

Interactive learning in economic education: integrating LearningApps.org tasks into Moodle

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Abstract. This paper explores the use of interactive learning tools in economic education. Specifically, it examines how the LearningApps.org platform can be integrated into the Moodle learning management system to create engaging and effective learning activities for economic courses. The paper outlines the benefits of interactive learning, reviews relevant literature on using technology in economic education, and provides examples of interactive LearningApps.org exercises for topics in economics. The results indicate increased student motivation and improved learning outcomes when using LearningApps.org in Moodle. The paper concludes that combining interactive tools like LearningApps.org with a system like Moodle can enhance economic instruction and recommends further research into instructional design strategies for integrating educational technologies.

Keywords: economic education, LearningApps.org, Moodle, interactive tasks, economic specialists, distance learning, ICT, higher education

1. Introduction

Integrating information and communication technologies (ICTs) into education has transformed teaching and learning approaches across disciplines. In economic education, leveraging technologies effectively is critical for training skilful specialists who can respond flexibly to evolving labour market needs [6]. As the global economy rapidly changes, new pedagogical strategies are required to develop economically competitive graduates with high levels of professional competence [2]. Interactive learning technologies present valuable opportunities to improve the quality of economic instruction.

Interactive learning involves active student participation and engagement with course material and activities [4]. Integrating interactive tools can increase motivation, promote a more

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profound understanding of concepts, provide personalised feedback, and develop problem-solving skills [11, 24]. Using simulations, games, visualisation exercises, and other multimedia activities can help concretise abstract theories and models for economic courses. Enabling students to construct their knowledge through meaningful interactions is a highly effective instructional approach.

Online learning management systems (LMS) like Moodle allow interactive resources seamlessly incorporated into economic courses alongside traditional content [28]. One particularly useful platform is LearningApps.org, which contains a diverse library of interactive templates that can be customised for specific learning objectives [33]. From multiple-choice quizzes to crossword puzzles, LearningApps.org provides adaptable activities linked to various topics in economics. This paper examines the integration of LearningApps.org into Moodle courses to enhance student engagement and performance in economic education.

2. Methods

This study utilised a mixed methods approach to examine the integration of LearningApps.org exercises into Moodle-based economic courses. Quantitative data was collected to compare student performance on topics taught using traditional lectures versus interactive LearningApps.org activities. Qualitative data from surveys and interviews provided insights into student and instructor perceptions of the LearningApps-Moodle platform.

Participants included 54 undergraduate students enrolled in Principles of Microeconomics at a university in Ukraine. The students were divided into an experimental group ($n=27$) and a control group ($n=27$). Both groups received identical lecture content and reading materials. LearningApps.org activities were incorporated for the experimental group to replace 20%

LearningApps.org exercises were designed and embedded into the Moodle course page for the experimental group. Topics covered included supply and demand analysis, elasticity, consumer choice theory, and market structures. The multiple-choice and fill-in-the-blank LearningApps.org activities provided interactive explanations, feedback, and real-world applications for each concept. Students completed the exercises individually outside of class time.

Student performance was measured based on scores from quizzes administered after each major topic. An independent samples t-test compared mean quiz scores between the groups. Participants also completed an anonymous survey on their perceptions of the LearningApps.org exercises and their impact on engagement, motivation, and learning. Semi-structured interviews further explored instructor experiences designing and integrating the LearningApps-Moodle platform.

Quantitative data was analysed using SPSS Statistics to examine differences in academic achievement between the experimental and control groups. Thematic analysis was used to identify patterns in the qualitative survey and interview data concerning student and instructor perceptions of the LearningApps-Moodle integration. Triangulation of the three data sources allowed for a comprehensive assessment of the platforms' effects on student performance and the overall learning experience.

3. Related work

Enhancing and upgrading the quality of education and instruction is a vital concern, predominantly at the time of the spreading and development of education. ICTs can improve the quality of education in many ways: by augmenting student enthusiasm and commitment, by making possible the acquirement of fundamental skills and by improving teacher training. ICTs are also tools that enable and bring about transformation, which, when used properly, can encourage the shift to a student-centred environment [29].

The development of an information society involves the widespread use of information technologies in the process of training future specialists in economic specialities that is determined by several factors [13]:

- introduction of information technologies into economic education significantly accelerates the transfer of knowledge and accumulated technological and social experience of humanity not only from generation to generation but also from one person to another;
- modern information technologies, improving the quality of economic education and study, allow specialists to adapt to the environment and social changes, which occur much faster. This allows each person to get the necessary knowledge both today and in the future;
- the active and practical introduction of these technologies into economic education is an important factor in creating an education system that meets the requirements of modern information society and transforms the traditional education system into a new one.

The introduction and the further use of various components of the educational information environment are based on several principles, particularly resource availability, systemic adaptability, interactivity, practical orientation, security, transparency, efficiency and mobility. This process contributes to the formation and development of the intellectual potential of higher education applicants, improving the forms and content of the educational process, introducing computer methods of study that give the possibility to choose problems of specialists' training at a better level, considering international requirements. The improvement of educational process management, individualisation of study, improving the quality of education at all levels of specialists' training, organisation of systematic control of knowledge, integration of educational, research and practical activities, the ability to take into account psychophysiological features of each higher education applicant and research and teaching staff, etc., is the result of such implementation [25]. Cox [7] believes there will be an increase in concepts that have been around, such as Massive Open Online Courses (MOOCs) or textbooks that are free to access.

The special tools for distance learning – Course Management Systems (CMS), also known as Learning Management Systems (LMS) or Virtual Learning Environments (VLE) – are used to conduct this type of training. Such systems are designed to store training materials, automatic testing for higher education applicants, distance communication, information about them and their achievements, and reports on the work of distance learning subjects [20].

Using LMS in the learning process helps facilitate e-learning as it provides educational material without the constraint of time or place [1], enabling students and teachers to interact via the Internet and facilitating the sharing of course-related information and resources [17]. A few examples of LMS used in educational institutions include Moodle, WebCT, Blackboard, and

Desire2Learn [34]. Hassanzadeh, Kanaani and Elahi [9] revealed in his study that the definition of higher education had changed with the advent of information technology. In recent times, the acceptance of e-learning systems and technologies has been investigated by researchers in different educational environments around the world, using different models based on distinct criteria [12, 26]. It is worth mentioning that Moodle is the most popular Course Management System, as evidenced by the results of Google Trends statistics and data from the ListEdTech.com resource [20].

The heart of Moodle is courses that contain activities and resources. About 20 activities are available (forums, glossaries, wikis, assignments, quizzes, choices (polls), SCORM players, databases, etc.), and each can be easily customised. The main power of this activity-based model comes in combining the activities into sequences and groups, which can help guide participants through learning paths. Thus, each activity can build on the outcomes of previous ones. Many other tools make it easier to build communities of education applicants, including blogs, messaging, participant lists, etc, as well as useful tools like grading, reports, integration with other systems and so on [23].

As an example of a successful combination, we consider the LearningApps.org online service. This free Web 2.0 service contains exercise blocks of general use and allows creating tests, preparing training exercises for fixing the material, and further use in the educational process [15]. This resource supports the developments and contains exercises in 20 languages: Ukrainian, English, German, Russian, Bulgarian, Romanian, and Polish. It should be mentioned that LearningApps.org information is not translated into all languages but is filled by its users [14]. The set of tools proposed by this service is interesting because it allows for control of the achievement of cognitive goals at lower levels of Bloom's taxonomy (remembering, awareness, application) and higher levels (analysis and evaluation). All exercises are evaluated. Some of them have an input rating scale (for example, Quizzes); for most other types, the mark has the character of enrollment, and the exercise is performed until the correct answer is found [3]. Note that this service is one of the most functional and convenient; higher education applicants can efficiently independently study the service's functionality and create interactive tasks.

LearningApps.org can create interactive visual exercises in games, competitions, and classes. There are the following types of interactive exercises in the LearningApps.org system: category Choice (Quiz, Multiple-Choice Quiz, Highlight the words, The Millionaire Game, Words from letters); category Distribution (Pairing Game, Group assignment, Matching Pairs, Puzzle "Vpiznaiko (Recognizer)", Sorting, Correlation) and others. An important helpful function of this resource is the possibility to look through the tasks of other users, for example, for creating one's interactive exercise. After creating some task, you can publish, download, or share it with other users [22].

Sablina [27] reports that the LearningApps.org service is a Web 2.0 service to support learning and teaching processes with the help of not extensive interactive modules. These modules can be used directly as learning resources or for independent work and self-assessment of education applicants. The interactive educational environment of LearningApps.org proposes some interactive exercises divided into the following categories: by subject, by the level of education degree and by ready-made templates that can be used or created. Tasks in the LearningApps.org environment are created based on the proposed templates.

Stechkevych and Stechkevych [31] mention that didactic materials created using this service

perfectly fit into the competitions, quizzes and other extracurricular activities program. The benefit of these resources is the possibility for teachers to create/repository exercises, add interactive elements to the educational process, and, at the same time, raise the level of interest of education applicants, which is relevant in the conditions of distance learning.

Taran [32] determined that education applicants, with the help of templates of the LearningApps.org service, create both practical and control parts of the educational module that allow to examine the level of formation of special abilities of education applicants of different ages.

LearningApps.org – designer of interactive tasks, which allows for convenient and easy creation of electronic interactive exercises, which promotes activity, independence, efficiency, a connection of theory with practice, a combination of collective and individual forms of educational work, and more [10].

Using modern information technologies, including interactive learning technologies, opens broad prospects of deepening the theoretical base of knowledge, strengthens motivational orientation to studying disciplines, provides mastering of skills of person's self-development, an opportunity to think, create [27].

The process of technologicalization of education is undoubtedly accompanied by the involvement of students in mastering the methods of using the capabilities of information computer technologies [5]. Some researchers have already begun to propose various tools, techniques and approaches to support the active involvement of both teachers and students in the design of learning tasks and environments; new instructional and learning design practices are emerging that are based on the idea of student ownership of tasks, and that emphasises the importance of allowing flexibility, encouraging self-direction and choice as well as promoting creativity in the performance of tasks [18].

Results of the conducted research on using interactive tasks in the educational process indicate the intensification of the educational process and the intensification of cognitive activity of higher education applicants [21].

The last period is characterised by the active implementation of distance education into the national learning environment [16]. Higher education institutions intensify activities and develop various electronic educational resources (manuals, textbooks, virtual workshops, repositories, web-based learning support systems, distance learning courses, etc.), study possible ways of organisation of distance classes, presentation of educational material, solving issues of technical support of online learning, study other theoretical and practical problems, related to the introduction of distance learning in Ukraine. Educators used previously electronic learning resources only as teaching aids; in today's reality, e-learning resources are the only way to ensure the educational process by improving its quality due to the high degree of visualisation of learning material and accessibility, individualisation, interactivity, and self-control in study. The system of e-learning resources, which instructors and institutions of higher education can propose, is a powerful didactic resource for providing a system of support for distance education as a requirement of the time [8].

The instructors of Berezhany Professional College of NULES of Ukraine placed all electronic educational and methodical complexes on the portal of distance and blended learning Moodle. In such a way, the higher education applicants have the opportunity, after identification, to get access to distance learning courses at any time convenient for them. Also, the portal has electronic manuals, tutorials, workshops, multimedia presentations, etc., to provide a support

system for distance and blended learning.

The distance and blended learning portal Moodle is used actively now and helps form professional competencies, information culture of future economic specialists, and professional self-awareness to realise the creative potential of higher education applicants.

4. Results

An interactive study using the LearningApps.org online service in the Moodle system was introduced at Berezhany Professional College of NULES of Ukraine. The developed interactive tasks with the help of the LearningApps.org online service on disciplines of “Banking operations”, “Insurance services”, and “Economic analysis” were used during the classes with higher education applicants of economic specialities.

Introducing the traditional professional training of network technologies based on the Moodle system in the educational process of future specialists in economic specialities is accompanied by the creation of the didactic information environment, which is a platform for the realisation of the process of training via the Internet, contains the educational information and information with results of educational activity. Moodle Learning Management System has vast possibilities for multimodal presentation of educational information, automatization of control and monitoring, performing interactive network communication, parallel actions and exchange of information, using which need making adjustments to the organisation of forms and methods of teaching [6]. Although Moodle is a multimodular system, when creating interactive explanatory-illustrative materials, simulators, and questionnaires quickly and attractively, you should use a special separate software tool.

An essential aspect of using the Moodle platform in the educational process of future specialists in economic specialities is the ability to use external resources that can be built into the system.

External systems can be integrated easily to maintain authentication, enrolments and other things, allowing Moodle to react smoothly as data in other systems is modified [23].

Students widely consider Moodle as a platform for weekly access rather than a site they visit daily, and they are more likely to log in on the day of their lectures – they generally see it as a resource location, holding the slides necessary for the week’s lectures [19].

From the view of practical experience of using means of modern information technologies in the educational process, we want to note that interactive tasks, developed with the help of the LearningApps.org online service, activate the activities of higher education applicants and act as a means of control or self-control in the Moodle system.

The advantage of the LearningApps.org service is that the exercise templates have an attractive design and allow to switch on interface elements (markers of reactions to correct and incorrect answers), which have a positive emotional impact on students. The formation of positive emotions is facilitated by the playful nature of many exercises in the instruction templates, which allow for correcting mistakes. Due to this fact, the reason for the negative attitude to learning, as failure to perform tasks, is eliminated [30]. Using the LearningApps.org service helps higher education applicants better fix the studied theoretical material, increase their activity, motivation and interest, and acquire skills of independent and collective search for

ways to solve the tasks. Consider the algorithm for creating an interactive exercise on the LearningApps.org online service for clarity.

Note that you do not need to register to create and do exercises. However, registration is necessary for students to create groups, monitor performance, and create exercises. We will not detail the registration of a new account but will focus on creating an interactive exercise, “Crossword”, which is used to develop new concepts of the topic “Credit granting and repayment operations”, in more detail.

We recommend being acquainted with ready-made exercises before starting work on the online service. To do this, you must activate the option “View exercises” option and select an educational discipline from these categories. Each task can be added to the account page (“My exercises”) and will soon be used in the classroom, changing it to your needs or creating a completely different exercise. To create an exercise, you need to click the option “Create an exercise” and select the exercise “Crossword”.

The next step of creating the exercise “Crossword” is to fill in the template form, adding text, images, sound, video, description of the task, help, and feedback, and finally, activate the “Save exercise” option. After saving, the exercise is displayed on the LearningApps.org online service in the “My exercises” tab for use and, if necessary, editing. The exercise status also can be changed from private to public. When the exercise is ready for use, we can give higher education applicants access to its implementation using the QR code automatically created by the service, which will provide a quick transition to the exercise or by providing higher education applicants with a link to a demonstration of the exercise in regular or full-screen mode.

Interactive tasks, developed with the help of LearningApps.org, can be done directly on the website of the online resource and other web resources, particularly on the portal of distance and blended learning of Berezhany Professional College of NULES of Ukraine. For correct work with the LearningApps.org online service and to be able to embed tasks on other web resources, you must register and obtain an account.

To place interactive tasks on the Moodle distance and blended learning portal, you need to copy the link to the task we created in the LearningApps.org online service (figure 1, item 1) or download the SCORM package to your computer (figure 1, item 2).

Consider one of the ways to place interactive tasks of the LearningApps.org online service in the Moodle system, which was used the most often in teaching economic disciplines, namely, the creation of tasks using the SCORM package.

To integrate the created interactive task into the study course, first of all, it is necessary to click the “Edit” button in the Moodle system for the corresponding course in which we plan to insert it. When this option is enabled, the developer can add and edit resources placed in the electronic course. To add the SCORM package, it is necessary to choose the option “Add an activity or resource” (figure 2) and from the presented list – the SCORM package (figure 3).

After these steps, a window with detailed settings will appear. We will highlight only a few of the most important settings. For example, after entering the task name and downloading the SCORM package, we recommend the following:

- to click “Show less...” in the item “Appearance” and change the setting “Disable preview mode” to “Yes”;

LearningApps.org

Account settings: Уляна Дудка

Search In Apps | Browse Apps | Create App | My classes | My Apps

2021-03-19

Прийоми економічного аналізу (Techniques of economic analysis)

До якісних (абстрактно-логічних) прийомів дослідження відносять (Qualitative (abstract-logical) research techniques include):

До кількісних прийомів дослідження відносять (Quantitative research techniques include):

До описових прийомів відносять (Descriptive techniques include):

Аналітичні прийоми поділяються на (Analytical techniques are divided into):

індукцію, дедукцію (induction, deduction)	аналіз, синтез (analysis, synthesis)	ряди динаміки, графічний прийом (time series, graphic technique)	прийоми для дослідження співвідношень величин (techniques used to study stochastic relationships)
описові прийоми (descriptive techniques)	порівняння, евристичні прийоми (comparisons, heuristic techniques)	аналітичні прийоми (analytical techniques)	середні та відносні величини (average and relative values)
структурні та типологічні групування (structural and typological groupings)	прийоми для вивчення функціональних залежностей (techniques used to study functional dependencies)	описові прийоми (descriptive techniques)	ряди динаміки, графічний прийом (time series, graphic technique)

Create similar App | private App | public App | Edit App

Use App | Report copyright or misuse

Weblink: <https://learningapps.org/display?v=p1fq1hf7j21>

Fullscreen-Link: <https://learningapps.org/watch?v=p1fq1hf7j21>

Embed: `<iframe src="https://learningapps.org/watch?v=p1fq1hf7j21" style="border:0px;width:100%;height:500px" all`

SCORM | iBooks Author

QR-Code

Figure 1: Placing a link or SCORM in the LearningApps.org online service.

- to select “1 attempt” in the item “Attempts management” – “Number of attempts”;
- immediately look through the create task, you need to click “Save and display”. If necessary, you can change the settings.

These settings help higher education applicants take tasks more seriously and exercise self-control over knowledge and skills.

Note that if you select “Unlimited attempts”, “2 attempts”, and more in the settings in the “Attempts management” item, then higher education applicants will be able to re-perform the interactive task.

More detailed information on the SCORM package’s settings can be viewed by following the URL: https://docs.moodle.org/402/en/SCORM_activity.

After saving the settings mentioned above, a message will appear stating the number of allowed attempts to perform the task and score and using the “Enter” button, the finished

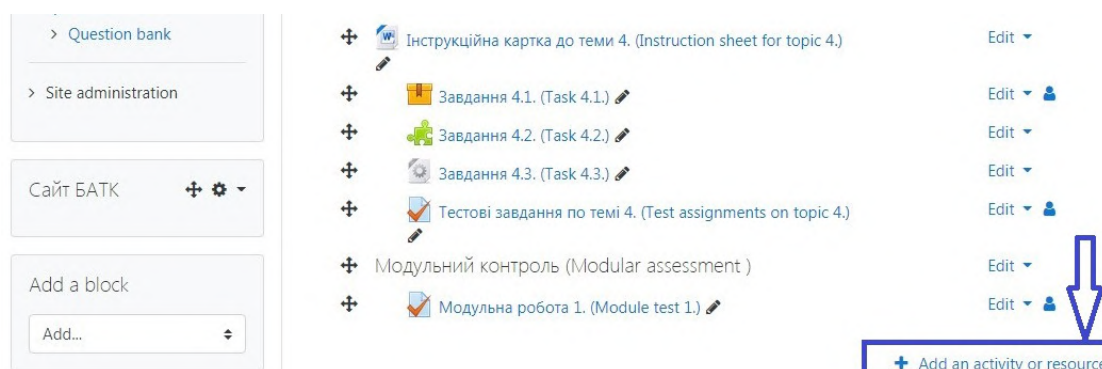


Figure 2: Activation of option “Add an activity or resource”.

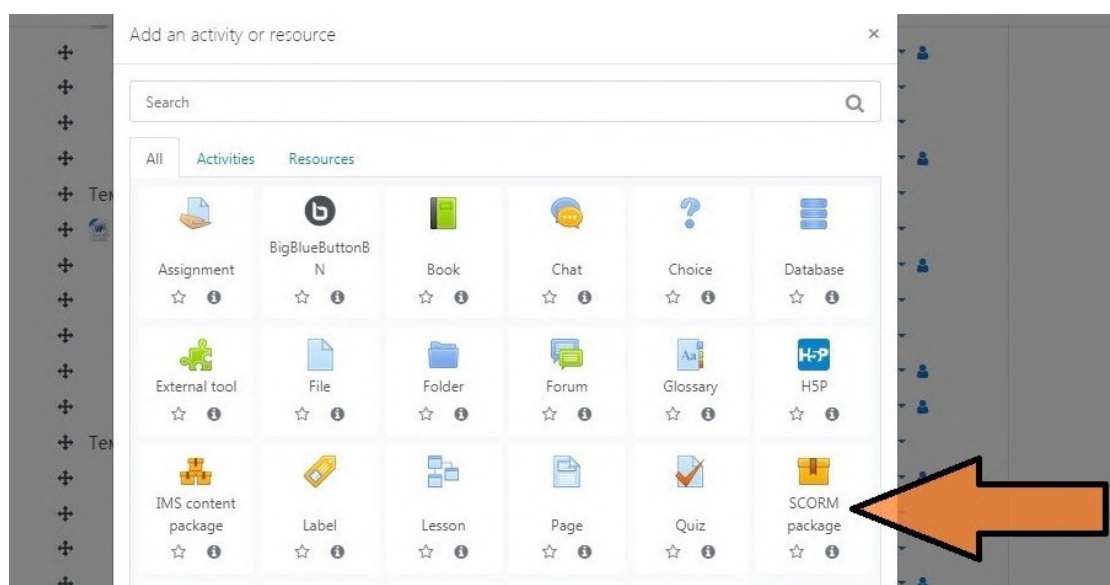


Figure 3: Selection of the “SCORM package”.

interactive task will open.

Consider the sequence of execution of one of the most interesting interactive tasks for future specialists in economic specialities, built into the Moodle system – the “Group Puzzle”. To do this task, it is necessary to choose the correct answer (figure 4, item 2) for each category (figure 4, item 1). If the answer is correct, some part of the picture will be shown, but if the answer is incorrect, a message will appear stating the cause of the error, and the answer will be highlighted in red. If the interactive task is done correctly, a welcoming message will appear.

The advantage of integrating interactive tasks into the LMS Moodle using the SCORM package is that the scores for their performance are displayed in the score journal in the Moodle system. It is always possible to observe whether the higher education applicant (figure 5, item 1) has completed the task, how much time was spent on its completion and how many attempts were

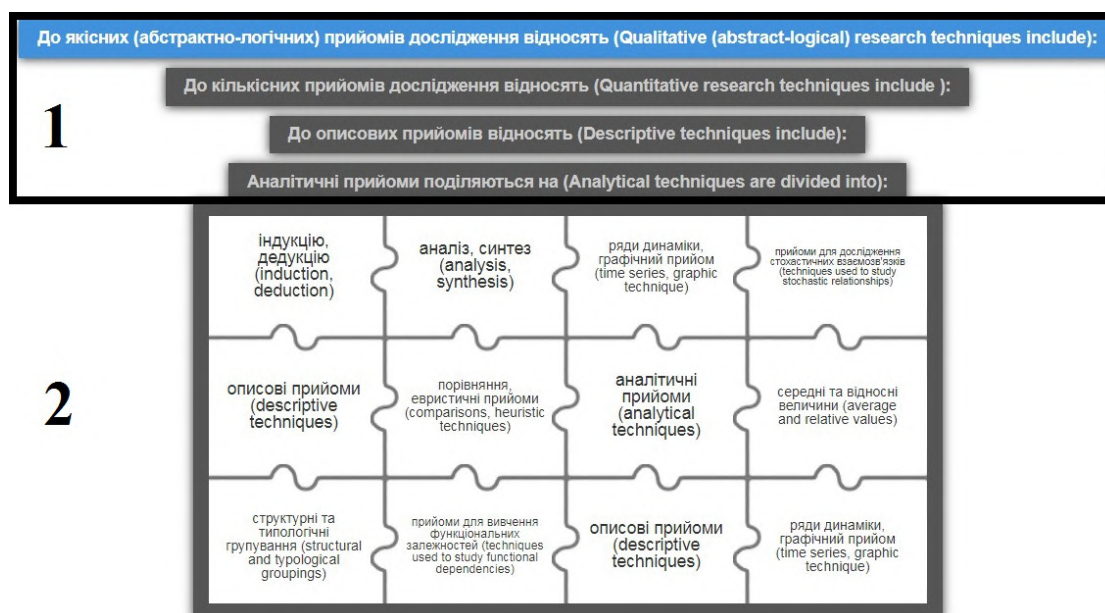


Figure 4: Example of “Group Puzzle” interactive task.

made to complete it (figure 5, item 2). The future specialist’s score (figure 5, item 3) is credited only for the correctly performed task. A critical component of ensuring monitoring control of studying activities of higher education applicants is that the score journal (figure 5, item 4) can be downloaded conveniently.

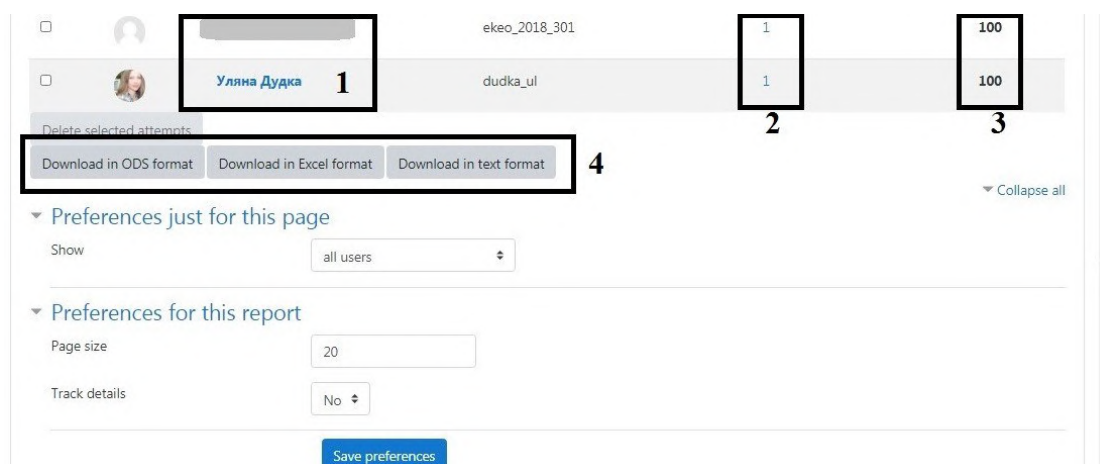


Figure 5: Score journal on the distance and blended learning Moodle portal.

In addition to the interactive task mentioned above, we used other tasks of the LearningApps.org online service in training future specialists in economic specialties, including:

- to fix the basic concepts in economic disciplines, we use the task “Cloze text” (figure 6), in

which you should choose a correct notion from the specified list, and the task “Crossword”, in which it is necessary to fill in some notions to the specified definitions, the task “Freetext input” (figure 7), in which you must enter the missing words or calculated data. Such exercises can be used while studying the topics “Subject and types of economic analysis”, “Methods of factor analysis”, “Methodical techniques of economic analysis”, “Analysis of resource provision of the enterprise and evaluation of the efficiency of its resources”, “Analysis of production costs”, etc.;

- to solve typical questions – the task “Freetext input”, in which it is necessary to fill in missing words or calculated data, and the task “Guess”, in which you also must enter calculated data or missing words. However, the difference from the previous task is that it is possible to choose an opponent while performing the task. These interactive tasks help future specialists in economic specialities to master such topics as “Analysis of production, works and services”, “Analysis of production costs”, “Analysis of resource provision of the enterprise and evaluation of the efficiency of its resources”, etc.

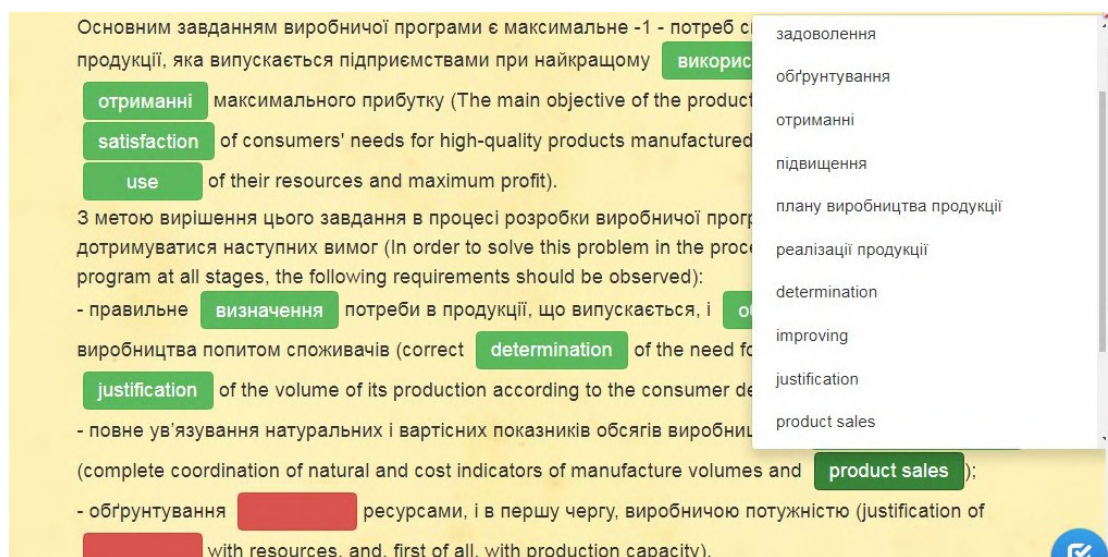


Figure 6: Example of interactive task “Close text”.

Thanks to the LearningApps.org online resource, future specialists in economic specialities are interested in creating interactive tasks on their own (figure 8) that help them to fix studied material, develop cognitive activity, and form professional and personal qualities.

Joining the possibilities of the Moodle system and online services guarantees the improvement of any training course, gives the ability to make it more productive, and makes the educational process more exciting and high quality for higher education applicants. The result depends on the professionalism of teaching staff, given the number of such educational services [14].

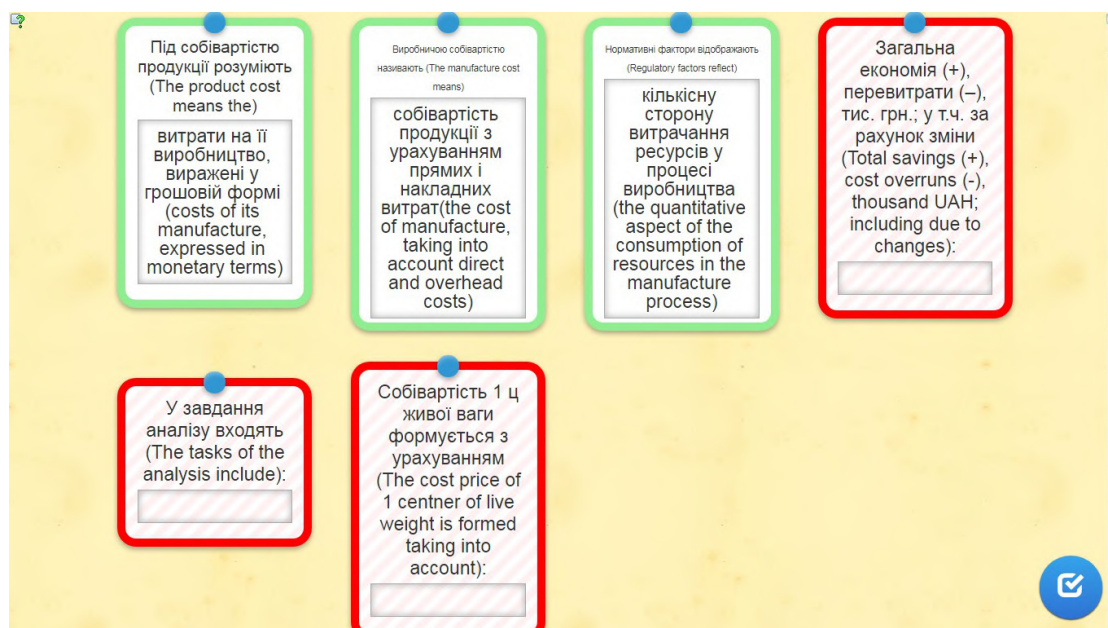


Figure 7: Example of interactive task “Freetext input”.

5. Conclusions and future work

This study demonstrates the value of incorporating interactive LearningApps.org exercises into Moodle-based economic courses. The results indicate increased student motivation, engagement, and learning outcomes using this integrated platform. Students responded positively to the game-like LearningApps.org activities, which helped concretise complex economic concepts through visualisation, collaboration, and instant feedback.

Quantitative analysis of test scores showed improved performance on topics where LearningApps.org were utilised compared to traditional lecture formats. The interactive exercises encouraged active learning and allowed students to construct understanding by applying concepts to solve real-world scenarios. Combining these activities with Moodle’s centralised learning hub provided a streamlined and effective learning experience.

This research highlights the benefits of aligning interactive resources like LearningApps.org with comprehensive LMS platforms like Moodle for economic instruction. The flexibility to customise LearningApps.org templates promotes student-centred learning, while Moodle offers robust tools for blended course delivery. This study provides a model for integrating educational technologies to enhance economic education.

Further research could expand the diversity of LearningApps.org activities for different economic principles. Exploring the impact of customising difficulty levels or scaffolding a sequence of interactive exercises may provide additional insights. Conducting qualitative studies on student and instructor experiences could reveal how interactive learning influences engagement, motivation, and teaching approaches in economics. Investigating using similar interactive resources besides LearningApps.org would also help identify best practices for

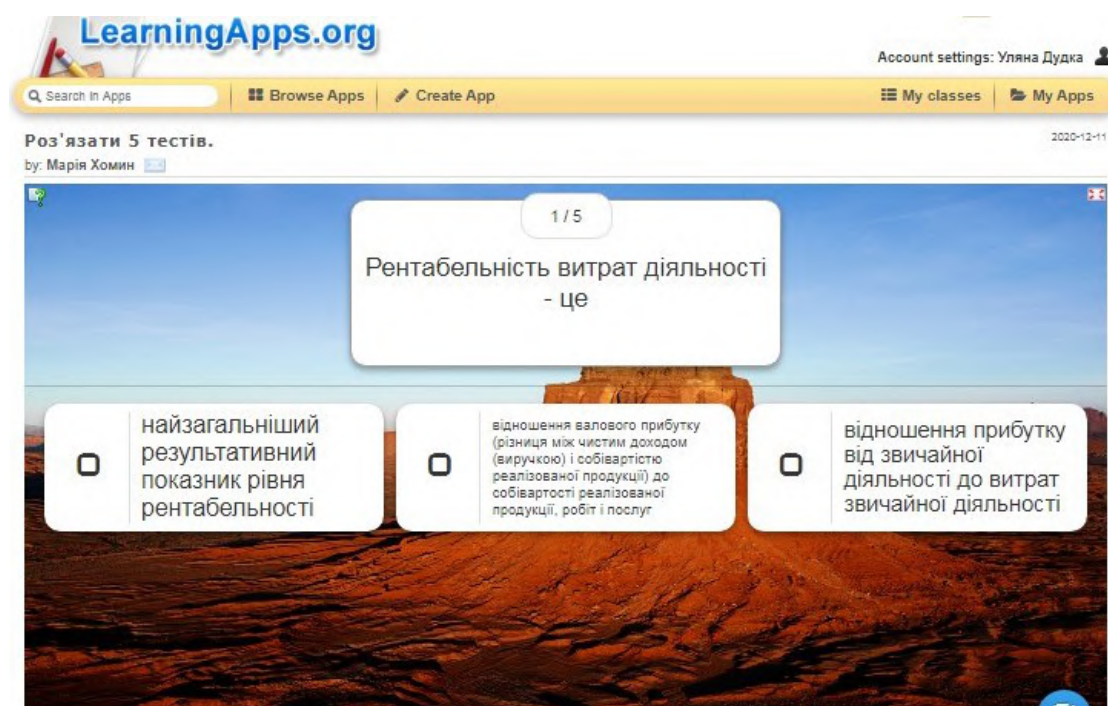


Figure 8: Example of the interactive “Multiple-Choice Quiz” task on the LearningApps.org online service.

instructional design. Overall, the positive outcomes of this study underline the merits of blending interactive tools with structured learning environments to create dynamic and effective economic education.

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