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# USE OF INTERACTIVE LEARNING PLATFORMS IN SOLVING MEDICAL PROBLEMS

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https://doi.org/10.5281/zenodo.23469675

**Abstract.** This paper describes the methodological potential of interactive learning platforms for teaching medical students to solve medical problems. A model is proposed, based on Moodle and its integrated H5P tools, that combines the stages of situation awareness, data analysis, solution selection and justification. The model is aimed at working with hypothetical medical data, interpreting diagnostic test results and making decisions in branching learning scenarios. A calculation task, assessment criteria and a pilot project for testing the model are presented. The effectiveness of the proposed approach has not been tested empirically in this work; the expected results are stated as research hypotheses.

**Keywords:** medical education, interactive learning platform, Moodle, H5P, virtual patient, medical problem, clinical reasoning, feedback, digital competence.

## 1. INTRODUCTION

In medical education, students must not only master theoretical knowledge but also identify the information relevant to a situation, analyze numerical data, and justify their chosen solution with evidence. Exercises aimed solely at finding a ready-made answer do not adequately reveal errors in the decision-making process. An interactive learning environment is therefore needed that allows a medical problem to be solved step by step, the reason for each choice to be explained, and the work to be redone after an error.

A systematic review of virtual patient simulations shows the potential of such tools for developing certain practical skills. However, differences between studies and the limited quality of the evidence do not justify concluding that every platform automatically yields strong results [1]. The pedagogical value of interactivity is determined not by the number of on-screen actions but by the student's interpretation of information, justification of their choices, and reconsideration of their solution on the basis of feedback.

Moodle serves to organize learning materials, assignments, and assessment within a single course. Its Quiz activity makes it possible to create assessment tasks with a question bank and detailed feedback [2]. H5P is used to prepare interactive videos and other learning materials, while the Branching Scenario tool builds a situation that continues depending on the student's choice [3, 4]. The aim of this work is to combine these capabilities in a single methodological model for teaching medical problem solving and to substantiate the procedure for evaluating the model.

**Initial data.** Hypothetical data compiled by the instructor, anonymized learning scenarios, and verified theoretical materials are selected for the tasks. The calculation example in this paper is not based on observations of real patients. It assumes that, among 1,000 hypothetical examinees, 100 have the condition under study and 900 do

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not. Test sensitivity is set at 90% and specificity at 80%. These values are instructional assumptions given to explain the difference between diagnostic test indicators.

**Model structure.** The learning process is organized in four stages: (1) situation awareness — the student studies the problem, the data, and the question; (2) analysis — the student identifies the necessary indicators, completes the table, and performs the calculation; (3) solution selection — the student specifies the answer or course of action in an interactive task; (4) justification and reflection — the student explains the choice with evidence and corrects errors on the basis of feedback. The instructor defines in advance the expected outcome and the assessment criterion for each stage. The model is based on subordinating the platform to the learning objective.

**Assessment design.** It is proposed to test the model during a single learning module with an experimental group and a control group. The groups have the same topic, allotted time, and assessment criteria; the experimental group completes interactive scenarios, while the control group completes traditional written problems with the same content. Calculation accuracy, interpretation of information, and the quality of solution justification are assessed through initial and final tasks. Each criterion is scored from 0 to 3 points: 0 — not completed; 1 — serious errors present; 2 — mostly correct, but the justification is incomplete; 3 — correct and supported by evidence. Group sizes are determined in advance by a statistical power analysis; agreement between two raters and differences in baseline preparation are taken into account.

**Practical task 1: interpreting a diagnostic test result.** Based on the given assumptions, the student calculates the number of true positives as $100 \times 0.90 = 90$, false negatives as $100 - 90 = 10$, true negatives as $900 \times 0.80 = 720$, and false positives as $900 - 720 = 180$. The total number of positive results is 270, and the positive predictive value is $90 / 270 \times 100 = 33.3\%$. In the Moodle assignment, the student completes the table and explains in writing why 90% sensitivity does not mean a 90% positive predictive value. The feedback shows that these indicators have different denominators and that the predictive value depends on the prevalence of the condition under study.

Table 1. Calculation and interpretation of hypothetical diagnostic test results

| Result type | Condition present | Condition absent | Total |
|---|---|---|---|
| Test positive | 90 | 180 | 270 |
| Test negative | 10 | 720 | 730 |
| Total | 100 | 900 | 1,000 |
| Sensitivity | 90 / 100 | — | 90% |
| Positive predictive value | 90 / 270 | — | 33.3% |

## 4. CONCLUSION

The use of interactive learning platforms in solving medical problems makes it possible to organize situation awareness, data analysis, solution selection, and justification in a consistent way. In the proposed model, Moodle is used for course management and assessment, and H5P for creating interactive learning scenarios. The main methodological requirement is that tasks, feedback, and assessment criteria be

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directed toward a single goal. The effect of the model on learning outcomes must be tested through the planned pilot study.

**Expected results and limitations.** The model is expected to develop students' calculation accuracy, critical interpretation of data, and evidence-based justification of solutions. These expectations are not measured results of this work. Internet access, digital readiness, high-quality content in Uzbek, and the time instructors spend creating tasks affect implementation. To reduce these limitations, a short guide, a sample scenario, and downloadable materials will be prepared. Virtual scenarios complement work with real patients; the assessment of competence in clinical practice is organized separately [1].

**Practical task 2: a branching medical scenario.** Using the H5P Branching Scenario tool, preliminary information about a hypothetical patient and diagnostic test results are provided. The student chooses between accepting the result immediately as a final conclusion and pursuing ways of identifying the missing information. Each path continues with explanatory feedback: which evidence is sufficient, which information is missing, and where the uncertainty comes from. A subject-matter expert checks the clinical content in advance. In addition to the path chosen, the quality of the student's written justification is assessed in the task; the score cannot be equated with the real-world outcome of patient care.

**Practical task 3: comparing medical data.** A spreadsheet containing indicators of hypothetical examinees is posted in the Moodle course. The student identifies blank cells, duplicate entries, and inconsistent units of measurement in the data, records the cleaning decisions, and calculates group means. The student presents the results in a chart and explains that an observed difference alone does not prove a causal relationship. The answer and the calculation file are submitted to the platform, and the instructor assesses the accuracy of the figures together with the student's comments on data quality. Such a task connects the processing of medical information with a culture of scientific reasoning. A spreadsheet containing indicators of hypothetical examinees is posted in the Moodle course. The student identifies blank cells, duplicate entries, and inconsistent units of measurement in the data, records the cleaning decisions, and calculates group means. The student presents the results in a chart and explains that an observed difference alone does not prove a causal relationship. The answer and the calculation file are submitted to the platform, and the instructor assesses the accuracy of the figures together with the student's comments on data quality. Such a task connects the processing of medical information with a culture of scientific reasoning.

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