



MODERN PROBLEMS IN EDUCATION AND THEIR SCIENTIFIC SOLUTIONS

MODELS AND MODELING STRATEGIES IN IMPLEMENTING STEAM EDUCATION

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Abstract: *This article discusses models and modeling strategies for implementing STEAM education. The article also provides recommendations for integrating models and modeling into the development of authentic STEAM curricula and programs.*

Key words: *STEAM education, model, modeling, STEAM program, STEAM approach, integration.*

Modeling and models are one of the main explanatory tools in the implementation of new and modern STEAM education. It is important to carefully develop strategies for modeling and models so that STEAM-based education is understandable to teachers and students. We have outlined these strategies in the following sections. To promote a model-based STEAM learning approach, science teachers need to show students how to model topics. focus on designing meaningful modeling activities that involve students' active model building, selecting, developing, or modifying the appropriate model to use, demonstrating the scope and limitations of different models, and will be

1. The following modeling strategies can be promoted in the educational process: - targeting a specific model or modeling activity;

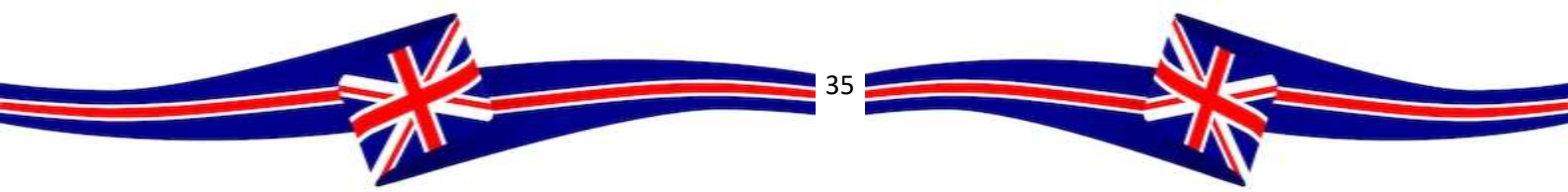
- describe a meaningful modeled state of the event during any practical work;
- describe the resource in a specific emerging model;
- support mental visualization of the model;

to show the interdependence of the model and the components that make up different models in the description of various specific phenomena.

2. To teach students modeling strategies to develop the mental image of the model;

- understand that a model can exist in several forms;
- determine whether models contain objects to convey concepts; understanding that a model can help predict or solve a problem; determine whether the solution to the problem of the value of the model is correct or incorrect;

3. Teaching and modeling models contribute to science learning because mental modeling is central to understanding. Articulating and testing models reflects the practical nature of science, and understanding science relies on the interpretation of scientific and historical models. Modeling in science and technology involves the





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visualization of a development cycle associated with iterative changes of the produced model, the intended purpose and the intended outcome of the process;

4. Students should be given the opportunity to experience how mathematical models are created and to question the trade-offs involved in developing a mathematical model, including evaluating the limitations and strengths of different models;

5. Combining modeling and design activities promotes STEAM learning because design connects scientific, technological, engineering, and mathematical elements. Also, the modeling activity serves as a bridge between the practical situation and the mathematical analytical tools needed to model different versions of reality. It helps in solving the problem, especially in the understanding of science and the manipulation of reality;

6. Internal, external, and internal-external perspectives of models—can inform teaching strategies for talking about the nature and applications of models and modeling in science, technology, and engineering;

7. Developing students' conceptual understanding of modeling supports technological practice in technology while enabling individual modeling skills and can be used by teachers as a pedagogical strategy for learning concepts in science. In relation to models and modelling, mathematical knowledge and skills can be developed along various dimensions, including

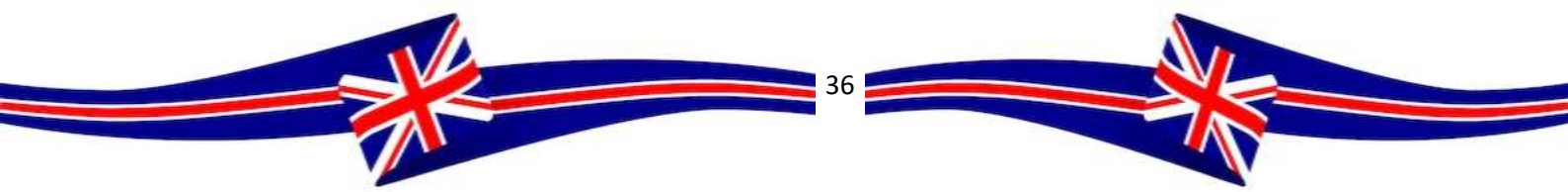
from the concrete to the abstract, from the particular to the general, from the global to the concrete, or from planning to formalization. This, in turn, helps students evaluate and monitor their work using real tools, engage in model-making activities, and build practical models that are powerful in all aspects of putting their theoretical knowledge into practice.

Here are some recommendations for integrating models and modeling into the development of authentic STEAM curricula and programs:

First, the integration of models and modeling can be implemented in STEAM curricula by educating science teachers about the precise nature and role of models. Integrating models and modeling in STEAM curricula can be promoted by teaching students to use models, revise models, reconstruct models, and construct new models.

Secondly, the use of models as a tool in the implementation of STEAM education is considered the most correct way, and in its implementation, it is necessary to pay attention to the following:

- any subject should consist of several topics;
- paying great attention to following the historical sequence of model development of a given topic;
- how to use;





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- cognitive restructuring in modeling;
- correct assessment of strengths and weaknesses of models.

Third, implementing models and modeling to promote STEAM education that encompasses science and technology education requires an understanding of the importance of learner context. This means that approaches and training programs must be targeted, reliable and personally meaningful. This allows students to understand the relationship between science and technology content and apply knowledge to find solutions to real problems.

Fourth, models and modeling should be seen by educators and curriculum developers as a valuable bridge between science and technology, which in turn can promote authentic STEAM education, authentic provides an opportunity to develop the ability to find solutions to problems and make rational decisions by combining science and technology concepts.

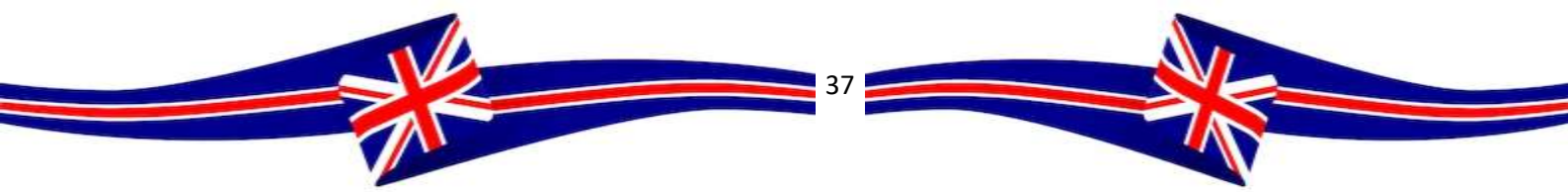
Fifth, through Modeling activities, students understand the strengths and weaknesses of the traditional model and potentially gain a better new position. They will also be able to apply, adapt and even create new mathematical models for new situations of STEAM subjects.

Sixth, the comprehensive aspects of modeling in STEAM curricula allow integration at different points in student development.

In conclusion, we can say that the implementation of models and modeling in STEAM educational programs helps students to build, modify and improve conceptual models that are relevant not only to mathematics, but also to engineering activities.

REFERENCES:

1. Kizi, M. I. B., Nemattillaevna, K. Y., & Jalolidinovna, I. Z. (2021). DISINFECTION OF WATER FOR DRINKING: OZONE DISINFECTION METHOD. Достижения науки и образования, (1 (73)), 68-70.
2. Jalolidinovna, I. Z. (2023). Morphology and histology of skin. Texas Journal of Medical Science, 16, 52-56.
3. Jalolidinovna, I. Z. (2022). Hirudotherapy of Migraines-Diseases of Unknown Etiology. Central Asian Journal of Medical and Natural Science, 3(5), 1-4.
4. TISHABAEVA, N. A., IBRAGIMOVA, Z. J., & MIRZAJONOVA, S. A. (2022). IRON DEFICIENCY ANEMIA AS AN ACTUAL PROBLEM IN MEDICAL PRACTICE. THEORETICAL & APPLIED SCIENCE Учредители: Теоретическая и прикладная наука, (4), 653-656.





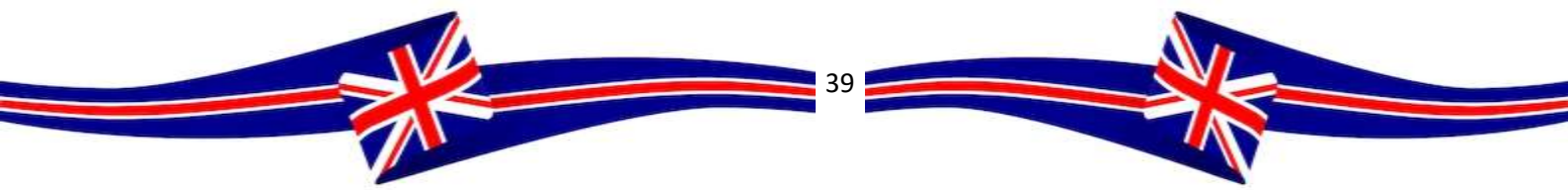
MODERN PROBLEMS IN EDUCATION AND THEIR SCIENTIFIC SOLUTIONS

5. Ибрагимова, З. Ж., & Хомидчонова, Ш. Х. (2022). РОЛЬ ПОЧЕК В РЕГУЛИРОВАНИИ АРТЕРИАЛЬНОГО ДАВЛЕНИЯ. Экономика и социум, (2-2 (93)), 630-633.
6. Jalolidinova, I. Z. (2022). ONKOLOGIK KASALLIKLARDA LIMFA TUGUNLARIDA MORFOFUNKSIONAL O'ZGARISHLAR. Scientific Impulse, 1(5), 952-955.
7. Ибрагимова, З. Ж. ФАКТОРЫ ОБУСЛОВЛИВАЮЩИЕ ОЖИРЕНИЕ И ЗАБОЛЕВАНИЯ КАК ПОСЛЕДСТВИЯ ОЖИРЕНИЯ. ЯНГИ ЎЗБЕКИСТОН: ИННОВАЦИЯ, ФАН ВА ТАЪЛИМ 18-ҚИСМ, 27.
8. Namrayeva, O. F. Q. (2023). OLIY TA'LIM MUASSASASI TALABALARINI KOMMUNIKATIV KOMPETENTLIGINI RIVOJLANTIRISHNING AYRIM JIHATLARI. Oriental renaissance: Innovative, educational, natural and social sciences, 3(1), 537-544.
9. Namroyeva, O. F. (2023). OLIY TA'LIM MUASSASASI TALABALARINI KASBIY-KOMUNIKATIV KOMPETENTLIGINI RIVOJLANTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 3(4), 985-991.
10. Abdurakhmonov, V. (2022). Functional Specificity Of Alternative Interrogative Sentences. Oriental Journal of Social Sciences, 2(03), 82-87.
11. Abdusattorovich, A. V. (2022). Methodological and semantic classification of alternative interrogative pronouns. Fsu. Scientific News-Научный Вестник. Фергу, 1.
12. Abdurahmanov, V. A. (2022). M Bisubstantivation in alternative interrogative sentences. Issues of linguistic theory and practice.
13. Abdupattoev, M., & Abdurahmonov, V. (2021). Microtext composition. ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL, 11(1), 466-473.
14. IBATOVA, N. I. (2021, March). NEW METHODS OF USING INNOVATIVE TECHNOLOGIES IN FOREIGN LANGUAGE TEACHING. In E-Conference Globe (pp. 221-226).
15. Polvonova, M. R., & Bazarbayeva, A. S. (2022). CONTRADICTION RELATIONSHIP IN COMPOUND SENTENCES. Oriental renaissance: Innovative, educational, natural and social sciences, 2(10), 766-771.
16. Tolipov, X. T. (2021). Determination of inulin in plants. Вестник магистратуры, (4-1 (115)), 16-18.
17. Ахмадалиев, М. А., & Толипов, Х. Т. (2022). ТЕХНОЛОГИЯ ПОЛУЧЕНИЯ КАРБОМИДОФУРАНОВОЙ СМОЛЫ НА ОСНОВЕ КАРБАМИДА, ФОРМАЛЬДЕГИДА, ФУРИЛОВОГО СПИРТА. O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI, 1(12), 136-140.



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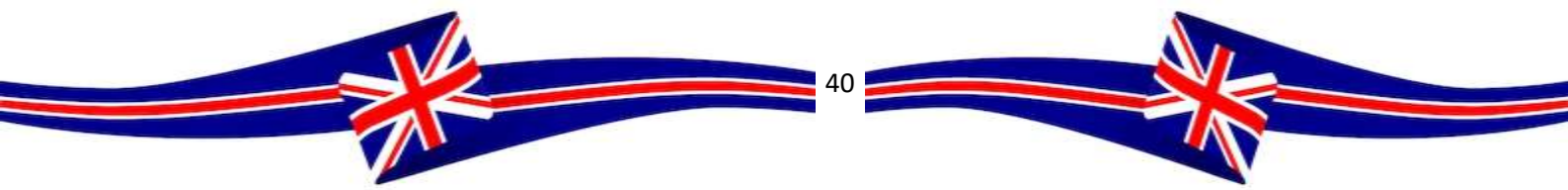
18. Абдуллаев, Ш. В., Маматкулова, С. А., & Назаров, О. М. (2019). Компонентный состав экстрактов *Raphanus sativus* L. произрастающего в Узбекистане. *Universum: химия и биология*, (8 (62)), 29-31.
19. Mamatkulova, S. A. (2020). Abdullaev Sh. V., Dehqonov RS, Matmurodov UU Extraction of pectin from turnips of the Brassicaceae family, and classification and certification based on its chemical composition. *Academica: An international Multi-disciplinary Research Journal*, 10(12).
20. Abdurakhmanov, G., Zakhidov, R. A., Vakhidova, G. S., & Mamatkulova, S. A. (2010). On the criteria of efficiency of power supply to individual households using thermo-and photovoltaic converters. *Applied Solar Energy*, 46, 165-168.
21. Абдурахманов, Г., Вахидова, Г. С., & Маматкулова, С. А. (2017). ИСПОЛЬЗОВАНИЕ ВТОРИЧНЫХ ЭНЕРГОРЕСУРСОВ КАК «ЗЕЛЕНАЯ» ЭНЕРГЕТИКА. ЧАСТЬ 2. НАУЧНО-ТЕХНИЧЕСКИЕ АСПЕКТЫ. И ПРИКЛАДНЫЕ ВОПРОСЫ ФИЗИКИ FUNDAMENTAL AND APPLIED PROBLEMS OF PHYSICS, 272.
22. Xaydarova, D., Siddikov, G., Abdullayev, S., & Mamatkulova, S. (2021, July). Preliminary results of introduction of the medicinal plant *Scutellaria comosa*. In Конференции.
23. Mamatkulova, S. A., Dexqanov, R. S., & Abdullayev, S. V. (2020). DESIGNATING SOME FRUITS AND VEGETABLES ACCORDING TO FEAN NG. *Scientific and Technical Journal of Namangan Institute of Engineering and Technology*, 2(2), 94-101.
24. Abdusamatovna, M. S., Voksidovich, A. S., Mukhammadzokir, N. R., & Ulmasbek, M. U. (2021). Description of Organic Substances in the Roots of *Turpa Brassica Rapa L. 1753 Family*. *JournalNX*, 7(03), 411-413.
25. Mamatkulova, S. A., Dexqanov, R. S., & Abdullayev, S. V. (2020). CLASSIFICATION AND CERTIFICATION OF BIOLOGICALLY ACTIVE SUBSTANCES BY THE CHEMICAL COMPOSITION Isolated from *HELIANTHUS TUBEROSUS* PLANT BY TIFN TN. *Scientific and Technical Journal of Namangan Institute of Engineering and Technology*, 2(2), 70-77.
26. Abdurakhmanov, G., Zakhidov, R. A., Vakhidova, G. S., & Mamatkulova, S. A. (2012). Some characteristics of doped silica glass as the thermoelectric material for solar energy. *Geliotekhnika*, 17-23.
27. Маматкулова, С. А., угли Абдуллаев, Ш. Ш., & Аскарлов, И. Р. (2023). CHILONJIYDA (ZIZIPHUS JUJUBA) OSIMLIGINING KIMYOVIY TARKIBI VA SHIFOBAXSH XUSUSIYATLARI. *Журнал химии товаров и народной медицины*, 2(1), 184-209.





MODERN PROBLEMS IN EDUCATION AND THEIR SCIENTIFIC SOLUTIONS

28. Karimova, D. M., & Mamatqulova, S. A. (2023). I BOB. ANJIR MEVASINING FOYDALI XUSUIYATLARI. Новости образования: исследование в XXI веке, 1(10), 956-958.
29. Mamatqulova, S. A. (2023). FICUS CARICA O'SIMLIGINING XALQ TABOVATIDAGI AXAMIYATI. Scientific Impulse, 1(9), 1825-1827.
30. Mamatqulova, S. A., Maxsudova, G. M., & Usmanova, T. E. (2023). O 'ZBEKISTONDAGI IQLIMLASHTIRILAGAN AYRIM MANZARALI O 'SIMLIKLARNING SHIFOBAHXSHLIK XUSUSIYATLARI. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 20(5), 146-150.
31. Дехканов, Р. С., Абдуллаев, Ш. В., Маматкулова, С. А., & Салойидинова, М. К. К. (2023). ИЗУЧЕНИЕ АМИНОКИСЛОТНОГО СОСТАВА И БИОЛОГИЧЕСКИЕ СВОЙСТВА ЛИЗОЦИМА ВЫДЕЛЕННОГО ИЗ МАРГЕЛАНСКОЙ РЕДКИ. Research Focus, 2(1), 57-61.
32. Isaqov, X., Mamatqulova, S., & Obidova, B. (2022). CHEMICAL COMPOSITION AND MEDICINAL PROPERTIES IN THE PAPAYA (CARICA PAPAYA L.) PLANT. Science and Innovation, 1(8), 867-872.
33. Isaqov, X., Mamatqulova, S., & Obidova, B. (2022). MACRO AND MICROELEMENT COMPOSITION AND MEDICINAL PROPERTIES IN THE GUAVA (PSIDIUM GUAJAVA L.) PLANT. Science and Innovation, 1(8), 873-877.
34. Абдусаматовна, М. С. (2022). BRASSICA RAPA L. ОИЛАСИГА МАНСУБ ТУРП ИЛДИЗМЕВАСИНИНГ ТАРКИБИДАГИ ОРГАНИК МОДДАЛАР ТАВСИФИ. O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI, 1(12), 321-324.
35. Abdusamatovna, M. S., & Maqsudovna, X. S. (2022). SHOLG'OM O'SIMLIGI TARKIBIDAGI MODDALARNI KIMYOVIY TARKIBINI TAHLIL QILISH. O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI, 1(12), 310-314.
36. Xayotillo, I., & Abdusamatovna, M. S. (2022). ANJIR DARAXTINING BIOLOGIK XUSUSIYATLARI. O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI, 1(12), 141-143.
37. Сулаймонов, Ш. А., & Абдуллаев, Ш. В. (2022). APIGENIN TIBBIY QO'SHIMCHALAR ASOSI. Журнал химии товаров и народной медицины, 1(3), 137-151.
38. Isaqov, X., Mamatqulova, S., & Obidova, B. (2022). ГУАВА (PSIDIUM GUAJAVA L.) O 'SIMLIGINING MAKRO VA MIKROELEMENT TARKIBI HAMDA DORIVORLIK XUSUSIYATLARI. Science and innovation, 1(D8), 873-877.



39. Isaqov, X., Mamatqulova, S., & Obidova, B. (2022). PAPAAYA (CARICA PAPAAYA L.) O 'SIMLIGINING KIMYOVIY TARKIBI VA DORIVORLIK XUSUSIYATLARI. Science and innovation, 1(D8), 867-872.
40. Xaydarova, D., Siddikov, G., Abdullayev, S., & Mamatkulova, S. (2021, July). Preliminary results of introduction of the medicinal plant Scutellaria comosa. In Конференции.
41. Хидиров, X. Н. (2019). Philosophical Analysis of the Role of the Media in Shaping Civic Culture in Uzbekistan. Молодой ученый, (15), 322-324.
42. Хидиров, X. Н. (2017). Moral personality education in the philosophy of existentialism of Karl Jaspers. Молодой учёный, 30, 95.
43. Хидиров, X. Н. (2018). Social justice and the process of education, and their mutual influence in the philosophical views of Abu Nasr al-Farabi. Молодой ученый, (14), 262-263.
44. Ostonov, O. A., Akhmedov, K. A., Khushvaktov, K. O., & Norimovich, K. K. (2020). SOME FEATURES OF THE DEVELOPMENT OF NATIONAL CRAFTS ON THE BASIS OF TOURISM IN UZBEKISTAN. Journal of Critical Reviews, 7(11), 1256-1261.
45. Ostonov, O. A., Akhmedov, K. A., Khushvaktov, K. O., & Norimovich, K. K. (2020). SOME FEATURES OF THE DEVELOPMENT OF NATIONAL CRAFTS ON THE BASIS OF TOURISM IN UZBEKISTAN. Journal of Critical Reviews, 7(11), 1256-1261.
46. Norimovich, K. K. (2022). GENDER EQUALITY: A MATTER OF SOCIAL JUSTICE. Thematics Journal of Law, 6(2).
47. Ostonov, O. A., Akhmedov, K. A., Khushvaktov, K. O., & Norimovich, K. K. (2021). The recent past and present of the protection of historical and cultural monuments in Uzbekistan. ACADEMICIA: An International Multidisciplinary Research Journal, 11(4), 289-294.
48. Джураев, А. А., Хидирова, X. Н., & Золотых, Н. В. (2019). ГРАЖДАНСКОЕ ОБЩЕСТВО И ВОПРОСЫ СОЦИАЛИЗАЦИИ ЛИЧНОСТИ. Ц-37 Ценностно-гуманитарная парадигма формирования нового поколения специалистов в условиях развития цифровой, 237.