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Article

The Role and Place of Teachers and Students in The Physics Curriculum Under The Credit-Module System: Balance Between Theory and Practice

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Abstract: This study thoroughly examined and analysed the opinions and feedback of physics teachers in higher education institutions on the current physics curriculum. Based on the results obtained, the existing curriculum was compared with a newly developed project-based curriculum. The content, practical applicability and degree of acceptance of the curricula were taken into account during the comparison. Furthermore, the problems, shortcomings and opportunities identified during the research were analysed, followed by reasoned discussions and practical recommendations. A specially designed questionnaire was used to collect data for the study. Fourteen students from the Asian International University, selected from higher education institutions in the centre of Bukhara city, and ten qualified physics and mathematics teachers participated in the study. Important conclusions regarding the current situation were drawn based on their responses.

Keywords: Physics, curriculum, credit-modular system, curriculum development, technological changes, project-based approach

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1. Introduction

In the modern era, the rapid growth of information and technology has led to swift changes in various sectors within our country. In order to fulfil one of the primary functions of education — 'training individuals who are qualified and able to meet the needs of society' — educational curricula must be updated continuously in line with societal development [1].

Technological changes, social needs and transformations can be evaluated from four main perspectives:

1. Students: Students are the primary input element of the education system and must effectively achieve the predetermined competencies. Any factors hindering this achievement must be identified and addressed.

This creates the necessity to improve the existing curriculum. Additionally, problems experienced by students in higher education, failure rates, academic achievement at higher levels or in other institutions, and employment opportunities for graduates should be studied to identify shortcomings in the current curriculum and implement necessary improvements and changes.

2. New knowledge and technological changes: Rapid changes in science and technology have a significant impact on the education system and society. The world is evolving so quickly that education and social systems must develop in parallel. Curricula in higher education institutions should be sensitive to, and responsive of, new scientific and technological advancements. Curricula must reflect these changes, and continuous work on curriculum development is required to adapt to new knowledge and technologies [2].

3. Social needs and changes: The education system aims to provide individuals with the qualifications necessary to meet societal needs. However, rapid changes in science and technology are also bringing significant transformations to the structure and needs of society. Therefore, the curricula introduced in higher education must be capable of responding to these changes. This requires continuous analysis and development. [3].

In conclusion, to ensure the effective functioning and development of the higher education system in line with societal changes, it is essential to continuously improve educational curricula [4].

This is an ongoing strategic process that receives significant attention in all developed countries.

2. Methodology

Curriculum development. From time to time, we hear or read opinions about the necessity of updating and balancing lesson plans. Curriculum development is a multifaceted process involving decisions about the goals students should achieve in different subjects and grade levels. Once these goals and the content to be studied have been set, subsequent stages such as selecting teaching and learning methods and developing instructional materials can begin [5].

The curriculum is defined as follows: 'A coordinated set of efforts within and outside higher education aimed at effectively achieving its goals through the development of content and activities using appropriate methods, techniques, tools and equipment.' However, in our country, curriculum development is often narrowly understood as merely adding or removing lessons or topics, or increasing or decreasing the time allocated to them. This understanding is very limited and insufficient [6].

When forming an effective curriculum, the following must be taken into account: [7]:

1. Individual characteristics and needs.
2. Changes and developments in society.
3. Societal expectations of education
4. Innovations and changes in the subject area

The importance of the teacher in curriculum development Curriculum development is an ongoing and extensive process that requires a wide range of knowledge, experience and skills. Therefore, teamwork is essential. As well as subject matter experts and professional educators, all groups affected by the curriculum should participate, including teachers, students, parents, supervisors, administrators, and so on [8].

Previously, only subject experts were involved in curriculum development, but today, all stakeholders are engaged in the process as much as possible. One of the most important factors in education is the teacher. Teachers are primarily responsible for organising the learning process in accordance with the set goals within the group. At the same time, teachers must educate students to be active, creative and logical thinkers [9].

In fulfilling their duties, teachers carry out various activities based on the current curriculum. Thus, a good teacher is at the heart of curriculum development, finding and developing learning materials and experimenting with changes within the group. During the development and implementation phases of curricula prepared by central organisations, the opinions of teachers should be given particular consideration. Teachers: [10]

1. Participate in initial discussions.
2. Review and evaluate draft curricula.
3. Provide feedback on classroom experiences and any shortcomings identified.

In other words, teachers are the key to bridging the gap between theory and practice [11].

Curriculum development. Previously, the Ministry of Higher Education, Science and Innovations' central organisation — the Council for Education and Training — was responsible for curriculum development. However, over time, the need to plan and implement curricula at the local level has become apparent.

Curriculum development efforts are based on the experiences of many European countries. Nevertheless, despite these efforts, the results achieved are still not at the desired level [12].

There is insufficient cooperation between the Ministry of Higher Education, Science and Innovation and universities. Participation and communication within the expert commission on the latest curriculum are also insufficient. Reports by foreign experts invited to advise on secondary education have also highlighted various issues.

3. Results and Discussion

A questionnaire was developed for physics teachers working in higher education institutions to evaluate the current physics curriculum and propose an alternative. Based on the results obtained from the questionnaire, analysis of the existing physics curriculum in practice was conducted and various proposals were developed accordingly [13].

Table 1. Comparison of Current and Project-Based Physics Curricula

Current Physics Curriculum	Project-Based Physics Curriculum
1. Matter and Its Properties	1. Physics, Measurement, and Scientific Method
2. Matter and Electricity	2. Matter and Its Properties
3. Matter and Magnetism	3. Matter and Electricity
4. Matter and Light	4. Matter and Light

If we look at the current physics curriculum, we can see that the sections 'Physics, Measurement and Scientific Method' and 'Matter and Light' have been added to the existing programme. Table 1:

However, based on the results of the research conducted, teachers expressed the following opinions: - Topics such as 'Pressure', 'Buoyant Force in Liquids' and 'Simple Mechanical Devices' should be added to the current physics course, as questions from these topics appear in university entrance exams. 'Vectors' should be specifically taught during the 'Matter and Electricity' section, as it is used in that context. According to the teachers, the 'Matter and Light' section should also be taught during this period — this section is already included in the draft curriculum [14].

Table 2. Physics Curriculum and Its Project-Based Version.

Current Physics Course Curriculum	
1.	Force
2.	Motion
3.	Newton’s Laws of Motion
4.	Motion on Earth and Universal Gravitation
5.	Momentum and Angular Momentum
6.	Energy and Work
7.	Electrostatics
8.	Electric Current
9.	Magnetism
10.	Electromagnetic Induction

Analysing the draft curriculum for the physics course reveals that it is more simplified than the existing programme, with topics related to electricity having been removed. This finding aligns with the research results. Table 2 shows that teachers consider the current physics curriculum to be very demanding and suggest moving the topic of 'Electromagnetic Induction' to the programme.

Table 3. Physics Course Curriculum Topics

Physics course curriculum	
1.	Light
2.	Wave motion
3.	Theories of light
4.	Atomic theory
5.	Motion of charged particles in an electric field
6.	Solar energy

The findings of this study demonstrate that, while the current physics curriculum is comprehensive, it remains overloaded and insufficiently aligned with examination requirements and modern educational needs. Teachers emphasised that the early inclusion of advanced topics such as electromagnetic induction hinders progressive learning, whereas fundamental subjects such as pressure, buoyant force and simple mechanical devices — essential for university entrance examinations — are absent.

The proposed project-based model addresses these shortcomings by simplifying the content and ensuring a more logical sequence of topics. Furthermore, including Physics, Measurement and the Scientific Method in the alternative curriculum was considered highly beneficial as it equips students with the analytical and methodological skills necessary for higher education and scientific enquiry. The study also confirms that teacher involvement is indispensable in curriculum development, serving as the critical link between theoretical frameworks and classroom practice. In conclusion, while the current curriculum provides breadth, it does not fully satisfy pedagogical and societal demands. The project-based approach offers a more balanced, responsive and practical alternative, emphasising the need for closer collaboration between universities and central authorities in future curriculum reforms [15].

4. Conclusion

The findings of this study demonstrate that, while the current physics curriculum is comprehensive, it remains overloaded and insufficiently aligned with examination requirements and modern educational needs. Teachers emphasised that the early inclusion of advanced topics such as electromagnetic induction hinders progressive learning, whereas fundamental subjects such as pressure, buoyant force and simple mechanical devices — essential for university entrance examinations — are absent. The proposed project-based model addresses these shortcomings by simplifying the content and ensuring a more logical sequence of topics. Furthermore, including Physics, Measurement and the Scientific Method in the alternative curriculum was considered highly beneficial as it equips students with the analytical and methodological skills necessary for higher education and scientific enquiry. The study also confirms that teacher involvement is indispensable in curriculum development, serving as the critical link between theoretical frameworks and classroom practice. In conclusion, while the current curriculum provides breadth, it does not fully satisfy pedagogical and societal demands. The project-based approach offers a more balanced, responsive and practical alternative, emphasising the need for closer collaboration between universities and central authorities in future curriculum reforms.

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