Modern American Journal of Linguistics, Education, and Pedagogy
ISSN (E): 3067-7874
Volume 2, Issue 10, October, 2026
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A METHODOLOGY FOR DEVELOPING ENTREPRENEURIAL SKILLS IN HIGH SCHOOL STUDENTS BASED ON DIGITAL EDUCATIONAL TECHNOLOGIES

Keldiyor Muradullayevich Khurramov
Senior Lecturer, Department of Economics and Management
Chirchiq State Pedagogical University

Abstract
This article outlines a methodology for developing entrepreneurial skills in high school students through the use of digital educational technologies. It analyzes the pedagogical potential of organizing entrepreneurship education by leveraging modern digital platforms, virtual business simulators, mobile applications, digital analytical systems, and artificial intelligence technologies. The study details an approach to modifying the learning process—designed to help students understand market environments and consumer demands—by incorporating visual design, leveling based on the pace of mastery, and a differentiated approach. Furthermore, the article explores the adaptation of software to suit students' individual abilities and educational needs, as well as the integration of interactive assignments, business simulators, case studies, and adaptive testing. The proposed approach serves to develop students' economic and marketing mindset, financial literacy, independent decision-making, innovative thinking, and practical entrepreneurial competencies.

Keywords: Digital educational technologies, entrepreneurial skills, high school students, entrepreneurship education, digital platform, business simulator, visual design, differentiated instruction, adaptive learning, consumer needs, market analysis, digital analytics.

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RAQAMLI TA'LM TEXNOLOGIYALARI ASOSIDA YUQORI SINF O'QUVCHILARINING TADBIRKORLIK KO'NIKMALARINI RIVOJLANTIRISH METODIKASI

Xurramov Keldiyor Muradullayevich
Chirchiq davlat pedagogika universiteti
"Iqtisodiyot va menejment" kafedrasi katta o'qituvchisi

Annotatsiya
Mazkur maqolada raqamli ta'lim texnologiyalari asosida yuqori sinf o'quvchilarining tadbirkorlik ko'nikmalarini rivojlantirish metodikasi yoritilgan. Tadbirkorlik ta'limini zamonaviy raqamli platformalar, virtual biznes-simulyatorlar, mobil ilovalar, raqamli tahlil tizimlari va sun'iy intellekt texnologiyalari asosida tashkil etishning pedagogik imkoniyatlari tahlil qilingan. O'quvchilarga bozor muhiti va iste'molchi talablarini tushunishga o'rgatuvchi algoritmni vizual dizayn, o'zlashtirish sur'ati bo'yicha darajalash hamda differensial yondashuv asosida modifikatsiyalash mazmuni ochib berilgan. Shuningdek, dasturiy ta'minotni o'quvchilarning individual qobiliyatlari va ta'lim ehtiyojlariga moslashtirish, interaktiv topshiriqlar, biznes-simulyatorlar, keyslar va adaptiv testlardan foydalanish imkoniyatlari asoslangan. Taklif etilgan yondashuv o'quvchilarning iqtisodiy va marketing tafakkurini, moliyaviy savodxonligini, mustaqil qaror qabul qilish, innovatsion fikrlash va amaliy tadbirkorlik kompetensiyalarini rivojlantirishga xizmat qiladi.

Kalit so'zlar: raqamli ta'lim texnologiyalari, tadbirkorlik ko'nikmalari, yuqori sinf o'quvchilari, tadbirkorlik ta'limi, raqamli platforma, biznes-simulyator, vizual dizayn, differensial ta'lim, adaptiv ta'lim, iste'molchi ehtiyojlari, bozor tahlili, raqamli tahlil.

Аннотация
В данной статье освещается методика развития предпринимательских навыков учащихся старших классов на основе цифровых образовательных технологий. Проанализированы педагогические возможности организации предпринимательского образования с использованием современных

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цифровых платформ, виртуальных бизнес-симуляторов, мобильных приложений, цифровых аналитических систем и технологий искусственного интеллекта. Раскрыто содержание модификации алгоритма обучения учащихся пониманию рыночной среды и потребительского спроса на основе визуального дизайна, дифференциации по темпам усвоения учебного материала и дифференцированного подхода. Также обоснованы возможности адаптации программного обеспечения к индивидуальным способностям и образовательным потребностям учащихся, использования интерактивных заданий, бизнес-симуляторов, кейсов и адаптивных тестов. Предлагаемый подход способствует развитию экономического и маркетингового мышления учащихся, финансовой грамотности, навыков самостоятельного принятия решений, инновационного мышления и практических предпринимательских компетенций.

Ключевые слова: цифровые образовательные технологии, предпринимательские навыки, учащиеся старших классов, предпринимательское образование, цифровая платформа, бизнес-симулятор, визуальный дизайн, дифференцированное обучение, адаптивное обучение, потребительские потребности, анализ рынка, цифровая аналитика.

Introduction

In the 21st century, the rapid development of the digital economy is driving fundamental changes across all sectors of society, including the education system. The modern labor market demands young professionals who are proactive, possess an innovative mindset, understand market mechanisms, and are capable of analyzing consumer needs. Consequently, developing entrepreneurial skills among students within the general secondary education system has become a key focus in pedagogy.

Traditional teaching methods often fail to provide students with an adequate understanding of real-world economic processes. As a result, students struggle to grasp the practical aspects of business operations, marketing, consumer needs,

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and the competitive environment. Therefore, organizing entrepreneurial education based on digital technologies—while differentiating the approach to account for individual student abilities and learning paces—has become a pressing pedagogical issue. A pedagogical innovation is presented here in the form of an approach to developing entrepreneurial skills in students through digital technologies. This approach is modified by incorporating a visual design for an algorithm that teaches how to understand market and consumer demands, while also applying a tiered and differentiated implementation strategy based on the students' individual learning paces.

In the context of entrepreneurship education, digital technologies facilitate the activation of students' cognitive processes, the creation of an interactive environment, and the development of individual learning trajectories. G. Siemens describes digital education as a process of knowledge formation based on data, artificial intelligence, and network technologies [110].

Digital technologies used in entrepreneurship education include:

- virtual business simulators;
- e-learning platforms;
- digital analytics systems;
- mobile applications;
- marketing modeling software;
- AI-based recommendation systems;
- e-commerce platforms, and others.

These technologies enable students to bridge their theoretical knowledge of the market economy with practical application.

An algorithm for understanding market and consumer demands. In modern entrepreneurship education, algorithms that teach how to understand market and consumer demands hold particular significance. Kotler and Keller (2016) emphasize that the process of identifying and satisfying consumer needs lies at the core of marketing activity [61].

This algorithm comprises the following stages:

1. Analyzing the market environment;
2. Identifying consumer needs;
3. Developing a product or service concept;

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4. Formulating a marketing strategy;
5. Analyzing the activities of competitors;
6. Evaluating and optimizing results.

When this algorithm is implemented in an interactive format via digital platforms, it effectively fosters the development of students' economic thinking and analytical competencies.

Modification based on visual design. As we know, modification refers to the act of altering, improving, or adapting an object, system, method, program, or process to achieve a specific objective.

Modifying software involves adding new functions to a program or enhancing its existing capabilities. Modifying educational methodology entails adapting teaching methods to meet modern requirements. Modifying a model involves reworking an existing model to make it more effective.

Enhancing software to develop entrepreneurial skills in students.

In a modern digital educational environment, the modification of software is a key pedagogical and technological factor in the development of students' entrepreneurial skills. This modification process involves tailoring existing software tools to align with students' age, psychological characteristics, and educational needs, as well as the requirements for building competencies related to entrepreneurial activity. This approach enhances the interactivity, flexibility, and effectiveness of the educational process.

One of the primary directions for software modification is enriching educational platforms with interactive tasks, business simulators, virtual project environments, and elements of gamification. Such features bring students closer to real-world practical activities and foster the development of their economic thinking. Specifically, through virtual business games, students engage in activities such as creating products, selecting marketing strategies, calculating costs, and analyzing profits within the context of a market economy [82].

Digital technologies enable the modification of adaptive software systems, making it possible to identify students' individual abilities and provide them with tailored tasks. This facilitates the gradual development of entrepreneurial skills. By analyzing the outcomes of a student's work, adaptive systems automatically

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adjust the level of complexity and offer recommendations that foster reflective thinking [66].

Researchers emphasize the importance of focusing on pedagogical design principles when modifying digital educational tools. In particular, ensuring that the user interface of software tools is simple, motivating, and intuitive increases students' interest in the learning process. From this perspective, the use of visual elements, diagrams, infographics, and case-based assignments—grounded in real-world business scenarios—proves effective when modifying software platforms designed for entrepreneurship.

Furthermore, software adapted for cloud technologies and mobile applications enables students to learn anytime and anywhere. This facilitates continuous education and enhances students' readiness for independent entrepreneurial activity. In particular, the inclusion of modules for business plan development, e-commerce elements, financial calculations, and project management within these mobile applications serves to develop students' practical competencies (Figure 1).

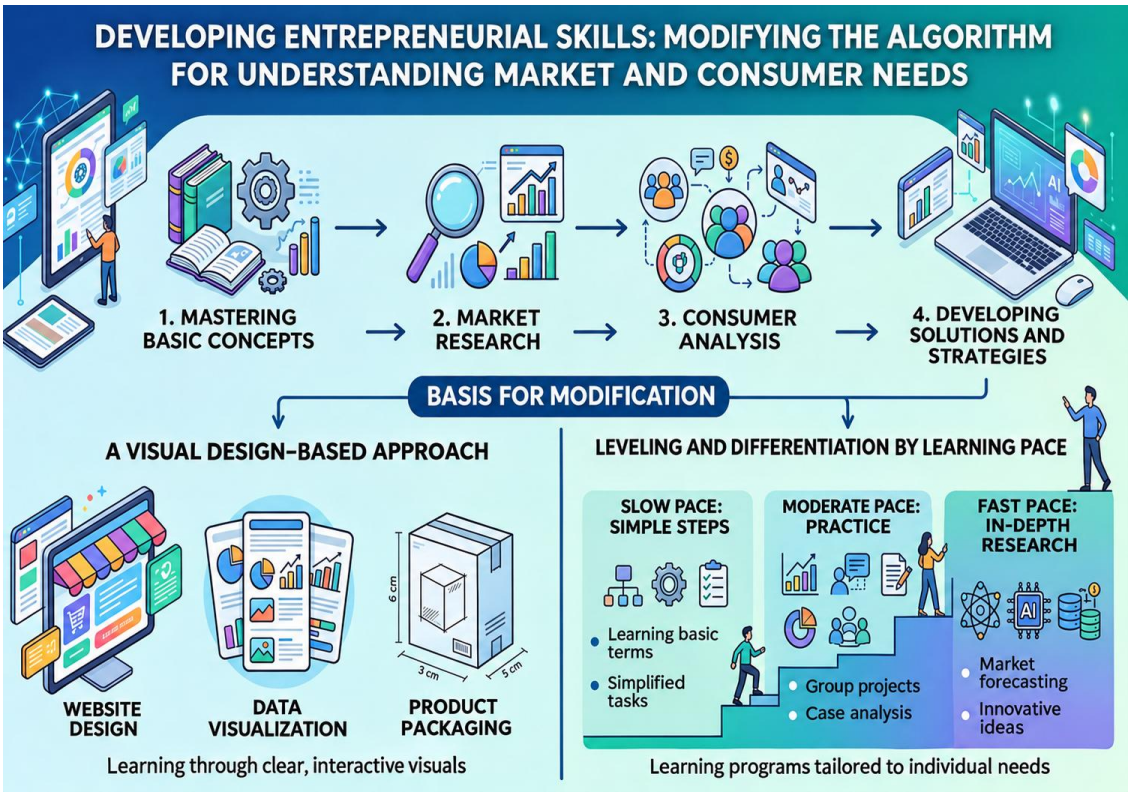


Figure 1. Algorithm for modifying [tools/content] based on an understanding of market and consumer demands.

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In general, the modification of software tools plays a crucial role in developing entrepreneurial skills among students; it serves as a key factor in modernizing the educational process, fostering interactivity, and implementing a learner-centered approach. Such modified software tools effectively facilitate the development of students' economic thinking, innovative mindset, independent decision-making capabilities, and practical entrepreneurial competencies.

In pedagogical research, visual design is regarded as an essential didactic tool that simplifies the comprehension of educational materials. Multimedia learning theory specifically highlights the role of visual elements in enhancing the efficiency of knowledge acquisition [70].

In entrepreneurship education, visual design is applied through the use of infographics, business process flowcharts, interactive diagrams, animated models, virtual commercial environments, and marketing strategy maps.

Modifications based on visual design help students develop competencies in:

- rapidly grasping economic data;
- gaining a better understanding of marketing processes;
- analyzing consumer needs;
- modeling business decisions. Furthermore, visual design enhances students' creative thinking and helps them understand complex economic processes in a simplified form.

In modern pedagogical approaches, the individual pace at which students master material is considered a key factor. Differentiated educational technologies make it possible to account for each student's cognitive activity and level of development. Differentiated instruction is defined as a pedagogical practice tailored to students' abilities, interests, and levels of preparation. In entrepreneurship education, this approach—categorizing instruction based on the pace of mastery—is implemented in the following ways [117]:

At the introductory level, students learn economic concepts, analyze simple business examples, and acquire the fundamentals of financial literacy.

At the intermediate level, students develop marketing strategies, create business plans, and conduct market analysis.

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At the advanced level, students create startup projects, develop digital marketing campaigns, formulate investment strategies, and so on. This tiered structure establishes a developmental trajectory aligned with each student's individual potential.

The pedagogical significance of this differentiated approach lies in the fact that it serves as a crucial factor in increasing the overall effectiveness of the educational process. By taking into account the individual characteristics of students:

- motivation increases;
- learning engagement is strengthened;
- economic thinking is developed;
- independent activity is fostered.

Differentiated instruction via digital platforms enables the provision of individual assignments, adaptive tests, and personalized recommendations to students.

For example, this might include complex business cases for advanced students, marketing analyses for those at an intermediate level, and financial literacy exercises for beginners. This reinforces the learner-centered nature of education.

Learning analytics technologies enable the monitoring and analysis of students' activities. Siemens and Baker view learning analytics as a tool for optimizing the educational process and supporting individual development [110].

Through learning analytics, the following are determined:

- students' level of economic knowledge;
- the quality of their execution of business tasks;
- their marketing competence;
- their interest in entrepreneurship. Based on this data, adaptive recommendations are developed, and the students' developmental trajectories are modified.

Advantages of the modified model. The model, refined during the course of the research, offers the following advantages:

- increased interactivity in education;
- development of students' economic thinking;
- formation of individual developmental trajectories;
- development of skills for understanding market and consumer needs;
- enhanced adaptability to the digital economy.

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This model also fosters students' creativity, initiative, communicative competencies, and innovative thinking.

The pedagogical effectiveness of the model is demonstrated by the following outcomes:

- □ an increase in the level of financial literacy;
- □ the formation of a marketing mindset;
- □ a heightened interest in business projects.
- □ development of adaptability to a market economy;
- □ formation of the competence to make independent decisions.

Furthermore, the model serves to foster students' professional orientation and innovative activity.

Consequently, the use of digital technologies to develop entrepreneurial skills—structured through a modified approach that employs visual design, tiered pacing, and differentiated application—represents a significant modern pedagogical strategy. This model enhances the effectiveness of entrepreneurship education, cultivates students' economic competencies, and prepares them to operate successfully within a digital economy.

Digital platforms designed to develop students' entrepreneurial skills are available online. These platforms can be utilized in teaching the subject "Fundamentals of Entrepreneurship" to foster students' business mindset, innovative thinking, and practical skills. They provide opportunities for interactive lessons, the development of business projects, and the creation of startup ideas.

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