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Physics Education in Decline: A Two-Decade Mixed-Methods Investigation of Trends and Factors Influencing Albanian Students' Interest

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Abstract

Over the past two decades, Albania has witnessed a notable decline in the interest of primary and secondary school students in studying physics. Physics, once considered a prestigious discipline, studied by the best and offering an intellectually rewarding career, is increasingly perceived by students as a tedious, highly abstract, and difficult subject that offers no prestige or income today. This declining trend, although it began much earlier, after the fall of communism, seems to have accelerated rapidly over the past two decades. This study undertakes a comprehensive mixed-methods analysis, integrating national quantitative data with qualitative findings from audits of curricula, physics textbooks, interviews with teachers and students, and policy reviews. The research identifies a series of interrelated causes: outdated curricula and inconsistent with the needs of the time and technological developments, poor textbooks on topics with incorrect linguistic and scientific terminology, a large shortage of qualified physics teachers - especially in rural areas - insufficient professional development, and chronically insufficient investments in laboratory and school infrastructure, etc. The paper concludes by proposing a series of recommendations aimed at curricular reform, teacher support, and learning infrastructure through experience and the implementation of projects related to actual real-world issues and technological developments, with the aim of restoring physics as a vital discipline in Albanian pre-university education.

Keywords: *Physics, Pre-University Education, Students' Engagement, Teaching and Learning*

1. Introduction

Physics is not just a science subject, but it is a natural connection of people with the laws of nature. The more people study physics, the more they connect with nature and learn how to enjoy and protect it. Studying physics provides individuals with the opportunity to develop their critical thinking skills and enhance their logical reasoning abilities. Studying physics doesn't just mean solving equations by performing mathematical analysis, but also identifying reasons beyond the numbers and exploring different paths to the solution, as well. Paying attention to physics classes may lead to the development of strong analytical skills because physics education also promotes flexible problem-solving strategies and structured analytical thinking.

Analyzing all the benefits of physics education, it is disappointing to see that students nowadays have little interest in the subject of physics, and even less interest in pursuing university studies in physics. Physics that was historically perceived as a high-status academic discipline within the Albanian education system has gradually lost part of its perceived academic and professional relevance. What remains today is the opinion that physics is a challenging subject, and there is little reason for students to be involved in it, since it is generalized the idea that many professions of the future can be accomplished without in-depth knowledge of physics.

Over the past two decades, Albanian pre-university education has witnessed a significant decline in students' interest and enrollment in the physics study program [1]. As a consequence, fewer physics teachers and even fewer physicists are being graduated [1,2]. Interestingly, despite the number of high-school students who choose physics as an elective subject for Matura exams remains almost constant over years, the grade average shows a slight decline while the number of students failing this exam has slightly increased [2]. This result may suggest reduced depth engagement of students with the subject. Investigation shows that the overall performance of students and physics teachers in Albanian schools has been steadily declining [1,2], prompting discussions among education professionals regarding long-term effects on the education system and in the implication of young people in science and beyond.

Our study examines the current state of physics education in Albania by analyzing structural, curricular, and assessment-related factors that have contributed to this situation, and comparing them with the situation approximately two decades ago. The study aims to identify the underlying factors and to propose evidence-based directions for its improvement with the broader objective of strengthening the academic positioning and sustainability of physics education in Albania. The methodology we follow is a mixed-methods approach that combines national quantitative indicators with qualitative findings derived from curriculum audits, physics textbooks review, interviews with teachers and students, and policy analysis.

The findings indicate the presence of multiple interrelated factors influencing the current situation, including curricular inconsistencies, challenges related to instructional teaching materials, uneven distribution of qualified physics teachers, and limitations in laboratory and professional development support. These elements appear to interact and contribute to the observed trends in students' engagement and performance. The paper concludes by outlining evidence-based recommendations aimed at strengthening curricular coherence, teacher support, learning infrastructure, and motivating continued discussions on the future development of physics education in Albania.

1.1 Historical Background

Testimonies from retired physicists and physics teachers indicate that during communism, physics was considered as an elite subject among people, and studying physics was accessible only to the best high-school students. Data show that physics teachers, as part of natural sciences teachers, were distinguished and respected not only by their students but by society at large, as well. They were perceived as authoritative, rigorous, and highly competent professional, both in and outside the classroom [3]. In the years that followed the post-communist period, although this high status gradually began to decrease, the subject of physics and physics teachers still enjoyed a good reputation again in the early 2000s [4]. Physics was still considered an elite subject that only the most gifted could understand and appreciate.

In recent years, the perceived academic prestige of physics seems to have declined, which has also led to the gradual decline in the academic and social importance of physics teachers. This decline has been ongoing for years, and it appears to be continuing without a clear indication of when or where it will come to a halt. In the early 2000s, physics was part of the mandatory final exams subjects for high school students in Albania, known as "Provimet e Pjekurisë" ("Matured Exams"). All students were required to take three final compulsory exams: mathematics, literature, and physics, a requirement that lasted until 2005. This requirement reflects the institutional importance attributed to physics subject in the pre-university education system at that time.

In 2006, because of a reform in the pre-university education conducted by the Ministry of Science and Education in Albania, the final exams for high-school students were called "Matura Shtetërore" or "Matura Exams" [5]. According to this reform, the physics subject was removed from the mandatory final exams, and along with other subjects, it became an elective subject exam, allowing students to choose whether to include it in their final exams or not. Although laboratory conditions were limited and the post-communist transition created structural challenges for science education, physics maintained a relatively stable status in the perception of students and society until the early 2000s. The available data suggest that the 2006 reform marked an important structural change in the institutional positioning of physics within the examination system, which may have contributed to a gradual loss of importance and interest in the subject of physics [3,4]. Afterwards, the physics subject began to lose its prestige, and physics education in general, including the presence and significance of physics teachers, started losing ground in the overall education of children and youth. Nevertheless, over the past two decades, several other factors have emerged that have changed and reshaped the educational landscape in general, also having a significant impact on the subject of physics.

- The increase in emigration has been associated with a reduction in the number of students potentially interested in physics, as well as to the reduction in the number of qualified, experienced physics teachers, especially in small cities [6,7].
- Technological development during these two decades shifted youth interests toward more immediate and visual content, while physics education in Albania remained principally theoretical. Furthermore, the rapid developments of AI tools and instant access to information are largely impacting the education system, thus influencing students' study habits and expectations regarding learning effort [8–10].
- Physics education relies on hands-on experimental activities; therefore adequate laboratory infrastructure is essential. Despite some limited investment in the physics laboratory infrastructure, in several Albanian schools, and considering the worldwide

digital revolution, more technological equipment and simulators should have been added to physics laboratory facilities. The investments conducted, especially in small schools and rural zones [11–14], remain insufficient. Furthermore, different competitive exams for university admission and different performance metrics encourage students to prioritize subjects viewed as more test-oriented and less conceptually demanding, which may contribute to reduced interest in physics [15].

- During these two decades, the curriculum in the pre-university education system has undergone numerous and frequent changes, which have greatly influenced the teaching – learning process in Albania [16,17]. Evidence suggests that these frequent reforms have significantly affected physics subject starting from the 6th grade (time when students are exposed to physics subject). Increasingly, students and teachers report dissatisfaction with physics textbooks, often describing them as abstract and lacking conceptual coherence [18–20].

Generally speaking, data show a similar trend of declining interest in physics in Western European countries [21,22]**.** However, unlike small countries, such as Albania, steps to maintain excellence in physics and increase student interest have been taken much earlier [23,24]. These steps involve the implementation of innovative teaching methods, including simulations and leveraging digital and technological advancements, as well as promoting interdisciplinary STEM education and introducing physics subjects earlier in the curriculum. In contrast, the Albanian pre-university education system did not fully modernize its approach due to the above reasons. Although various reforms initiatives were announced over the years, their implementation has not fully addressed the emerging needs of students in a rapidly evolving educational system. Consequently, students' perception of physics has shifted, and for a considerable proportion of them, physics is perceived as an outdated and highly abstract and challenging subject, and insufficiently connected to everyday life.

2. Methodology

Our study adopts a mixed-methods research design combining both qualitative and quantitative data analysis in order to obtain a comprehensive understanding of the decline in students' interest in physics in Albania. This research has been developed gradually since 2017 and integrates data collected across these academics years received from our surveys, meetings in person, national and international assessment data from official documents and journals, and also on our own observations on the curriculum, physics books, and policy review. While some of the data have been reflected in the graphs, others have been used for further research and the development of qualitative comments. The analysis performed aims not only to understand the trend of declining attention in the physics subject but also to explore the deeper invisible causes and the perceptions of people influencing this trend. Furthermore, referring also to the data from more developed countries [23,24], we strive to provide a series of suggestions that could lead to the solution of this problem and to the increase in the awareness among young students and people in general, that studying physics has broader implications for scientific literacy and societal development, and it is not just an isolated issue related to the education system only.

2.1 Quantitative Data

The quantitative data were collected through structured surveys administered to:

- Secondary school students (Grades 6 – 9);
- High School students (Grades 10 – 12);
- University Students in natural sciences, engineering, and medicine;
- Physics and natural science teachers from different levels of pre-university education.

More than 200 students and approximately 70 teachers participated in this study voluntarily and based on their accessibility. The surveys included multiple-choice questions and Likert-scale items aimed at exploring and evaluating:

- Students' attitudes and perceptions toward the physics;
- Perceived level of difficulty;
- Textbook clarity and usefulness;
- Quality of lab equipment and availability of laboratory work;
- Teaching methodology;
- Career aspirations and intention related to physics.

All the quantitative data were analyzed using descriptive statistics in order to identify trends and recurring patterns in perceptions across different education levels. To make the study more complete and all-inclusive, in addition to survey-based data, the study incorporates secondary quantitative indicators derived from official and international sources, such as:

- Results and statistical reports from the national "Matura Shtetërore" examination system;
- Participation rates and performance data from Physics Olympiads and other international assessments;
- National results from the Programme for International Students Assessment (PISA) conducted by the OECD;
- Enrollment rates in university-level physics study programs in Albania over the last two decades.

These data were used to identify long-term performance trends of Albanian students and to connect them with the findings emerging from the surveys and interviews conducted. The purpose behind this was not to develop an advanced statistical modeling, but rather to visualize our perception-based findings within broader systemic indicator.

2.2 Qualitative Data

While quantitative data helped us identify observable trends, qualitative data were essential for interpreting the underlying reasons behind them. Direct interactions with participants allowed us to explore attitudes, experiences, and systemic concerns in greater depth. These qualitative data included:

- Semi-structured interviews in person with selected physics teachers and students to explore issues related to the teaching-learning process;
- Direct observation of classroom practices;
- Review and analysis of official curriculum documents issued by the Ministry of Education;
- Comparative analysis of physics textbooks approved for use in Albanian schools over these years;

In this process, particular attention was given to distinguishing between the official curriculum requirements and the way these requirements are interpreted and implemented in textbooks and classroom practices. This distinction was necessary in order to examine whether the perceived theoretical overload originates from the curriculum framework itself or from the textbook structure, instructional delivery, and teaching methodology. The curriculum documents analyzed include the National Core Curriculum for secondary and high school education approved and revised during these two decades. Meanwhile, on focus of physics textbooks analysis was the alignment that exists between textbooks and the official curriculum requirements as well as the way curricular objectives are translated into classroom content. Rather than undertaking a detailed didactic or linguistic textbook evaluation, the purpose in this process was to identify whether curriculum-prescribed competences, conceptual progressions, and practical components are reflected consistently in the textbooks currently in use. A more comprehensive structural and pedagogical analysis of the textbook content specifically focused on structural organization, conceptual sequencing, use of mathematical formalism, and integration of experimental activities, is beyond the scope of the present study and is planned as a subsequent, dedicated research project.

2.3 Limitations

This study has several limitations that need to be acknowledged and considered. First, the survey sample was based on voluntary participation and accessibility rather than probability sampling, which may limit the generalizability of the findings at the national level. Second, some of the data rely on self-reported perceptions by students and teachers, which may be influenced by subjective interpretation and opinions based on real-life situations often influenced by the emotions or other external conditions based on a specific social and cultural context .

Regarding the analysis of the curriculum and textbooks, the current study focused mainly on examining their harmonization and implementation logic rather than conducting a full content analysis. While this approach was sufficient to identify structural inconsistencies and perceived theoretical overload, a more detailed pedagogical and comparative analysis of the textbooks remains an area for future research.

Finally, secondary quantitative indicators (national examinations, international assessments, enrollment trends) were used descriptively to contextualize the observed patterns rather than performing advanced statistical modeling. Despite these limitations, the convergence of survey data, document analysis, and institutional indicators strengthens the internal consistency of the findings.

3. Results and Discussions

Physics, both as a school subject and as a university study program, has undergone significant changes over the past two decades, accompanied by changes in students' interest. A decline in interest seems to appear during students' initial introduction to the subject of physics and tends to intensify over time. Despite the efforts made by many physics teachers, didactic and regulatory conditions create few opportunities to adopt alternative teaching approaches. For years, teachers have been required to follow a dense, theory-oriented curriculum within limited teaching time [17,25–27]. Furthermore, over the past decade, the significant increase in administrative load and responsibilities has further reduce the time, energy, and motivation teachers can devote to developing interactive and pedagogically meaningful lessons. These limitations are reflected in students' classroom engagement, as well as in the level of understanding and preparation they demonstrate outside of school. The collected data indicate that high school students encounter greater difficulties in understanding and completing homework compared to students in lower secondary education (grades 6-9). Students report difficulties in understanding physics through textbook reading alone. Moreover, the level of mathematical knowledge required in high school physics is higher than that developed in mathematics courses. Consequently, many students rely on peer solutions or online resources without fully engaging in the problem-solving process.

Figure 1 shows that the majority of students in both grades 6–9 and grades 10–12 are not always confident that they can catch up on a new topic if they have missed it. Specifically, 58.4% of students in grades 6–9 and 50% of students in grades 10–12 answered "sometimes" to question (a).
With respect to question (b), both groups agreed that the content of the textbook is not sufficient to fully understand the lesson. Only a small proportion of students, 13% in grades 6–9 and 25% in grades 10–12, reported that they could rely on the textbook alone to understand the material. Regarding question (c), it results that 52.7% of students (grade 6-9) prefer a combination of receiving help from the teacher with other sources to fully understand the lesson.

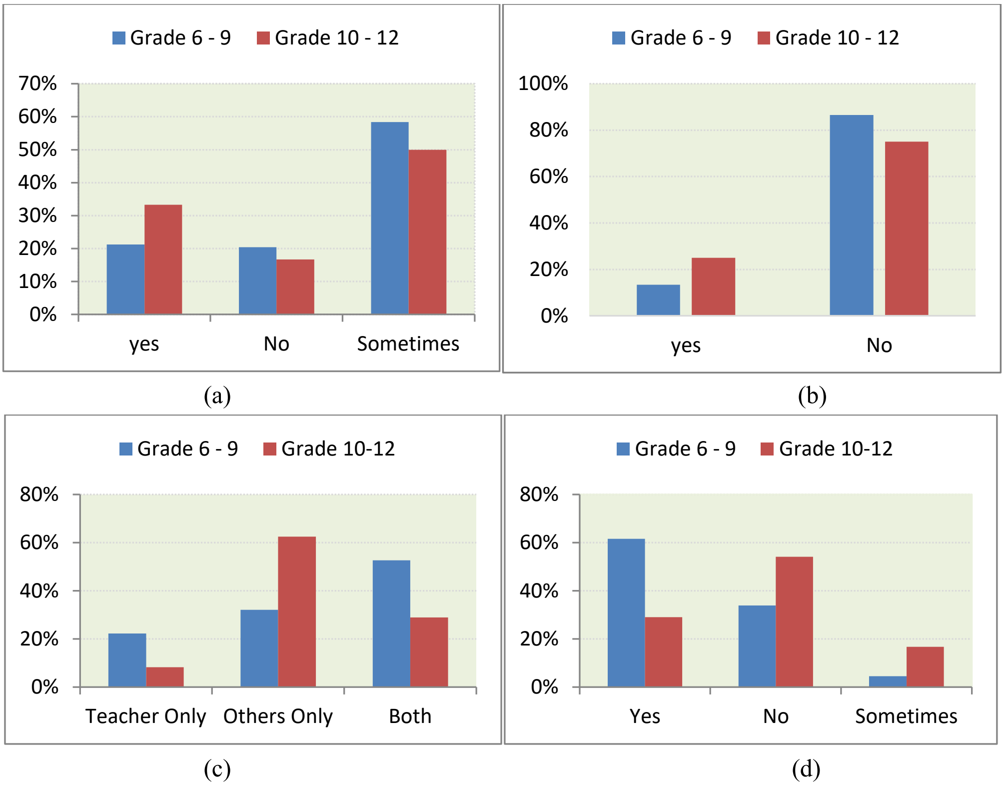

Figure 1. (a) Difficulty in catching up on the new topic in case they missed it; (b) Is the book enough to learn? (c) What kind of support do you need to understand/learn physics? (d) Are you able to understand and successfully finalize the homework?

On the contrary, the major part of students of grades 9-12, (62.5%) prefer other sources of help rather than the teacher to fully understand the lesson. This result indicates that students of grades 9-12 tend to be more independent in studying and understanding the lesson. According to the results for question (d), most students in grades 6–9 (61%) reported being able to complete their homework successfully. In contrast, about 50% of students in grades 10–12 stated that they are not able to fully understand and carry out their homework. This suggests that students in the higher grades struggle to cope with the increasing difficulty and complexity of the subject.

Students and teachers from all grades (6-12) were asked about different statements, and, interestingly, the percentage of their responses is quite close to each other, suggesting that a similar feeling and impression exists among teachers and students (Figure 2). When asked about teaching methodology, it is clear that traditional teaching methods are still prevalent in Albania. Indeed, 78% of teachers admit to using traditional methods, as they do not feel comfortable adopting modernized methodologies. While only 10% of teachers pretend to teach according to modern methods, the other 12% say they combine both methods, but this depends on the topic, and it has not yet been fully implemented in every class.

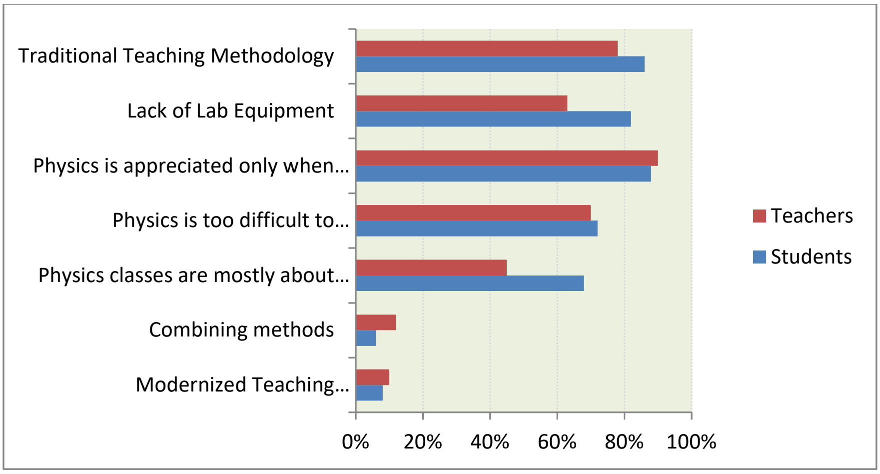

Figure 2. Comparison of the results of questions regarding the physics subject addressed to students and teachers.

Despite a slight increase in the percentage of teachers incorporating modern methods into their classes, it remains shallow compared to the experience in other EU or OECD countries [21,28,29]. Teachers admit they don't have the proper skills and training to use modern methods and improve the use of simulators and ICT in their classes [30]. This attitude was also evident during the COVID-19 pandemic period, when teachers were required to adapt to online teaching and utilize their technical skills immediately, without having time to prepare and learn themselves [31]. Although it has been seen how important ICT inclusion is in the teaching process, unfortunately, physics teachers haven't improved significantly [32,33]. This aspect can also be easily identified by the students who are very attracted to technological development, and their expectations for a modernized teaching methodology are high [34]. Consequently, only 8% of them believe that their physics teachers use modernized teaching methodologies, which is slightly lower compared to the percentage of teachers who admit to the same statement. This low difference, however, is noticeable because the concept of modernized methods is sometimes perceived differently by teachers and students. From direct interviews we understand that according to students a modern physics class must include more games, simulators, and AI inclusions. Additionally, this may also explain the following results: there are more students (86 %) than teachers (78%) who think that their physics teacher are using traditional teaching methodology only; more students (82%) compared to teachers (63%) who believe that there is a lack of lab equipment in their schools; and even more students (68%) compared to teachers (45%) who agree that physics classes are mostly about formulas and not experiments related to real life. In conclusion to this rating, we recognize that there is a common misconception among students and teachers regarding modern methodologies and the use of ICT and simulators. Despite the minor improvements made over the past two decades, this gap remains present and significant. This may represent an additional factor that discourages students from actively attending physics classes and consequently leading them to lose interest and attention.

In our frequent discussions with physics teachers, we have come to realize that they also feel a gap related to the concept of modern methodology between them and their students. Despite their desire to adapt to this change, they are unfortunately unable to do so in every physics class due to curricular requirements and teaching time schedule. Physics teachers admit that, according to the curriculum, they are required to cover a vast amount of theoretical content, and most of the time, they lack the time and resources for demonstrations. Moreover, the physical conditions of classrooms and laboratories sometimes make this impossible. For this reason, they feel obliged to use traditional teaching methodologies, as otherwise they will not be able to fulfill the curriculum requirements, even though they are aware that this approach will likely lose students' attention. Thus, heavy theoretical content, formulas to memorize, abstract language sometimes, and few opportunities for hands-on practical learning are pushing students away from physics [16,35].

Our research regarding high school students' interest and preparation for the final physics exam in the “Matura Shtetërore” (“Matura Exams”) shows that over the years, the number of students who have chosen physics as an elective subject has remained almost constant, but their average grade has suffered a slight decline. From the Public Report [36] on Students' Achievements on Matura Exams can be seen that the difference between the annual grade and the physics exam as an elective matura subject is, on average, about 1.16 grade units (Fig. 3). Specifically, at the national level, including all high schools in Albania, this difference is 0.99 grade units. If we consider only high schools in cities, urban areas, this difference drops to 0.93 grade units, but if we examine high schools in villages, rural areas, this difference increases to an average of 1.56 grade units, indicating that students' average annual grade is unrealistic. This leads to doubts about the level of teaching quality in these schools, especially for scientific subjects such as physics. These doubts are further reinforced by the lack of adequate laboratories, teaching facilities, and classroom conditions in general, which are also witnessed by students and teachers. Observations show that the reason behind this situation is not only the lack of investment in these institutions, but also the lack of physics teachers, and the evidently decline in the number of students due to internal migration and mass emigration [37].

Grouping high schools in public and private high schools, we can see that the difference in grade units is higher in private schools compared to that in the public schools, with a total of 1.13 grade units and 0.93 grade units, respectively. This difference may reflect variations in internal assessment systems between public and private schools. Nevertheless, from our observation, in many private schools, there is a completely different system of evaluation for the students, which gives them more chances to have a better final grade, and obviously, this will be reflected in the results. Despite these differences, the overall grade for the physics exam in Matura Exams is considered to be high. These high levels of student achievement are explained by the fact that these subjects are generally chosen by the best students in our pre-education system, at the national level. Unfortunately, only very few of them choose to study physics at university, and this phenomenon has been declining for years now [38].

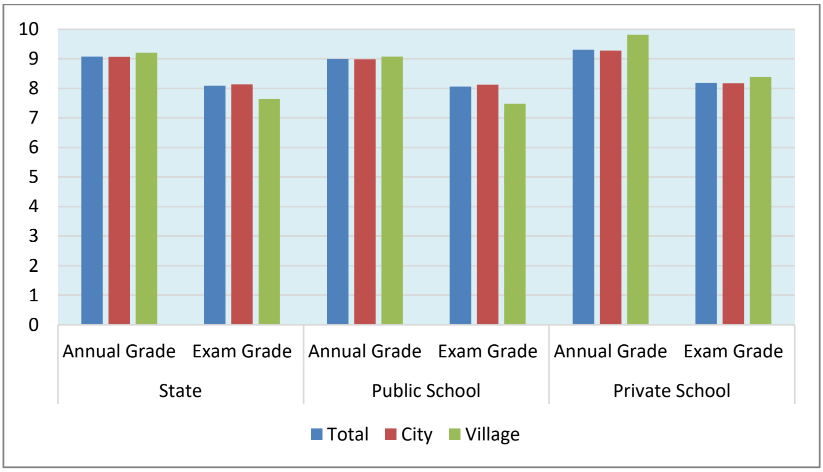

Figure 3: Results of the Annual Grade and Exam Grade for categories: state, public school, private school; City, Village.

According to the Public Report [36] on Students' preference for studying physics, enrolment in physics study program has significantly declined since 2015. Approximately ten years earlier the number of students enrolled in physics was around 150. Consequently, the number of excellent high-school students aiming to pursue this study program was very low. For instance, during the academic year 2017-2018, only 20 students enrolled in the Mathematics-Physics study program at Fan S. Noli University in Korça, with an average grade of 8.62, and only two of them exceeding 9.5. In subsequent years, enrolment declined further: in 2023-2024 and 2024-2025, only one student with an average greater than 9.5 enrolled in similar programs at Ismail Qemali University in Vlora and Luigj Gurakuqi University in Shkodra. Meanwhile, for the current academic year, only two students with an average grade above 9.5 enrolled in the Physics study program at the University of Tirana. These data indicate that enrolment in physics study programs at Albanian universities remains low, and academically high-performing students rarely choose this field of study [2]. This trend cannot be explained solely by technological developments and changing labor market preferences, which often direct students towards fields that are perceived as more secure and financially robust. Interviews with university students and early-career lecturers suggest that, despite minor reforms in the pre-education system, university-level physics teaching is often perceived as outdated and misaligned with students' prior preparation [39,40]. The curricula and textbooks used in universities are overloaded with theoretical concepts, and unlike in the past two decades, when students used to have very good theoretical knowledge, today, they need substantial work and dedication to catch up with the pace of university materials. Due to frequent changes in pre-university school curricula [41] during these two decades, physics and mathematics have undergone numerous changes, being reduced to theoretical scientific concepts that were once considered basic and necessary. This situation creates a significant academic gap, requiring physics students to invest additional effort to meet university-level expectations. Such challenges may further discourage persistence in the physics study program.

In several European countries, the physics subject is developed in a way that places the most significant emphasis on practical work, simple scientific experiments, investigative research, and conceptual evaluation [32]. Textbooks are rich in illustrations, descriptions of real situations, and proposals for structured laboratory activities. The curriculum is designed in such a way that each topic is accompanied by a mandatory practical activity that students must carry out [42]. On the other hand, to encourage experimental work and serious student involvement, at all levels of education, it has been decided that the final assessment of students includes not only multiple-choice exams and essays on theoretical issues and concepts, but also independent research projects, which students present at the end of the course [32]. Such approaches are associated with the increased students' engagement and motivation, to learn more and to be more active. Consequently, students are motivated to investigate rather than memorize, which increases their critical thinking and problem-solving skills. A comparative analysis with EU and OECD frameworks highlights notable structural differences between the Albanian curriculum and those implemented in other European countries. [43–45].

Table 1. Comparison of teaching methods between Albania and EU Countries.

Didactic Element	Albania	EU Countries
Content Focus	Focus on Formulas	Focus on the concept and practice work
Experimental Work	Limited or absent	Integrated into every unit, and sometimes obligatory, and evaluated
Evaluation	Written Exams Only	Portofolio – Continuous Evaluation = exam + project + Ese somemtimes
Real World Connection	Very Little	Dominant
Use of Simulators	Occasionally	Systematic (PhET, LoggerPro), almost in every topic

Over the years, the subject of physics has undergone significant changes in both the conception and treatment of teaching topics in textbooks and the teaching methods. This change is visible in both cycles of pre-university education. Observation show that in lower secondary education (grades 6-9), physics primarily addresses basic and some introductory practical concepts. In many cases, formulas are either minimally included or completely absent, leading to difficulty in understanding. Furthermore, standard symbols for physical quantities are often omitted. As a result, the few formulas presented are frequently expressed verbally rather than through equations and symbolic notation. In high school, grades 10-12, the approach to formulas, symbols, and mathematical expressions improves somewhat; however, their inclusion remains at the discretion of teachers.

Both students and teachers largely agree that simply reading the lesson in the book is not enough to understand the logic behind the connection between concepts (Fig. 1 and Fig. 2). In addition, the topics and concepts introduced in the first cycle are often limited in scope and very basic compared to those required to understand the material presented in the second cycle. This gap may contribute to the increased difficulty students experience when transitioning between two cycles of education. This may partially explain the higher rate of disengagement observed in high school students. On the other hand, in both cycles, it was also observed that topics which are conceptually interrelated are sometime presented separately across different chapters. This fragmentation does not reflect a structured spiral progression of concepts but often results in discontinuity and loss of logical coherence. The distribution of physics topics across grades reveals instances of repetition that do not always correspond to a clear increase in conceptual depth. The study does not question the theoretical validity of the spiral model itself, but rather examines how its implementation may lead to content repetition without sufficient conceptual progression. In such cases, repetition may weaken students' sense of conceptual progress and reduce engagement. To facilitate students' understanding teachers admit that they often follow a different path from the one suggested by the curriculum, because they see that their students encounter many difficulties and subsequently lose interest in the subject.

Currently, the physics textbooks used in Albanian schools are primarily translated from British curricula [46–48]. Based on long-term teaching experience and analysis conducted in this study, it appears that these textbooks are not entirely relevant to our curricula and sometimes are not translated accurately. Another relevant aspect is that the Ministry of Education in Albania allows different schools to choose different physics textbooks for their students. This means that, although they have to follow the same curricula, the way the topics in physics are transmitted to the students is different. Thus, this study suggests that the lack of unification and quality in physics textbooks is another factor contributing to the decline in students' interest in physics. Even teachers admit that the lack of unification in textbook selection is a weak point of our system. Still, having been left with only the option of choosing, they select what they believe is best for themselves and their students. Given that teachers differ in experience and training, the selection process may not always ensure optimal alignment between textbooks and students' needs.

More than ten years ago, the situation with physics textbooks was very different. Before, all students in Albania used to study from the same books as they were unified and selected by the Ministry of Education. Moreover, the physics books were written by Albanian physicists, and their content used to be heavy in theory, also including many formulas. The style of those books was influenced by Eastern methodology, and it was tough to understand; however, they followed a clearer structural progression of topics. According to experienced teachers, previous textbooks demonstrated greater structural coherence, despite being theoretically demanding. Nevertheless, despite all the changes made to improve the situation and increase students' interest in physics, it appears that physics curricula and teaching methodologies still emphasize the mathematical treatment of phenomena and the application of formulas through standard-type exercises. The mathematical treatment remains relatively basic. In majority of the cases, formulas are applied numerically without deeper exploration of the relationship between physical quantities. There is still a marked lack of experimental and interactive activities in the curriculum document and the relevant textbooks.

The participation of Albanian students in international competitions remains at a very low level, and the scores achieved by participants are discouraging. In the first two Balkan Physics Olympiads, organized in 2019 and 2021, there were no participants from Albania. However, in the 2021 Balkan Physics Olympiad, four students participated, and their results were disappointing, as none of them won a medal, despite receiving one Honorable Mention [49]. In the following competitions organized by Balkan Physics Olympiads between 2022 and 2024, no medals were won by Albanian students. However, in 2024, there were two Honorable Mentions from Albania. [50]. Other data shows a similar performance of Albanian students in the PISA performance. Although there is a slight increase in scores referring to science in general, the overall scores of Albanian students remain lower compared to those of other OECD countries [51]. On the other hand, PISA results indicate significant differences in the performance of students attending urban schools compared to those attending rural schools. Moreover, there is also a difference between girls and boys. What remains very disappointing and concerning is the fact that, over the last four years, there has been a visible decline in the science performance of 15-year-old students. They scored 378 points out of 485 in science, indicating a below-average performance compared to OECD countries [52].

4. Conclusions

Physics education in Albania appears to be facing a gradual decline in student interest, engagement, and performance, accompanied by a reduced number of students choosing to pursue physics at university level. The findings of this study suggest that several interconnected factors contribute to this situation. The removal of physics from the list of mandatory Matura exams in 2006 marked an important structural change in the future course of the fate of physics education in Albania. This fact may have influenced students' motivation to study the subject more consistently. In addition, curricular inconsistencies and challenges related to textbooks selection have created confusion and further difficulties for both teachers and students.

At the same time, rapid technological development has reshaped students' interest and expectations toward learning, requiring teaching approaches that integrate traditional scientific methodologies with modern instructional tools. Furthermore, such integration strongly depends on adequate teachers' training and institutional support.

Overall, the results indicate that the current state of physics education is shaped by a combination of policy decisions, curricular structure, instructional resources, and teachers' disposition. Addressing these elements in a coordinated manner may contribute to strengthening the long-term sustainability and relevance of physics education in Albania.

4.1 Recommendation

Based on our research and investigation to identify the possible causes that have led to the decline in interest in the subject of physics, we suggest several recommendations that we consider immediate and appropriate:

Modernization and Improvement of the Curriculum

- Simplification of the content of teaching topics from theoretical excess and increasing their connection with real life and practical tasks.
- Establishing coherence between teaching topics and their logical progression from 6th grade to the final year of high school, ensuring that the review of topics provides a visible progressive conceptual deepening according to a spiral model instead of mechanical repetition without cognitive progress.
- Especially for high school, the distribution of all necessary teaching topics and concepts is important to be carried out throughout the three years of high school, ensuring the inclusion of necessary mathematical knowledge and the increase in academic-scientific level from year to year.
- Inclusion of current topics such as AI, nanotechnology, medical physics, and space physics that increase curiosity in students.
- Improving and updating university curricula and adapting the first-year subjects of the bachelor's program in physics to the knowledge that students have acquired in high-school.

Financial investments for the improvement of physical, virtual laboratories, and digital tools:

- Construction and maintenance of basic physical and virtual laboratories in every school in the country, urban and rural areas;
- Collaborations with educational institutes abroad and technology companies to obtain experimental equipment.

Career development for the improvement of teacher training

- Cooperation with educational institutes abroad for educational mobility for students and staff.
- Mobility of physics teachers between schools within the country, such as short-term visits of physics teachers between schools in urban and rural areas;
- Professional training on the use of interactive methods in the classroom, AI as a virtual assistant for the teacher, and the use of digital and technological devices in the teaching process.

Educational policy and educational stability

- Increasing the number of physics lessons per week, according to the age of the students, by increasing the number of practical rather than theoretical lessons.
- Reducing the teaching load for physics teachers and reducing administrative paperwork to motivate them to work with their students in scientific research and experimental work, according to the scientific level of the class.
- Ensuring policy stability and long-term curriculum consistency.
- Financial support for teachers and students who wish to receive additional training or carry out mobility.
- The opportunity to work as assistant physics teachers for all students who graduate after three years of a bachelor's degree in physics. This would increase the number of teachers of this profile and also fill the shortages in schools in rural areas.

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Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

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