

Question Types for Assessment of Mathematics Education Problems in Dynamic Geometry Environments



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OUTLINE



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INTRODUCTION



- ❧ Assessment is a core activity in education.
- ❧ Impossible to think the learning-teaching process without assessment activities
- ❧ Determination of students' skills, knowledge, understanding and abilities is used to promote learning as well as to ensure that students meet the intended learning outcomes [1][

INTRODUCTION



- ❧ Assessment of student learning requires the use of techniques for measuring student achievement.
- ❧ Assessment is more than a collection of techniques, however. It is a systematic process that plays a significant role in effective teaching.
- ❧ It begins with the identification of learning goals, monitors the progress students make toward those goals, and ends with a judgment concerning the extent to which those goals have been attained [1]

INTRODUCTION



- Recent developments in higher education have involved increased adoption of information and communication technologies (ICT).
- Education activities such as e-learning and technology-enhanced learning (TEL) have become important elements, providing new opportunities and approaches to teaching, learning and assessment in higher education.

INTRODUCTION



- ✧ In the literature, the integration of technological tools into the assessment process is expressed by the “e-assessment” concept [2,3,4]
- ✧ Assessment using ICT has come to be known as e-assessment, which includes the entire assessment process, from designing assignments to storing the results with the help of ICT .
- ✧ The most of the researches related to the e-assessment focused on how to transfer the examinations in paper-pencil environment to the electronic environment [2,3,4,5]

INTRODUCTION



❧ E-assessment is practical because;[2]

- ❧ Increased efficiency and consequently lower costs;
- ❧ Greater flexibility regarding administration (such as tests on demand);
- ❧ Instant scores and/or feedback;
- ❧ Fewer errors in marking

INTRODUCTION



- ✧ In addition to those studies, in the research about the integration of computer assisted assessment tools to the mathematics instruction, the participant pre-service teachers use these tools in favor of the formative assessment [5]
- ✧ In a similar study, pre-service teachers prepared lessons and home works using technological tools such as dynamic geometry software and thus it is shown that those tools can be used in the process of assessment [6]

AIM OF THE STUDY



- ❧ In the literature, there is numerous studies concerning technology supported mathematics instruction. [7,8,9,10]
- ❧ But almost none of them is related to the assessment dimension of the mathematics teaching. In particular, it is highly recommended to conduct researches about the use of technology in that dimension. [9,10]

AIM OF THE STUDY



- ❧ The aim of this study is to determine which types of questions can be used in the assessment of computer based mathematics instruction.
- ❧ Within the concept of this aim, this study focuses on only geometry subjects.

METHODOLOGY



- ❧ Case study is considered as the methodology of the research. The reason is that a case study investigates a contemporary phenomenon in depth and within its real-life context when the boundaries between phenomenon and context are not clearly evident
- ❧ 15 pre-service mathematics teachers have participated to the study of 6 weeks (3 hours per week). Every pre-service teacher worked individually on total of 26 geometry questions of different types.

METHODOLOGY



- ❧ At the same time, they explained their approaches to solve problems by filling out a paper.
- ❧ In addition, a screen capture program is used to grab the video of what is seen on the computer screen.
- ❧ Meanwhile the researchers observed pre-service teachers' work on computers.

Open Ended Question Examples

1. Draw the bissector of a given angle without using «the bissector» tool
2. When does the projection of a point outside of a triangle onto the sides become aligned?
3. Draw a tangent to a circle from outside without using «tangent» tool.

Multiple Question Examples

1. Which statement is false? Find the false statement and show its true by using Cabri 3D.
 - a) Let k and m be two parallel lines in space. If another line p is parallel to k , then p is also parallel to m .
 - b) Three parallel lines may not be on the same plane
 - c) Let k and m be two parallel lines in space. If another line p intersects with k , then p intersects also with m .
 - d) Let E be a plane and P be arbitrary point outside E . There exists only one plane that passes from P and parallel to E .
 - e) Let E be a plane and P and Q be arbitrary points. There exists only one plane that passes from P and Q and perpendicular to E .

FINDINGS



- ❧ The table shows the types of questions and how the participants respond to those questions.
- ❧ Best on multiple choices and matching tests
- ❧ Lower on open ended question.

FINDINGS



- ❧ The video capture of the students' computer screen plays a very crucial role in assessment.
- ❧ The last saved file sometimes does not represent the students work.
- ❧ [Example video](#)
- ❧ [Example file](#)

RESULTS



- ❧ Questions of all types can be used for the assessment in dynamic geometry environments.
- ❧ Among them, open ended questions are the best. They reflect most clues about students knowledge.
- ❧ Question should be prepared in the way that students must show all of his work.

RESULTS



☞ To assess an answer in this situation, the following must be absolutely taken into consideration:

- The last product is dynamic or not
- The accuracy of the answer
- The skill of the use of program
- The knowledge about questions.



THANK YOU FOR
LISTENING

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