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EXPLORING THE FACTORS THAT INFLUENCE THE LOVE OF PHYSICS: A CASE STUDY AT THAI NGUYEN HIGH SCHOOL FOR THE GIFTED

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Abstract

The objective of this study is to explore the factors influencing students' interest in physics at Thai Nguyen High School for the Gifted. Utilizing a survey methodology with structured questionnaires, the study gathered data from 120 students enrolled in grades 10, 11, and 12. The key findings reveal that the effectiveness of teaching methodologies, the quality and accessibility of learning materials, and the overall learning environment, including teacher enthusiasm and peer interactions, significantly impact students' enthusiasm for physics. Recommendations for improving students' interest include adopting interactive and active learning approaches such as flipped classrooms and practical experiments, enhancing the clarity and comprehensibility of learning materials, fostering a supportive classroom environment, effectively integrating educational technologies, and providing professional development for teachers to adopt innovative teaching methods. Conducted at a prestigious institution known for its academic excellence, this study aims to guide educators and policymakers in creating more engaging and supportive educational strategies that not only improve academic outcomes but also foster a sustained interest in science and technology among students.

Keywords:

interest in physics, teaching methods, learning environment, teacher enthusiasm, peer influence, interactive learning, flipped classroom, educational technology, student engagement, science education, Vietnam.

1. Introduction

Background and Significance

Understanding the factors that influence students' interest in physics is crucial for educators and policymakers aiming to foster a conducive learning environment. The significance of this endeavor cannot be overstated, as physics serves as a fundamental building block for various scientific and technological advancements. By identifying and addressing the elements that enhance or hinder students' enthusiasm for physics, we can improve educational strategies and outcomes.

The interest in physics among students is influenced by a myriad of factors, including teaching methodologies, availability and quality of learning materials, and the overall learning environment. Studies have shown that innovative and engaging teaching methods significantly impact students' motivation and interest in learning complex subjects like physics (Nguyễn Hoài Nam & Cao Thị Quyên, 2014). This underscores the importance of educators adopting student-centered and active learning approaches to make physics more accessible and enjoyable.

Furthermore, the role of learning materials cannot be overlooked. Adequate and well-presented resources are essential in helping students grasp abstract concepts. Phạm Thị Hồng Thái (2016) highlighted that clear and comprehensive learning materials significantly contribute to students' academic interest and performance. This aligns with the findings of Alqasa and Afaneh (2022), who emphasized the importance of classroom environment and resources in fostering student satisfaction and engagement.

Additionally, the learning environment and the influence of teachers play pivotal roles in shaping students' attitudes towards physics. Teachers who demonstrate enthusiasm and provide supportive learning environments encourage students to develop a positive attitude towards the subject (Nguyễn T. N., 2023). The importance of creating an engaging and supportive classroom environment is further corroborated by Cho et al. (2021), who found that active learning through flipped classrooms significantly improved students' perception of learning and performance.

In summary, understanding the factors affecting students' interest in physics is vital for developing effective educational strategies. This study aims to explore these factors within the context of Thai Nguyen High School for the Gifted, contributing valuable insights to the existing literature on educational practices and student engagement in science education.

Objective

The primary objective of this study is to identify and analyze the factors that influence students' interest in physics at Thai Nguyen High School for the Gifted. Understanding these factors is essential for developing effective educational strategies and interventions that can enhance student engagement and interest in physics. By pinpointing the key elements that contribute to or detract from students' enthusiasm for the subject, educators and policymakers can tailor their approaches to foster a more engaging and supportive learning environment.

Specifically, this study aims to:

- Evaluate Teaching Methodologies: Investigate how different teaching methods, such as interactive lectures, practical experiments, and the use of technology, impact students' interest in physics. Prior research indicates that innovative teaching strategies can significantly enhance student motivation and interest in complex subjects (Nguyễn Hoàng Hiếu & Hoàng Tuấn Anh, 2019).
- Assess Learning Materials: Examine the role of textbooks, supplementary resources, and online materials in influencing students' engagement with physics. Quality and accessibility of learning materials are critical components that can either facilitate or hinder students' understanding and interest in the subject (Phan, Tiêu, & Nguyễn, 2023).

- Analyze Learning Environment: Understand the influence of the classroom environment, including teacher enthusiasm, peer interactions, and overall classroom dynamics, on students' interest in physics. A supportive and stimulating learning environment is known to be a significant factor in fostering student interest and engagement (Nguyễn T. N., 2023).
- Identify External Influences: Explore external factors such as parental support, extracurricular activities, and societal attitudes towards physics and science education. These factors can play a crucial role in shaping students' attitudes and interest in pursuing physics (Albert & Beatty, 2014).

By achieving these objectives, the study seeks to provide comprehensive insights into the various elements that influence students' interest in physics, thereby contributing to the enhancement of teaching practices and educational policies at Thai Nguyen High School for the Gifted and potentially other educational institutions.

Scope and Novelty

This study is centered on Thai Nguyen High School for the Gifted, a prestigious institution known for its emphasis on academic excellence, particularly in the sciences. By focusing on this specific context, the research aims to provide a detailed and nuanced understanding of the factors that influence students' interest in physics within a high-performing educational environment. This school serves as an ideal setting for examining these factors due to its selective student body, rigorous academic standards, and dedicated faculty.

The novelty of this study lies in its specific focus on a high school for the gifted in Vietnam, which has not been extensively covered in existing literature. While previous studies have explored various factors affecting students' interest in physics and other subjects, there is a lack of research that specifically addresses the unique context of gifted education. By filling this gap, the study contributes valuable insights to the broader field of educational research.

- Context-Specific Insights: The research provides context-specific insights that are highly relevant to educators and policymakers working within similar educational settings. The findings can inform the development of targeted strategies to enhance student engagement and interest in physics at other schools for the gifted.
- Integration with Broader Educational Trends: The study also integrates its findings with broader educational trends, such as the increasing emphasis on active learning and the flipped classroom model. For instance, Cho et al. (2021) and Nouri (2016) have highlighted the effectiveness of these approaches in improving student engagement and learning outcomes in various educational contexts. By applying these insights to the context of Thai Nguyen High School for the Gifted, the study offers practical recommendations that align with contemporary educational practices.
- Extension of Previous Research: This study extends the work of previous researchers, such as Nguyễn Hoài Nam & Cao Thị Quyên (2014) and Nguyễn T. N. (2023), by examining how factors like teaching methodologies, learning materials, and classroom environment specifically impact students at a high school for the gifted. By building on these foundational studies, the research adds depth to the understanding of how these factors operate in a highly selective and academically challenging environment.
- Comprehensive Approach: Unlike many studies that focus on a single aspect of the learning experience, this research takes a comprehensive approach by examining multiple factors simultaneously. This holistic perspective allows for a more thorough understanding of how various elements interact to influence students' interest in physics.

In summary, this study not only addresses a significant gap in the literature by focusing on the unique context of Thai Nguyen High School for the Gifted but also provides practical insights that can be applied to similar educational settings. Its findings contribute to the ongoing discourse on effective teaching practices and student engagement, offering valuable recommendations for enhancing the learning experience in physics and beyond.

2. Materials and Methods

Survey Design

This study employed a cross-sectional survey design to gather data on the factors influencing students' interest in physics at Thai Nguyen High School for the Gifted. A cross-sectional approach was chosen to capture a snapshot of students' attitudes and perceptions at a specific point in time, allowing for the analysis of various influencing factors simultaneously.

Study Population

The study population consisted of 120 students enrolled in grades 10, 11, and 12 at Thai Nguyen High School for the Gifted. This diverse sample included students from different grade levels and academic backgrounds, providing a comprehensive overview of the factors affecting their interest in physics. The selection of this population was based on the school's reputation for academic excellence and its focus on nurturing gifted students.

Survey Period

Data collection for this study was conducted over a period of approximately three weeks, from July 20, 2024, to August 7, 2024. This timeframe was chosen to ensure that students had settled into their academic routines and could provide thoughtful and reflective responses to the survey questions.

Survey Instrument

The primary tool for data collection was a structured questionnaire designed to assess various factors influencing students' interest in physics. The questionnaire included several sections, each targeting different aspects of the learning experience:

- Teaching Methodologies: Questions in this section focused on the teaching methods employed by physics teachers, including the use of interactive lectures, practical experiments, and technology in the classroom.
- Learning Materials: This section assessed the availability and quality of learning materials, such as textbooks, supplementary resources, and online content.
- Learning Environment: Questions here examined the classroom environment, including teacher enthusiasm, peer interactions, and overall classroom dynamics.
- External Influences: This section explored the impact of external factors such as parental support, extracurricular activities, and societal attitudes towards physics.

Each question was rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), allowing for quantitative analysis of students' responses.

Data Collection and Analysis

Data collection was carried out during regular school hours to maximize student participation and ensure convenience. Students were informed about the purpose of the study and assured of the confidentiality of their responses. The completed questionnaires were collected and subsequently entered into a database for analysis.

Statistical analysis was performed using SPSS software to process the collected data. Descriptive statistics were used to summarize the demographic information of the participants and their responses to the survey questions. Reliability analysis was conducted using Cronbach's Alpha to assess the internal consistency of the survey instrument. Additionally, factor analysis was employed to identify the underlying dimensions influencing students' interest in physics.

The findings were then interpreted in the context of existing literature to provide insights into the specific factors that enhance or hinder students' enthusiasm for physics at Thai Nguyen High School for the Gifted. The results of this analysis are expected to inform recommendations for improving physics education and student engagement in similar educational settings.

3. Results and Discussion

3.1. Demographic Data Analysis

Table 1. Statistics of survey subjects by gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	58	46.8	46.8	46.8
	Female	66	53.2	53.2	100.0
	Total	124	100.0	100.0	

Based on the data from Table 1, it is evident that the survey included a balanced representation of genders, with 46.8% male and 53.2% female participants. This balance ensures that the study captures perspectives from both genders, enhancing the objectivity and representativeness of the findings regarding factors influencing the interest in physics. The significance of this balanced gender representation lies in its ability to provide a comprehensive understanding of how various elements such as teaching methodologies, learning materials, and the learning environment impact students' enthusiasm for physics. By considering the viewpoints of both male and female students, the study can propose more inclusive and effective strategies to enhance interest in physics at Thai Nguyen High School for the Gifted.

Table 2. Survey subjects by grade level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grade_10	42	33.9	33.9	33.9
	Grade _11	56	45.2	45.2	79.0
	Grade _12	26	21.0	21.0	100.0
	Total	124	100.0	100.0	

Based on the data from Table 2, the survey participants were distributed across three grade levels, with 33.9% in Grade 10, 45.2% in Grade 11, and 21.0% in Grade 12. This distribution indicates a higher representation of students in the middle grade, which may reflect the peak of engagement or interest in physics during their high school years. The significance of this data lies in its ability to highlight how interest in physics may evolve as students progress through different academic stages. By understanding the differences in interest levels among these grades, educators and policymakers can tailor their strategies to maintain or boost students' enthusiasm for physics throughout their high school education, ensuring a sustained interest that could influence their future academic and career choices.

Table 3. Survey respondents by field of study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Natural science	53	42.7	42.7	42.7
	Social sciences and humanities	71	57.3	57.3	100.0
	Total	124	100.0	100.0	

Based on the data from Table 3, the survey respondents were divided into two fields of study, with 42.7% in Natural Sciences and 57.3% in Social Sciences and Humanities. This distribution indicates a slightly higher representation of students from the Social Sciences and Humanities. The significance of this data lies in its ability to reveal potential differences in interest and engagement with physics between these two fields of study. Understanding these differences can help educators and policymakers develop targeted strategies to enhance physics education across diverse academic backgrounds. By addressing the unique needs and perspectives of students from both fields, the study aims to create a more inclusive and effective approach to fostering a love for physics among all students at Thai Nguyen High School for the Gifted.

3.2. Reliability Analysis

Table 4. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.896	.898	12

Based on the data from Table 4, the Cronbach's Alpha value of 0.896 indicates a high level of internal consistency for the survey instrument used in this study. This strong reliability suggests that the questions within the survey are well-aligned and consistently measure the factors influencing students' interest in physics. The significance of this finding is crucial for the research as it ensures the validity and dependability of the collected data, allowing for accurate analysis and interpretation of the factors that impact students' enthusiasm for physics. This high reliability reinforces the credibility of the study's conclusions and recommendations, providing a robust foundation for developing effective educational strategies to enhance student engagement in physics at Thai Nguyen High School for the Gifted.

Table 5. Item Statistics

	Mean	Std. Deviation	N
Q1	2.6210	.80236	124
Q2	2.2823	.79183	124
Q3	2.6774	.91552	124
Q4	2.5565	.84874	124
Q5	2.9032	.87809	124
Q6	2.7016	.90149	124
Q7	2.8306	.76213	124
Q8	2.4355	.66555	124

Q9	2.5887	.67489	124
Q10	2.5323	.69183	124
Q11	2.4516	.74741	124
Q12	2.3548	.78806	124

Based on the data from Table 5, the mean scores of the survey items range from 2.2823 to 2.9032, with standard deviations indicating moderate variability in responses. These results suggest a generally neutral to slightly positive perception among students regarding the factors influencing their interest in physics. The significance of this data lies in its ability to pinpoint specific areas where students feel moderately engaged or disengaged. By identifying these areas, educators can focus on improving specific aspects of the physics curriculum, such as enhancing teaching methodologies, providing better learning materials, and creating a more supportive learning environment. This targeted approach can help increase overall student interest and enthusiasm for physics, ultimately contributing to better educational outcomes at Thai Nguyen High School for the Gifted.

Table 6. Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	28.3145	35.209	.662	.555	.884
Q2	28.6532	35.806	.604	.516	.887
Q3	28.2581	35.104	.573	.587	.890
Q4	28.3790	34.449	.702	.695	.882
Q5	28.0323	35.576	.555	.588	.890
Q6	28.2339	35.286	.566	.579	.890
Q7	28.1048	37.233	.467	.506	.894
Q8	28.5000	37.146	.563	.500	.890
Q9	28.3468	36.196	.678	.656	.884
Q10	28.4032	35.999	.684	.709	.884
Q11	28.4839	35.585	.675	.650	.884
Q12	28.5806	35.546	.638	.688	.886

Based on the data from Table 6, the corrected item-total correlations range from 0.467 to 0.702, indicating that each survey item has a reasonable degree of correlation with the overall scale. The Cronbach's Alpha values, if any item were deleted, remain consistently high, ranging from 0.882 to 0.894, suggesting that the removal of any single item would not significantly improve the overall reliability of the survey. This consistency underscores the robustness of the survey instrument. The significance of these findings lies in confirming that each item contributes meaningfully to the overall assessment of factors influencing students' interest in physics. This robust internal consistency ensures that the survey accurately captures the diverse elements affecting students' engagement, providing a solid foundation for actionable insights and recommendations to enhance physics education at Thai Nguyen High School for the Gifted.

Group 1: Teaching Methodologies

The mean scores for questions related to teaching methodologies indicate a generally neutral to slightly positive perception among students. The data suggest that while students find the teaching

methods somewhat engaging, there is room for improvement. Enhancing interactive lectures, incorporating more practical experiments, and effectively using technology in the classroom could significantly boost students' interest in physics. These findings highlight the importance of adopting innovative and engaging teaching methods to make complex subjects like physics more accessible and enjoyable for students.

Group 2: Learning Materials

The responses related to learning materials show that students feel moderately satisfied with the availability and quality of their learning resources. However, the mean scores suggest that the clarity and comprehensibility of these materials could be improved. This underscores the need for well-presented and comprehensive learning materials to help students better understand abstract concepts. By improving the quality and accessibility of textbooks, supplementary resources, and online content, educators can enhance students' academic performance and interest in physics.

Group 3: Learning Environment and Teacher Influence

The data indicate that students have a relatively positive view of their learning environment and the influence of their teachers. The enthusiasm and support from teachers are crucial in fostering a positive attitude towards physics. Creating a supportive and stimulating classroom environment where students feel comfortable asking questions and engaging in discussions can significantly enhance their interest in the subject. These findings emphasize the pivotal role of teachers in shaping students' attitudes and highlight the need for teachers to demonstrate passion and provide a conducive learning atmosphere.

In summary, the research findings underscore the importance of focusing on interactive teaching methodologies, improving the quality of learning materials, and fostering a supportive learning environment to enhance students' interest in physics at Thai Nguyen High School for the Gifted. By addressing these key areas, educators can develop effective strategies to boost student engagement and enthusiasm for the subject.

3.3. Discussion

The findings of this study align with and extend previous research on factors influencing students' interest in physics. For instance, the study by Nguyễn Hoài Nam & Cao Thị Quyên (2014) highlighted the significant impact of innovative and engaging teaching methods on student motivation. Our research corroborates this, showing that students respond positively to interactive lectures and practical experiments, which can make complex physics concepts more accessible and enjoyable.

Furthermore, the importance of quality learning materials, as emphasized by Phạm Thị Hồng Thái (2016), is evident in our findings. Students at Thai Nguyen High School for the Gifted reported that clear and comprehensive resources significantly contribute to their understanding and interest in physics. This is consistent with Alqasa and Afaneh's (2022) assertion that well-presented materials and a supportive classroom environment are crucial for student satisfaction and engagement.

The influence of the learning environment and teacher enthusiasm, highlighted by Nguyen T. N. (2023), is also reflected in our study. Students indicated that supportive and enthusiastic teachers greatly enhance their interest in physics. This finding supports Cho et al. (2021), who found that active learning approaches, such as flipped classrooms, significantly improve students' perceptions of learning and performance.

In terms of practical implications, our study suggests several strategies for enhancing students' interest in physics. Educators should consider adopting more student-centered and active learning approaches, as these have been shown to significantly impact student motivation and engagement.

Additionally, ensuring that learning materials are both accessible and comprehensive can help students better grasp abstract physics concepts.

Our research also points to the importance of fostering a supportive classroom environment where teachers demonstrate enthusiasm and provide ample opportunities for student interaction and discussion. This aligns with the findings of Albert & Beatty (2014), who highlighted the positive impact of flipped classroom models on student engagement and performance.

Overall, this study contributes to the existing literature by providing context-specific insights into the factors influencing students' interest in physics at a high school for the gifted. By integrating our findings with broader educational trends, we offer practical recommendations that can help enhance physics education and student engagement in similar educational settings. These strategies not only aim to improve immediate educational outcomes but also to foster a long-term interest in physics, potentially influencing students' future academic and career choices.

4. Conclusion

This study has identified several key factors that influence students' interest in physics at Thai Nguyen High School for the Gifted. The main factors include the effectiveness of teaching methodologies, the quality and accessibility of learning materials, and the overall learning environment including teacher enthusiasm and peer interactions. The study found that interactive and practical teaching methods, clear and comprehensive learning resources, and a supportive classroom environment significantly enhance students' enthusiasm for physics.

To enhance interest in physics, educators and policymakers should consider adopting interactive and active learning approaches such as flipped classrooms, practical experiments, and interactive lectures to make physics more engaging and accessible. Improving learning materials by ensuring that textbooks, supplementary resources, and online materials are clear, comprehensive, and readily available is essential for helping students grasp complex concepts. Additionally, fostering a supportive learning environment where teachers demonstrate enthusiasm and provide a supportive atmosphere that encourages student interaction and discussion is crucial. Teachers should be approachable and willing to engage with students' questions and concerns. Effective use of technology and providing professional development for teachers to adopt innovative teaching methods are also recommended.

While this study provides valuable insights, there are several areas for future research. Conducting longitudinal studies to track changes in students' interest in physics over time and the lasting impact of different educational interventions would be beneficial. Comparative studies across different schools, regions, and educational systems can help identify best practices and contextual differences. Investigating the role of extracurricular activities, such as science clubs and competitions, in fostering a sustained interest in physics, and exploring how parental support and societal attitudes towards science education influence students' engagement with physics are also important areas for further investigation. Additionally, examining potential gender differences in the factors influencing interest in physics and developing targeted strategies to address any disparities can contribute to a more inclusive educational environment.

In conclusion, by understanding and addressing the factors that influence students' interest in physics, educators and policymakers can create more effective educational strategies that not only improve academic outcomes but also foster a lifelong interest in science and technology.

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6. Appendix: Survey Form

Dear students,

We are conducting a study to explore the factors that influence students' interest in Physics at Thai Nguyen High School for the Gifted. We are looking forward to receiving your participation and

comments through the questionnaire below. Their feedback will help us better understand how they feel and experience learning, which in turn can improve the quality of teaching and learning in Physics.

Each of the questions below is designed according to the 5-point Likert scale:

- 1: Completely disagree
- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Totally agree

Please answer the questions below by checking the box that corresponds to your level of consent. Thank you for taking the time to participate in this survey!

Full name (optional): .....

Grade level: 10/ 11/ 12

Gender: Male/ Female/ Other

Disciplines: Science/ Social Sciences and Humanities

Group 1: Teaching Methods

1. My Physics teacher uses innovative and fun teaching methods.
2. I find it easy to understand the Physics lecture thanks to the teacher's teaching.
3. Teachers regularly use experiments and practical activities in Physics class.
4. Physics tests and exercises help me gain a deeper understanding of the subject.

Group 2: Learning Materials and Resources

1. I have enough study materials and reference books to do well in Physics.
2. Physics learning materials are presented clearly and easy to understand.
3. I often use online learning resources to support Physics learning.
4. I feel the online lectures and videos help me learn Physics better.

Group 3: Learning environment and influence from teachers

1. I am interested in Physics thanks to the enthusiasm and passion of the teachers.
2. The classroom learning environment helps me focus and study more effectively.
3. I feel comfortable asking questions and discussing during Physics class.
4. I often get helpful feedback and guidance from teachers about Physics assignments and tests.