

Methods Of Improving The Quality Of Medical Education Through The Teaching Of Biochemistry, Adjusting Its Teaching And Assessment, And Introducing New Teaching Methods

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Abstract: This article examines strategies to enhance medical education by focusing on the teaching and assessment of biochemistry, acknowledging that effective pedagogy is crucial for elevating educational outcomes and impacting both mental and physical health. We propose a comprehensive framework that integrates traditional pedagogical approaches with Bloom's taxonomy, Cambridge methods, and 5E model, alongside interactive and adaptive learning technologies. By refining assessment methods and incorporating these innovative strategies, our aim is to improve student engagement, understanding, and practical application of biochemical knowledge in medical practice.

Key words: learning, knowledge, skills, biochemistry, medical education, approach, student, teacher, method, evaluation.

Introduction

The correct implementation of educational practices significantly contributes to the advancement of various economic sectors, including medicine. Pedagogical approaches play a crucial role in shaping medical education. With a good pedagogical approach, the education and training of medical personnel can be greatly enhanced, leading to the proper development of their abilities and the growth of the medical field. On this basis, we have chosen to focus on biochemistry because of its critical role in the development of accurate evaluation criteria and its foundational importance in understanding intracellular mechanisms. This understanding is essential for the proper study of pharmacology, therapy, and other medical disciplines, ultimately fostering the effective education of medical students.

In Uzbekistan, one of the primary challenges in medical education is the state's predominant role in managing educational programs. However, recent years have seen the private sector involvement, with universities such as CAU (Central Asian University) and KIUT (Kimyo International University in Tashkent) making significant contributions. Within this context, work on medical education has emerged as a sub-discipline. Considering the scarcity of studies conducted in this area of research in Uzbekistan in the past, we attempt to contribute to this field. The first process includes improving the quality of teaching biochemistry and developing a criteria list of knowledge assessment among students.

The **IB (International Baccalaureate) learner profile** describes a broad range of human capacities and responsibilities that go beyond academic success. They imply a commitment to help all members of the school community learn to respect themselves, others, and the world around them. The IB program aims to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world[1]. There are 10 main characteristics of this profile: inquirer, knowledgeable, thinker, communicator, principled, open-minded, caring, risk-taker, balanced, and reflective.

- **Inquirers** - students should nurture their curiosity, developing skills for inquiry and research. They should know how to learn independently and with others.
- **Knowledgeable** - students should develop and use conceptual understanding, exploring knowledge across a range of disciplines. They engage with issues and ideas that have local and global significance.
- **Thinkers** - students use critical and creative thinking skills to analyze and take responsible action on complex problems. They exercise initiative in making reasoned, ethical decisions.
- **Communicators** - students express themselves confidently and creatively in more than one language and in many ways. They collaborate effectively, listening carefully to the perspectives of other individuals and groups.
- **Principled** - they act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. Students take responsibility for their actions and their consequences.
- **Open-minded** - students should critically appreciate their own cultures and personal histories, as well as the values and traditions of others. They seek and evaluate a range of points of view, and are willing to grow from the experience.
- **Caring** - students must show empathy, compassion, and respect. They have a commitment to service, and they act to make a positive difference in the lives of others and the world around them.
- **Risk-takers** - they should approach uncertainty with forethought and determination; they need to work independently and cooperatively to explore new ideas and innovative strategies. They are resourceful and resilient in the face of challenges and change.
- **Balanced** - students must understand the importance of balancing different aspects of their lives—intellectual, physical, and emotional—to achieve well-being for themselves and others. They recognize our interdependence with other people and with the world in which they live.
- **Reflective** - students must thoughtfully consider the world and their ideas and experiences. They should work to understand their strengths and weaknesses in order to support their learning and personal development.

Integrating biochemistry teaching with the IB Learner Profile and the 5E Model of pedagogy provides a comprehensive approach to student development and understanding. By utilizing the 5E model biochemistry instruction can foster attributes of the IB Learner Profile such as being inquirers, thinkers, and reflective individuals.

The 5E Model of Instruction includes five phases: Engage, Explore, Explain, Elaborate, and Evaluate. It provides a carefully planned sequence of instruction that places students at the center of learning. It encourages all students to explore, construct an understanding of scientific concepts, and relate those understandings to phenomena or engineering problems, says Rodger Bybee[2].

1. **Engage** - The first phase is to engage which is mainly about getting students' attention and focus.
2. **Explore** - The next stage is explore. In this stage, students get to investigate and try things out on their own.
3. **Explain** - Here students explain what they have learned from exploring
4. **Elaborate** - In this phase, students use what they have learned in new ways.
5. **Evaluate** - In the final stage, both students and teachers check to see how well the students understand the material.

Is there any positive development when we compare our previous books to new editions?

Comparing past to present

The role of scholar books is as high as the teaching methodology. And that could be the reason that after 2020, there was reform in the Uzbekistan scholar books and curriculum, initiated by the Uzbek government. Here are key changes:

1. Curriculum updates:

- There have been several improvements in the school curriculum to enhance the quality of education. It includes the introduction of new subjects, modern methodologies, and latest content in the existing subjects.

2. Technology Integration:

· 2022 Textbooks have more connection to digital resources, which aims to better embodiment technology into learning. For example, QR codes linking to online resources and usage of education platforms.

3. Pedagogical Approaches:

The modern type of pedagogical approaches added to the textbook. It includes the 4C teaching methodologies with skills like critical thinking, creative thinking, communicating, and collaborating. Obviously, these skills are meant for making a productive lesson both for the teacher and students.

4. Environmental and Practical education:

- More environmental-related content can be found in the new textbooks, developing a sense of love towards ecology among students. New textbooks include more environmental awareness, sustainable development, and practical knowledge.

5. Global Perspectives:

- Introductory content on global perspectives is more available in the 2022 textbooks in order to raise pupils to become more aware and engaged with the rest of the world outside Uzbekistan.

These changes, therefore, remain quite positive in improving education quality and ensuring adequate preparation of students for their future.

Ways to improve the education system of Uzbekistan

Adaptation of educational programs/curriculum of other countries in Uzbekistan

- A)** Applying educational practices and curricula from other countries can also be helpful as it can show how the standards of education in Uzbekistan can be improved. This adaptation involves comprehending the effectiveness and limitations of other countries' education systems and finding places that the practices can be integrated into Uzbek education.
- B) Needs Assessment:** A needs assessment that is comprehensive is the first step that has to be taken to adapt educational programs. This involves collecting information on the current status of education in Uzbekistan, in terms of students' achievements, teachers' credentials, school facilities and teaching aids. Self-administered questionnaires, interviews or focus groups with students, teachers, parents and education administrators and officers may reveal the current situation and challenges in need of enhancement. Furthermore, comparison with other countries' education system can also reveal what has been done right and what needs improvement in the practice of Uzbekistan.

- C) Pilot Programs:** Pilot programs should be conducted in some schools before adopting new programs for the implementation of educational programs across the country. Such pilot programs enable the development of the new curricula and the teaching methodologies and check their feasibility on the limited scale. Through observing the results and collecting responses from teachers and students, there will be an understanding of what can go wrong soon enough to fix it. When an effective pilot has been carried out inputs can then be extended to additional schools over time while avoiding disruptions to the education system.
- D) Teacher Training:** Successful adoption of educational programs entails a massive level of training among teachers. They also require to be informed and educated to teach the new curriculum and viable teaching approaches. Continuing and staff development should address instructional methodology, behavioral disorders, instructional media, and content specialty. Workshops, seminars and other online classes focusing on professional development help teachers to be abreast with the current trends within practices in their teaching field. Also, strengthening programs that allow effective teachers to provide assistance to their inexperienced counterparts could also help in the development of teacher training.
- E) Infrastructure:** There is a need to make improvements on the schools and make it easier to access some of the technologies in learning. Some subcategories include classroom, laboratory, library, and instrumental facilities with improvement of school infrastructure to improve learning experience. Furthermore, supplying schools with contemporary technology, for example, computers, tablets, interactive whiteboards, and fast internet connections is helpful for technologies' inclusion into the process of education. To reduce the gap created by socio-economic differences in students' access to technology and education, it is important that every student receives high quality technology regardless of his status.
- F) Vocational Training:** Improving the vocational training schemes can make a student fit the market challenges appropriately. It can also be beneficial to ask industries, businesses, and vocational training institutes to participate in the provision of curriculum content so that it matches the needs of these estates. Enrolling for vocational courses, apprenticeships, and internships can enable students to gain practical experience in the job market and hence increase their chances of getting employment. In the same regard, teaching entrepreneur education and building an entrepreneurial culture enhances student's conformability to search for careers in the uncharted realm.
- G) Can We Adapt?**
Yes, Uzbekistan can effectively retrieve educational programs of other nations by inferring cultural, social, and economical parameters. It is possible to divide the plan by stages, first introducing pilot projects and gradually increasing their number, in order not to disrupt the work of the organization. It is crucial to assess the possibilities of applying all of the above approaches in Uzbekistan and adjust the adapted programs to the local context. Regarding the strategies aimed at the adaptation and sustainability of the new educational programs, it should be noted that the active involvement of stakeholders, provision of sufficient resources, and the regular analysis of the implementation process can facilitate effective implementation of the change initiatives.
- H) Which Country is Better to Take From?**
- i) **Finland**
Strengths: Education system in Finland has been rated amongst the best due to flexibility allowed to the teachers, the students' welfare as well as the program that is offered to them. Primarily, the Finnish teachers are well-trained and well-credited members of society and are free to introduce new strategies of teaching. Education in Finland also majors on the enhancement of thinking skills particularly critical thinking, creativity and problem solving skills.
Applicability: The ideas presented in the movie, like the Finnish emphasis on equality and very limited 'outside the box thinking / multiple choices' testing, could promote transformations in the socio-cultural circumstances of the Uzbekistan education system: an opportunity to develop a new approach to stimulate practice-based student evaluations and to advance teachers' professional proficiency. Thus, adopting Finland's student-centered approach, Uzbekistan can contribute to the creation of a more helpful and interesting learning atmosphere.
- ii) **South Korea**

Strengths: Finally, as for the general information, it is necessary to note that the Korean education system is famous for its strict admission criteria, academic programs, and especially for a focus on the so-called STEM disciplines. Regarding PISA, South Korean students continuously show favorable results in competitions associated with overall and specifically, mathematics and sciences.

Applicability: For that reason, the outcomes of STEM education in South Korea can be used to improve the teaching of science and technology subjects in Uzbekistan. By applying the features of the South Korean education system's concentration on a hard academic curriculum and effective STEM program, Uzgaz can prepare students for the requirements of a contemporary world economy.

iii) Singapore

Strengths: Hence Singapore can be said to have an effective bilingual policy, a strong focus towards mathematics and science and most importantly; effective methods of pedagogy. Singapore has been performing well in competitive international tests, and its students offer superior problem solving abilities due to THE curriculum that is taught in the country.

Applicability: Thus, it is possible to note that Singaporean bilingual approach and high value on the quality of education can be applied to enhance the level of language learning as well as educational performance in Uzbekistan. Thus, incorporating Singapore's modern approaches to teaching and learning accompanied by a planned curriculum can contribute to the development of the general learning process in Uzbekistan.

iv) Japan

Strengths: Discipline, respect and equality between academic and casual education system is also practiced in the Japanese education system. Japanese students have basic skills as well as strong character build up all thanks to their schools.

Applicability: Japan's balanced conception and orientation could be deemed useful for developing the students in Uzbekistan more harmoniously. If Uzbekistan could take the best out of Japan and process it into the school system, then discipline, respect and with it character development would be part of the arsenal with which the new generation is armed.

Comparative Table of Key Education Metrics

Metric	Uzbekistan	Finland	South Korea	Singapore	Japan	USA
Student-Teacher Ratio	17:1	12:1	16:1	14:1	14:1	16:1
Average Class Size	25	20	23	25	26	24
Literacy Rate	99.98%	100%	100%	97.5%	100%	99%
Education Expenditure (% of GDP)	6.2%	5.5%	4.5%	3.2%	3.3%	5%
PISA Ranking (2018) - Overall	53	3	6	2	15	13

l) Education System Structure

Educational Feature	Uzbekistan	Finland	South Korea	Singapore	Japan	USA
Use of Technology in Classrooms	Moderate	High	High	Very High	High	Very High
Teacher Training Programs	Developing	Extensive	Extensive	Extensive	Extensive	Extensive
Vocational Training Emphasis	Moderate	High	High	High	High	High
Student Well-being Programs	Developing	Extensive	Developing	High	High	High

Conclusions

1. Specific aspects of the above-mentioned methods (IB, Cambridge, Model 5E) should be adapted to the teaching of medical education in Uzbekistan.
2. The correct use of assessment criteria, correct grading, scoring of each question according to its level, correct overall summative assessment of students by formative methods should be brought to assessment. This indicates whether the student is on the right or wrong cycle of development.
3. Familiarizing the teachers teaching in this area with the criteria for summarizing their knowledge and skills, familiarizing them with assessment methods and training them will lead everyone to the same thinking.

If we use the methods mentioned above, it will lead to the development of medicine itself at the same time as education. Also, it will strengthen the social protection of the life of people living in Uzbekistan, if they receive quality medical care, their labor efficiency will improve and they will be less ill, and this will be of great benefit to our economy.

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