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THE PEDAGOGICAL AND PSYCHOLOGICAL ASPECTS OF PREPARING FUTURE CHEMISTRY TEACHERS FOR INTERNATIONAL ASSESSMENT STUDIES

Tilyabov Maxsudjon Umurzokovich
Uzbekistan-Finnish Pedagogical Institute
E-mail: tilyabov_maq@mail.ru

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Abstract: This article discusses the pedagogical and psychological aspects of preparing future chemistry teachers for international assessment studies. It highlights the scientific research of scholars and their pedagogical-psychological perspectives. Additionally, the works of authors who have conducted research on developing competencies for international assessments, as well as those who have created educational manuals and didactic materials in this area, are analyzed. The research findings and the methodological section mainly present an analytical review of scholars' scientific works.

Keywords: functional literacy, PISA, cognitive level, interactive environment, modeling, adaptive, productive.

ПЕДАГОГИЧЕСКИЕ И ПСИХОЛОГИЧЕСКИЕ АСПЕКТЫ ПОДГОТОВКИ БУДУЩИХ УЧИТЕЛЕЙ ХИМИИ К МЕЖДУНАРОДНЫМ ОЦЕНОЧНЫМ ИССЛЕДОВАНИЯМ

Аннотация: В данной статье рассматриваются педагогические и психологические аспекты подготовки будущих учителей химии к международным оценочным исследованиям. В ней освещаются научные исследования ученых и их педагогико-психологические перспективы. Кроме того, анализируются работы авторов, проводивших исследования по формированию компетенций для международных оценок, а также тех, кто создавал учебные пособия и дидактические материалы в этой области. Результаты исследования и методический раздел в основном представляют собой аналитический обзор научных работ ученых.

Ключевые слова: функциональная грамотность, PISA, когнитивный уровень, интерактивная среда, моделирование, адаптивный, продуктивный.

INTRODUCTION

On January 28, 2022, by the Presidential Decree of the Republic of Uzbekistan (PF-60), titled "On the Development Strategy of New Uzbekistan for 2022-2026," significant work is being carried out to fundamentally improve the quality of education and raise the knowledge and qualifications of pedagogical staff to an international level in order to build the foundation of New Uzbekistan and the Third Renaissance. Additionally, the prospects for national development are being reviewed. Reforms are being implemented within the country's continuous education system, which aims to develop educational and cognitive competencies in students based on advanced international practices, and to ensure the development of modern competency-based approaches within the general secondary education system.

The Level of Study of Problem

In our country, the issues of measuring and assessing the quality of education, ensuring that students receive high-quality education based on international assessment studies, have been explored in the scientific works of scholars such as D.M. Maxmudova, M.T. Ergasheva, I.E.

Shernazarov, G'.A. Razakov, and Z.B. Sangirova. Scholars from the Commonwealth of Independent States (CIS) countries, such as G.S. Kovaleva, L.O. Roslova, G.A. Sidorova, A.Y. Pentin, have researched the assessment and development of creative thinking in the context of the PISA international study; the development of functional scientific and financial literacy in students and future chemistry teachers; O.A. Rudze, Ye.S. Kvitko, K.A. Krasnyanskaya, L.O. Roslova, L.O. Denisheva, I.I. Karamova have researched the development of mathematical literacy; and S.Ye. Dyukova, T.V. Koval, and others have conducted scientific research on global competencies.

Research Tasks:

To create the scientific and methodological support for preparing future chemistry teachers for international assessment studies, based on the integration of natural sciences.

To develop context-based tasks aimed at forming competencies in the PISA international study (functional literacy, creative activities, and natural science literacy).

To develop a methodology for enhancing the functional literacy of future chemistry teachers based on international assessment studies and to ensure the correlation of tasks with cognitive levels.

To improve the methodological system for preparing future chemistry teachers for professional activities, based on the content of students' independent activities with a focus on productive sustainability.

To develop a non-traditional approach to preparing future chemistry teachers for international assessment studies, aimed at enhancing scientific competencies in alignment with international assessment programs.

Research Methods:

To achieve the research tasks, the following methods were used:

Theoretical analysis of philosophical, psychological, pedagogical, and professional literature on the topic.

Pedagogical modeling.

Experimentation, surveys, and tests conducted among future chemistry teachers at higher education institutions, along with generalization, comparison, and systematization.

Pedagogical experimental work, including diagnostics and forecasting, organizational preparation, practical and summarizing stages, with statistical analysis methods.

Practical Results of the Research:

The creative support for future chemistry teachers, as well as qualification requirements, curricula, and educational-professional programs, have been improved.

The levels and criteria for enhancing the creative competency in the functional literacy of future chemistry teachers have been developed.

An educational and methodological manual for integrating advanced pedagogical and information-communication technologies into the educational process for future chemistry teachers has been created.

Contextual tasks for improving the functional literacy of future chemistry teachers have been developed.

METHODOLOGY

Educational activity is such a type of activity in which the psychological processes of an individual are formed and developed, leading to the emergence of new activities. Educational activity is a continuous process that manifests itself throughout a person's life.

The Russian psychologist A.N. Leontiev emphasized that there are psychological and practical forms of human activity, and that the mind of the student primarily develops through educational activities [1; pp. 232-241]. D.B. Elkonin pointed out the characteristics of educational activity, emphasizing its social nature based on its essence, content, and manifestation forms [2; pp. 22-31].

Educational activity is such an activity where, as a result, the student undergoes changes. Its product must be built on various motives. These motives should be directly related to the personal growth and development of the student. Educational activity is closely related to the concepts of education, reading, and learning. Education is the activity of cooperation between the teacher and the student, where the teacher imparts knowledge, skills, and competencies to the students.

The process of education is focused on acquiring information, actions, and forms of behavior. The concepts of reading and teaching are directly related to educational activity, and they serve to acquire knowledge, skills, and competencies.

There are five elements of educational activity:

- Learning motives.
- Educational tasks.
- Educational actions.
- Teacher's supervision.
- Teacher's assessment.

According to D.B. Elkonin, the formation of educational activity is a process in which students gradually learn to perform tasks independently, without the teacher's direct participation, based on the experience of their activity [2; p. 38].

The educational process consists of several components and is organized and managed by the teacher. It organizes and supervises the students' educational activities.

The educational process includes five key elements:

- Educational goal – Why is it necessary to teach?
- Educational content – What should be taught?
- Methods of teaching, techniques, and pedagogical communication.
- Teacher.
- Student.

Organizing the educational process involves acquiring the necessary external world information and integrating it into various types of activities to ensure the correct selection and application of methods and procedures, in line with the educational goals.

The success of the educational process depends on:

- Motivation.
- Teaching methods.
- Clarity of the information.
- Memory.
- Application of knowledge.

The development of the student in the educational process is a key psychological issue. Several theories have been developed about the problem of education and development, one of which emphasizes the gradual development of intellectual behavior, knowledge, skills, and competencies [3; pp. 111-114].

V.V. Davydov's theory emphasizes the importance of teaching students at primary school age to master scientific concepts. In this process, students must internalize the system of educational concepts, which leads to the transition from specialized to general knowledge [4; p. 31].

According to A. Savenkov, the psychological foundations of education cover many issues. The success of education is influenced by several psychological factors. First, it is necessary to focus on the student's attitude towards learning. This attitude is expressed in their attention, emotions, interests, and will, and is visible in their chosen path [5; pp. 11-20].

In today's world, the goal is to create innovative educational systems and provide teachers with training that meets global standards. One of the key tasks is to prepare future teachers for using diverse technological and pedagogical tools that can engage students and enhance their learning experience.

S.Y. Andreyeva emphasized that the selected educational materials should align with the subject program requirements, facilitate the students' understanding of academic knowledge, enhance their cognitive abilities, independent and creative thinking, and their logical reasoning skills [6; p. 11].

Jean Piaget's Theory According to the Swiss psychologist Jean Piaget, a child's cognitive development follows internal laws and progresses through a series of genetic stages. Education can only speed up or slow down this process but cannot significantly influence cognitive development itself. Therefore, education should align with the laws of development. The educational process must cater to the psychological capabilities of the child at the relevant developmental stage. Without education, complete cognitive development is impossible, and when conditions are favorable, education helps form logical thinking skills and lays the foundation for cognitive growth.

Lev Vygotsky's Theory Russian psychologist L. S. Vygotsky, in contrast, viewed education and development from the perspective of a socio-historical process. He emphasized that acquiring knowledge is a process of participating in the culture and history of humanity. According to his cultural-historical theory, the development of psychological functions involves moving from external expressions to internalization. Each tool or method should assist in understanding the essence of a subject, allow students to independently solve creative tasks, foster interest in science, and contribute to the development of competencies.

Shaping Competencies in Future Chemistry Teachers In the educational process, it is crucial to form both theoretical and practical skills in future chemistry teachers. This involves using visual aids, integrating innovative technologies into educational practices, and presenting learning materials in ways that promote productivity, reproducibility, and cognitive engagement. The aim is to integrate creative approaches and competency-based teaching into the educational process, enhancing the effectiveness of knowledge delivery.

The Role and Emotions of the Teacher The teacher plays a critical role in the learning process, as they guide students in developing necessary skills. Teachers need to show students what to focus on, whether it is short-term or long-term knowledge retention, and how to understand concepts. Moreover, the emotional aspect of education is significant. If no emotional involvement is conveyed when providing information, students may struggle to retain and recall the material effectively. Positive emotional states, such as joy and optimism, enhance the productivity of learning activities and help students absorb the material more effectively.

Future teachers must take responsibility for the emotional aspect of the educational process. This issue holds significant importance. First and foremost, because the content of education has become increasingly complex and its scope has expanded substantially. To successfully assimilate this content, students' educational activities must be strengthened. Positive attitudes significantly influence the effectiveness of the educational process.

It is well-known that in psychology, two types of student interest are identified in the learning process: direct interest and indirect interest. Every future teacher strives to develop indirect interest among students regarding the subject. Through interest, students demonstrate an active attitude toward learning. In psychology, interest is the relationship a person has with something that is valuable or enjoyable to them.

When students pursue a specific goal, overcome challenges, avoid distractions, and develop a desire for learning, their determination becomes of special importance in the educational process.

Psychological research has shown that the assimilation of materials provided by teachers is closely related to the development of willpower. Willpower is a crucial condition for active learning.

In the educational process, particular attention must be paid to the development of cognitive processes. Cognitive activities are very complex, involving a transition from direct observation to abstract thinking, and from abstract thinking to practical application, ultimately leading to the acquisition of objective reality. Therefore, the first thing we need to consider is the process of perceiving educational material. As noted in general psychology, perception refers to the process by which sensory input leads to the formation of mental representations or images in a person's mind. The process of perception in education can take various forms, such as oral explanations by the teacher, discussions, lectures, visual aids, field trips, and the use of information and pedagogical technologies. It's important to note that age characteristics of students must be considered when developing their perceptual abilities, as there are notable differences in the perception of space, time, and movement between age groups.

The process of learning is directly linked to human motives, with its essence reflecting the internal consistency of human behavior, which can be seen in the motivating concepts that drive actions.

The process of acquiring knowledge and its psychological components are fundamental to understanding education. The result of education is the assimilation of knowledge, with both internal and external activities changing to align with specific goals. Education allows one person to impart knowledge and skills to another. Knowledge, skills, and abilities are the outcomes of the educational process. The problem of the process of assimilating knowledge has been explored by P.Y. Galperin and N.F. Talizina. They developed the theory of the step-by-step formation of intellectual actions, explaining how intellectual activities are expressed in external speech and internal thought. The first stage of intellectual actions is the use of symbols such as drawings, diagrams, and shorthand signs.

For students to continuously assimilate updated information independently and, after completing their studies, not fall behind in the rapidly advancing fields of science and technology, they must develop intellectual abilities that enable them to keep pace with these changes.

The development of creative thinking and the formation of imagination in students are fundamental tasks of modern education.

In the context of Uzbekistan's participation in international assessments, there has been a focus on preparing students for these evaluations. Several experts have worked on creating tasks and seminars aimed at developing students' scientific literacy, in line with international standards.

D. Asqarova and S. Akbarova's guide on international assessments offers practical examples and tasks that aim to shape students' understanding of science in international studies.

A.A. Ismailov, G.O. Togayev, S.R. Akbarova, and D. Asqarova's work on evaluating scientific literacy in natural sciences through PISA offers examples of tasks for assessing students' literacy in the natural sciences.

A.A. Ismailov, X.J. Daminov, N.A. Karimov, X.P. Ahmedov, G.O. Togaeva, Z.A. Kasimov, "In the first issue of the bulletin intended for preparing students for international research, examples of tasks related to mathematics, natural sciences, reading literacy, and creative thinking in international studies are presented. All these tasks are from the international assessments of PISA, and they have been tested in practice [15].

A.A. Ismailov, X.J. Daminov, N.A. Karimov, G.O. Togaeva, Q.K. Karimberdiev, Z.A. Kasimov, "In the second issue of the bulletin intended for preparing students for international research, examples of tasks related to mathematics, natural sciences, reading literacy, and creative thinking are provided. All these tasks are from the international assessments of PISA, and they have been tested in practice. In addition, the descriptions of the tasks, answers, and their assessment criteria are also provided [15].

In the guidebook titled "The Scope of Assessing Creative Thinking in the PISA Study" translated by D. Maksudov, the necessity of assessing creative thinking, the general scope of PISA assessments as a proof, the identification of assessment areas, understanding and evaluating creative thinking in the educational process, individual factors related to creative thinking, social factors influencing creative thinking, and the significance of developing creative thinking assessment in the PISA research are thoroughly explained [16].

In the guidebook titled "PISA 2018 Reading Literacy Scope" translated by E. Tursunov, definitions, areas of reading literacy, assessment of reading literacy, and the importance of abilities in reading literacy are provided [17].

A.A. Ismailov, X.J. Daminov, Z.A. Kasimova, G.A. Pirimov's "Assessing Creative Thinking" guidebook contains all the necessary information regarding the assessment of creative thinking in the PISA study.

In the CIS countries, a number of scholars are conducting experiments and research aimed at improving the quality of education and aligning with international assessment systems. For example, G.S. Kovaleva [18], L.O. Roslova, G.A. Sidorova, A.Y. Pentin [19], have been conducting research on assessing and developing creative thinking in the context of the PISA international study; the concept of the teacher's creative activity, as well as possible ways of its formation and development, and the basis of shaping creative and innovative abilities in students, as well as shaping the functional scientific literacy of future teachers and students.

Based on the tasks used in the PISA international program, G.S. Kovaleva, E.A. Krasnovskiy, L.P. Krasnokupitskaya, K.A. Krasnyanskaya have developed a set of tasks for shaping skills in working with tasks related to reading, mathematics, and natural sciences for student youth [20].

G.S. Kovaleva, A.Yu. Pentin, G.Yu. Semenova, E.A. Nikishova, K.P. Vergeles, N.A. Zagranichnaya developed a collection of reference materials for shaping skills in natural scientific

literacy based on tasks from international assessment research. The first and second issues of this collection have been prepared.

E.L. Rutkovskaya, E.S. Korolkova, A.A. Kozlova, A.V. Polovnikova, G.S. Kovaleva, A.A. Bochixina, and N.V. Shtilman developed and implemented a collection of reference materials for shaping students' financial literacy (Issue 1, Part 1 and Part 2 of Issue 2).

Research conducted on shaping students' mathematical literacy and international assessment tasks based on shaping mathematical literacy skills, along with context tasks (Reference material Issue 1, Parts 1-2, and Issue 2, Parts 1-2), has been identified in the works of O.A. Rydze, G.S. Kovaleva, E.S. Kvitko, K.A. Krasnyanskaya, L.O. Roslova, I.I. Karamova, L.O. Denishcheva [21-22].

In the area of functional literacy, global competencies widely used in current international assessments, reading literacy, and the creative (innovative) thinking of students have also been subjects of numerous scientific studies. Based on tasks from international assessments to shape these competencies, collections of reference materials and context task sets have been developed to enhance students' literacy. For example:

- S.E. Dyukova, G.S. Kovaleva, and T.V. Kovallar developed context tasks on shaping global competencies (Reference materials Issue 1 and 2).
- A set of tasks on shaping students' creative (innovative) thinking (Creative thinking tasks Reference materials Issue 1 and 2) was developed by O.B. Loginova, G.S. Kovaleva, N.A. Avdeenko, S.G. Yakovleva, M.Yu. Demidova.
- Tasks on shaping students' reading literacy were developed by M.I. Kuznetsova, G.A. Sidorova, G.S. Kovaleva, L.A. Ryabinina, Yu.N. Gosteva, T.Yu. Chaban (Reading literacy. Reference materials. Issue 1, Parts 1-2, Issue 2, Parts 1-2), and implemented in practice.

E.M. Bazilevich's scientific work focuses on developing students' creativity in visual educational activities and researching related sources.

E.V. Bugakova's research explores the self-development sources of creative thinking and their role in general secondary education. The goal of the research was to establish the composition and functional model of self-development in creative education for secondary school students.

L.S. Baytimerova's study addresses shaping creative skills in secondary school students within the educational process and provides recommendations for this.

V.M. Grebennikova's research covers the continuous pedagogical process in schools and universities as a means of developing creativity in secondary school students and future teachers.

K.B. Belikov's research on developing creativity in future chemistry teachers includes shaping their professional competencies and has produced recommendations that have been implemented in practice.

E.V. Sivak and I.V. Fitzlar conducted research on shaping natural scientific literacy in students in grades 7-8 within the school educational environment.

D.M. Mirzanurova's scientific articles provide interesting resources on shaping natural science literacy in chemistry classes.

T.S. Skileva's work draws on teachers' professional experience to shape natural science literacy in students and teachers.

Russian psychologist E.M. Bazilevich conducted research on students' creativity in visual activities and developed programs for their purposeful development within the educational process.

E.V. Bugakova explored the self-development of creative thinking in secondary school students in the context of creative education, aiming to base the composition and functional model of self-development.

In shaping creative skills in secondary school students, L.S. Baytimerova's work can be referred to, which focuses on creating a model for shaping creative skills in students during the educational process.

Research by K.B. Belikov emphasizes shaping the professional competencies of future chemistry teachers to foster student creativity. The goal is to develop a model for enhancing creativity in secondary school students by shaping the professional competencies of future teachers.

The text you've shared covers the research and pedagogical approaches focused on developing functional scientific literacy in school students. Below is a summary of the key points:

T.P. Pauudis' Research: Pauudis' works on the development of functional scientific literacy highlight that the formation of such skills should be aligned with national education policies. The goal is to improve the quality of education and create an environment conducive to achieving a new educational standard.

E.V. Sivak and I.V. Fits: Their studies focus on the educational environment in schools, particularly in grades 7-8, as a critical space for shaping students' scientific literacy. They stress that the school environment plays a key role in the development of functional literacy.

D.M. Mirzanurova: Her work emphasizes that the aim of education in the field of chemistry is to form students' understanding of the natural world and their ability to apply functional literacy to solve real-life problems. She stresses that functional literacy is a foundation for active participation in social, cultural, and economic life.

T.S. Skileva: Focused on the teaching of natural sciences, particularly in geography and biology, Skileva discusses how these subjects can contribute to the development of scientific literacy.

Mathematical Literacy (O.A. Rudze, G.S. Kovaleva, et al.): This work focuses on developing students' ability to apply mathematical knowledge in real-world situations. The goal is to help students see the relevance of mathematics in everyday life.

Creative Thinking (O.B. Loginova, G.S. Kovaleva, et al.): This research is centered on fostering creativity in students. The focus is on tasks and information that help students apply their school knowledge to solve real-life problems, while also promoting independent and collaborative work. Tasks are designed for students aged 10-13 years.

Scientific Literacy (G.S. Kovaleva, A.Yu. Pentin, et al.): The collection of tasks designed by these authors aims to help students develop the ability to apply scientific knowledge to address real-world environmental and nature-related problems. These tasks are intended for students aged 10-13 and 13-15 years, depending on the level of difficulty.

Global Competence (S.Ye. Dyukova, G.S. Kovaleva, et al.): This research aims to develop students' global competence, focusing on their ability to engage with global issues, understand cultural relations, and critically analyze social and environmental challenges. Tasks are designed for students aged 10-13 and 12-16 years, encouraging them to work independently or in groups.

These pedagogical approaches all share a common goal: enhancing students' ability to apply academic knowledge in real-world contexts, thereby fostering functional literacy that prepares them for active participation in society. Would you like more information about any of

these specific studies or how they contribute to the development of functional literacy in education?

The research and methodology provided by S.Dyukova, G.S. Kovaleva, and T.V. Kovallar on "Functional Literacy" and "Global Competence" focuses on the development of global competencies in students. Here's a breakdown of the key points:

Global Competence Development:

The primary goal of this research is to enhance students' ability to critically examine global problems and cultural relations, which are essential for successful socialization in the modern world.

This approach aims to foster critical thinking skills regarding the global issues and cultural interactions that students encounter.

Task Collection for 10-13-Year-Old Students:

The first version of the task collection is designed for students aged 10-13 years.

It includes a series of tasks that focus on global issues and relationships between cultures.

Tasks are structured with descriptions, expected answers, and evaluation criteria to guide students' learning and assessment.

The tasks encourage independent or collaborative work, helping students engage with the topics deeply.

Interactive Tasks for Functional Literacy:

The tasks in the collection help students familiarize themselves with all components of functional literacy.

They are designed to be interactive, facilitating engagement with the content and promoting a more active learning environment.

Task Collection for 12-16-Year-Old Students:

The second version of the task collection is targeted at students aged 12-16 years.

Similar to the earlier collection, these tasks also focus on global issues and intercultural relationships, but the complexity is increased for the older age group.

This set of tasks also encourages both independent and group work, fostering collaboration and critical discussions on global problems.

Key Focus:

Both collections emphasize the development of critical thinking and the ability to analyze and engage with global and intercultural issues.

The tasks are intended to help students apply their learning to real-world situations and understand the importance of global competence for their future roles in society.

This methodology aims to cultivate a well-rounded global perspective in students, enabling them to navigate the complexities of an interconnected world effectively. If you need more details on how these tasks are structured or examples of them, feel free to ask!

Scientific Literacy refers to the understanding of scientific concepts and methods that are crucial for making informed decisions, participating in societal and cultural activities, and promoting economic efficiency. It encompasses not only the understanding of facts but also the ability to engage with them in practical, meaningful ways in real-world contexts. Scientific literacy is closely linked to the understanding of natural phenomena, critical thinking, and the application of empirical methods such as observation, experimentation, and statistical analysis.

Key Elements of Scientific Literacy:

Understanding Scientific Facts and Principles: Scientific literacy involves grasping scientific facts and their meanings, especially in subjects like physics, chemistry, biology, ecology, and geology. This understanding enables individuals to make decisions based on scientific evidence.

Critical Thinking and Problem-Solving: A scientifically literate individual can think critically, experiment, and reason logically. They should be able to explain phenomena, draw conclusions based on evidence, and evaluate the validity of information based on its source and methodology.

Contextual Knowledge and Application: Scientific literacy isn't just about understanding science in abstract terms. It requires the ability to apply scientific knowledge to solve real-world problems, like climate change, ecological issues, and sustainability challenges.

Correlation with Other Areas: The concept of scientific literacy is tied to other areas such as environmental, economic, and social literacy. Understanding the interconnectedness of these issues is crucial for informed decision-making and societal participation.

Global and Environmental Awareness: In the context of global challenges, such as climate change, energy conservation, and ecological balance, scientific literacy enables individuals to comprehend and contribute to solutions. It connects the understanding of natural systems with actions aimed at improving human well-being and environmental sustainability.

Historical Development of the Concept: Initially, scientific literacy was understood in simpler terms. However, as scientific understanding has evolved, so too has the concept of literacy itself, now encompassing a broader and more integrated perspective that includes global competence and environmental literacy.

Impact on Society: In today's interconnected world, being scientifically literate is seen as essential for active and informed citizenship. It empowers individuals to engage in debates, solve societal problems, and contribute to democratic processes.

Scientific Literacy and Education:

The development of scientific literacy in education involves a multifaceted approach:

- Encouraging critical engagement with scientific topics.
- Providing practical applications through problem-based learning.
- Integrating global and environmental perspectives into the curriculum to help students see the relevance of scientific knowledge in their daily lives.

Ultimately, **scientific literacy** is about preparing individuals to navigate and thrive in a world increasingly shaped by science and technology, helping them to make sound decisions for themselves, their communities, and the planet.

RESULTS

The relationship with science can have a significant impact on scientific literacy. In the context of education theory, understanding content relates to the cognitive domain, while attitudes fall into the affective domain. Thus, negative attitudes towards science, such as fear or aversion, can act as a filter that impedes understanding and can hinder the achievement of future educational goals.

In the United States, research indicates that students' attitudes towards science begin to decline starting from the fourth grade and continue to decrease during middle school. This decline is often linked to an increased focus on subjects that students feel more comfortable with, such as mathematics, and a growing sense of disengagement from scientific subjects. Students who

maintain high motivation for the subject often exhibit positive attitudes toward it and engage more actively with scientific learning.

Scientific literacy is also crucial for **decision-making** in various aspects of life, especially in the context of global challenges. An individual's ability to understand scientific concepts and relate them to their responsibilities toward the environment and society is a key factor in shaping proactive, informed decisions. Scientific literacy empowers individuals to engage meaningfully with issues like ocean conservation, climate change, and other pressing global matters.

Moreover, scientific literacy forms an integral part of the broader educational system and remains an important focus in curriculum standards. It is also essential for making informed societal and policy decisions. Therefore, enhancing scientific literacy is a vital goal of education, as it enables individuals to understand complex, dynamic processes in the world around them.

Various initiatives and programs, such as global science challenges and environmental science competitions, further aim to cultivate scientific literacy. For instance, programs like the **Global Challenge Award**, **National Ocean Science Bowl**, and **Action Bioscience** are examples of efforts to engage students in the scientific process and encourage a deeper understanding of science through practical application and competitions.

As we progress into an increasingly technology-driven world, knowledge in the sciences becomes a more significant part of everyday decision-making. The curricula of schools today are designed to cultivate not just knowledge but critical thinking and problem-solving skills, which are vital for the future. Science education continues to evolve with more emphasis on **real-world applications**, such as through digital systems, outsourcing, and ongoing, lifelong learning.

In conclusion, enhancing scientific literacy is essential not just for academic development but also for preparing students to contribute meaningfully to society and address the complex issues of the modern world.

In the modern world, **continuous learning** is understood as an ongoing process, where learning never truly stops. It involves consistent reflection, awareness, and action, which in turn shapes the learner's cognitive abilities, critical thinking, and decision-making. By analyzing past actions, students are prepared to anticipate future challenges, fostering competencies that will guide them in making informed decisions. This is especially important for the development of skills that are increasingly required in today's world.

Contemporary schools should help students develop not just knowledge but the ability to adapt and thrive in a constantly evolving world. Today's school education goes beyond simply imparting knowledge; it involves fostering **creativity**, **critical thinking**, **problem-solving skills**, and **collaborative action**. These are essential for preparing students to understand complex societal and technological changes and contribute to the collective well-being.

Unlike traditional approaches, where knowledge was divided into isolated subjects, modern education emphasizes the **interconnectedness** of various fields and the **integration of knowledge**. This approach encourages students to build connections across different areas and develop a comprehensive understanding of the world around them. It requires students to not only excel in their primary area of expertise but also to be able to relate to other fields and apply their knowledge in new, innovative ways.

In this context, modern schools should aim to cultivate **active, responsible citizenship**. This involves equipping students with the skills to collaborate effectively in diverse settings, contributing to the prosperity and well-being of society. Today's education should guide students

in recognizing the diversity of life and understanding the importance of working together in solving problems, both local and global.

The shift in educational goals also reflects a growing recognition of the **importance of social and emotional competencies**. These competencies play a crucial role in personal and professional development, especially when it comes to navigating emotions, working in teams, and adapting to changing environments. In the future, the role of **emotional intelligence** will be just as critical as cognitive skills for achieving success.

Furthermore, in the context of **global integration**, interdisciplinary learning is becoming increasingly essential. Students should be prepared for a world where problems are multifaceted and require collaboration across different knowledge domains. This aligns with the need to create educational environments that empower students to solve real-world problems, be innovative, and contribute meaningfully to the betterment of society.

In conclusion, the future of education must foster not only technical knowledge but also the social, emotional, and interdisciplinary skills necessary for navigating a complex, ever-changing world. The focus should be on creating **learning environments** that prepare students to participate fully in society, contributing to its professional, social, and cultural growth.

CONCLUSIONS

Alignment of Theory and Practice: To prepare students for international assessments, it is crucial to ensure the alignment between theoretical and practical aspects in teaching. This, along with the implementation of educational reforms on a broad scale, is essential for achieving strong results in international assessments.

Mechanisms for International Assessments: In Uzbekistan, it has been identified that to perform well in international assessments like PISA, it is necessary to develop the skills for working with tasks that are part of these assessments. This requires focused efforts to build students' competencies in handling such tasks.

Psychological Preparation for International Assessments: It has been recognized that for students to succeed in international assessments, they need psychological preparation. By analyzing the performance of students from other countries, we can identify key strategies and create adaptations that will help our students perform better in these assessments.

Training Future Teachers: The pedagogical and psychological aspects of preparing future teachers for international assessments must be understood. This involves understanding the psychological nature of educational activities, the five elements of the teaching process, and how they affect the success of educational systems. This knowledge should be integrated into teacher training to better prepare educators for preparing students for international assessments.

Studying Best Practices: Analyzing the educational systems of countries that perform well in international assessments provides valuable insights. By learning from their practices and incorporating them into our own education system, we can improve our students' performance in these assessments.

These conclusions highlight the importance of preparing both students and teachers for the challenges posed by international assessments. By aligning theory and practice, developing key competencies, and drawing from successful international experiences, Uzbekistan's education system can improve its outcomes in future assessments.

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