are more logical, structured, and academically responsible.

In addition, learning motivation is also a factor that plays a major role in supporting the success of learning. High motivation encourages students to be more active, diligent and enthusiastic in following every stage of learning. Motivated students will be more eager to do assignments, participate in discussions, and be better prepared for learning evaluations. In this study, it was found that learning motivation has a significant influence on learning outcomes, both for students who follow the Archerys ID model and the TPACK model. Although there was no significant interaction between instructional design and learning motivation, these two factors independently contributed to improving student learning outcomes.

Visualization of this distribution can be seen through the histogram presented in the Figure 2.

From the research results, the lowest score of learning outcomes in the experimental class (50) was higher than the lowest score in the control class (45). While the highest score of learning outcomes in the experimental class (97.5) is higher than the control class score (82.5), and the standard deviation of the experimental class is higher than the control class. So, it can be concluded that the experimental class has the most spread and diverse values. For more details, the data above can be seen in the attachment.

Table 5. Frequency distribution of control class posttest

Class Interval	Absolute Frequency	Relative Frequency (%)	Cumulative Absolute Frequency	Cumulative Relative Frequency (%)
45–51.9	8	22.86	8	22.86
52–58.9	3	8.57	11	31.43
59–65.9	7	20.00	18	51.43
66–72.9	7	20.00	25	71.43
73–79.9	6	17.14	31	88.57
80–86.9	4	11.43	35	100.00

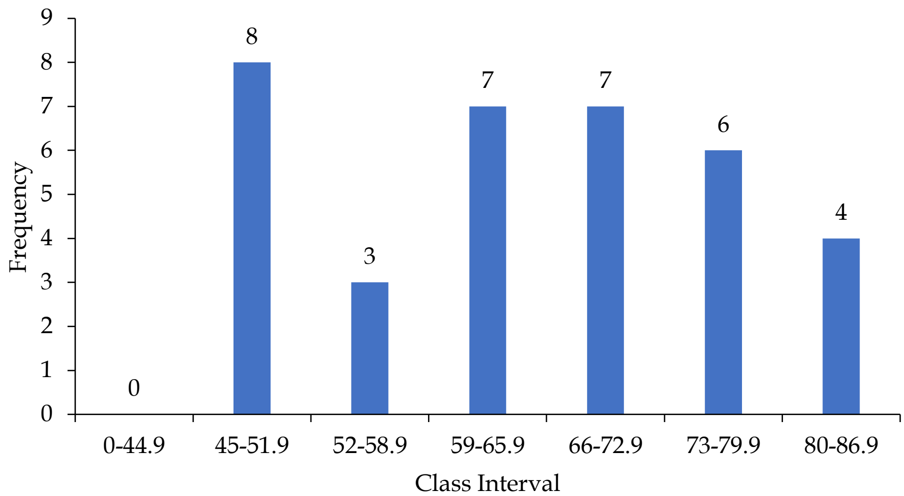

Figure 2. Histogram of posttest frequency distribution control class

The normality test is used to determine whether the data obtained from the experimental and control classes are normally distributed or not. tidak. Uji normalitas merupakan syarat multak sebelum melakukan analisis parametrik. Uji normalitas dilakukan dengan menggunakan uji Liliefors. Berikut adalah hasil uji normalitas dari hasil belajar peserta didik.

Table 6. Results of normality tests on learning outcomes in the experimental class and control class

Sample	L_{count}	L_{table}	Description
Experiment	0.098	0.147	Normal
Control	0.114	0.14976	Normal

Based on the test results above, it is known that $L_{count} < L_{table}$ at a significant level of 5%, it can be concluded that the data is normally distributed. Conversely, if $L_{count} > L_{table}$ at a significant level of 5%, it can be concluded that the data is not normally distributed. A summary of the overall normality test can be seen in the attachment.

The homogeneity test was carried out to determine the homogeneity of the data of the experimental and control classes. Data from the two classes that will be tested hypothesis first carried out a homogeneity test to ensure that the data obtained is homogeneous. This homogeneity test is an absolute requirement before hypothesis testing. This test is carried out with the test criteria, namely if the test results show a significance value > α = 0.05 then the data is homogeneous. is homogeneous. The following are the results of the homogeneity test of student learning results.

F-Test Two-Sample for Variances

	kelas eksperimen	*kelas kontrol*
Mean	73,47222222	64,42857143
Variance	196,8849206	144,5168067
Observations	36	35
df	35	34
F	1,362366946	
P(F<=f) one-tail	0,184753593	
F Critical one-tail	1,766998931	

Figure 3. Homogeneity test results of experimental and control class learning outcomes

Based on the test results above, it is known that the significance value of the experimental and control class learning outcomes is 0.184. This value is greater than > α = 0.05, so it can be concluded that the learning outcomes data obtained from the control class and experimental class are homogeneous. Furthermore, the homogeneity test of the learning outcomes of high motivation students was carried out. The following are the results of the homogeneity test of the learning outcomes of high motivation students.

Discussion

The Archerys ID learning model is developed through three main stages, namely introduction, core, and closing. At the introduction stage, the process begins with three systematic steps: giving attention, relevance reinforcement, and increased confidence (Safira et al., 2018). Since the beginning, this approach has included moral and spiritual elements, such as familiarizing learners to pray and be grateful before learning begins. Santoso et al. (2025) explained that prayer activities are not just religious rituals, but a means of internalizing the value of honesty and spirituality. Candiasa (2022) also asserts that the level of religiosity contributes to the formation of moral decisions and ethical behavior, while views gratitude as an important element in strengthening and motivating the moral values of learners.

In addition to spiritual habituation, giving attention also emphasizes the formation of discipline through the active presence of students at the beginning of learning. Attendance is not just a formality, but a reflection of commitment and responsibility. Putri et al. (2025) highlighted that discipline is the result of consistent practice, and added that attendance discipline contributes to academic achievement and character building such as responsibility and honesty.

This was confirmed by Putri et al. (2025) who found that habituation practices such as morning greetings and prayers together play an important role in fostering strong moral character among learners. The next step in the introduction is increasing confidence, where teachers provide psychological encouragement so that learners believe that they are able to achieve learning goals. This confidence has been shown to have a significant impact on students' moral development and positive attitudes. Found that confident students tend to be more engaged and show high learning motivation. Entering the core stage, Archerys ID learning is designed to be relevant to real life, such as linking renewable energy material to everyday practices in households. Emphasizes the importance of connecting learning materials with real-life contexts to make it more meaningful, while added that the contextual approach helps students understand the social and moral impact of the science they learn. The cultivation of moral values is also strengthened through the practice of giving fair praise and rewards. According to, praise is not just academic motivation, but also a means of strengthening relationships between individuals and strengthening respect for diversity. mentioned that Proportional and equitable praise can reduce behavioral inequality, while emphasize that verbal motivation can foster learners' moral responsibility and awareness of good and bad behavior.

The superiority of Archerys ID is not only on the moral side, but also has been shown to have a significant impact on academic learning outcomes. in their research concluded that the implementation of this model in informatics learning is able to improve academic achievement while strengthening student character, making it an effective and holistic instructional model. One of the learning strategies used in this model is the repetition of material through reminders of previous learning. This strategy aims to reinforce basic understanding and build connections between old and new knowledge. support this approach by stating that repetition through evaluation helps improve long-term retention. Furthermore, the dialogic nature of teacher-student interaction also encourages critical reflection and the development of learners' ethical awareness.

These results reinforce the view that effective learning does not solely rely on students' internal motivation, but rather on how the learning design is structured to encourage participation, stimulate interest in learning, and provide space for critical and reflective thinking. Archery's ID structured with the ARCS Motivational approach indirectly influenced learning motivation, even in students who initially had low motivation levels (Setyowati et al., 2022). In the long run, this shows that successful learning does not only come from dispositional factors, but is also strongly influenced by appropriate instructional interventions. Therefore, teachers and instructional designers need to pay great attention to systematically designed and goal-oriented learning models, such as Archery's ID, as this model is able to bridge the gap of students' motivation and ensure all participants learners have the same opportunity to achieve academic success (Magdalena et al., 2023).

Conclusion

Based on the research results and data analysis, it can be concluded that the application of the Archerys ID Model instructional design has a significant positive effect on improving the physics learning outcomes of grade X students at Batam State Senior High School. Students taught using the Archerys ID Model achieved a higher average score (73.47) compared to those taught with the TPACK model (64.43), indicating that the structured, motivation-based instructional approach in the Archerys ID Model enhances conceptual understanding and academic achievement more effectively. Learning motivation also played a crucial role, as highly motivated students taught with the Archerys ID Model scored an average of 86.88, higher than their counterparts in the control group who achieved 76.67. This demonstrates that the Archerys ID Model is particularly effective in supporting students with strong intrinsic motivation. However, the analysis revealed no significant interaction between instructional design and motivation level, suggesting that the Archerys ID Model can be effectively applied to both highly motivated and less motivated learners. Additionally, the study developed a Quantum Learning-based e-module for IPAS Project learning on Economic Behaviour and Social Welfare using the ADDIE model, which proved valid, practical, and effective. The e-module received high validation scores (75% from media experts, 89.7% from subject experts, and 96.7% from language experts), demonstrated practicality (79% from teachers and 82% from students), and showed significant effectiveness (t-value 16.17 > 1.697), confirming its suitability as a learning medium to improve student outcomes.

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Authors Contribution
Conceptualization and methodology, writing—original draft preparation, F. and D.; software, validation, formal analysis, and investigation, Z.Z. and F.Y.J.; data curation, writing—review and editing, E.M. and A.H.A.D.

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There is no conflict of interest.

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