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# Assessing Students' Knowledge Through E-learning Platforms

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**Abstract:** *In this report, an attempt is made to examine issues of discussion related to the assessment of student's knowledge and skills in the field of Accounting in general, and in „Financial Control" course in particular. The issue of measuring students' knowledge and skills is a very important issue that has always caused controversy and discussion among professionals working in the education system. It is so because one of the most important indicators of the quality of education is students' performance expressed through the grades that teachers give to students. It is quite understandable that it is in the interest of all members of society and especially employers that students' grades correspond to the maximum extent possible to the knowledge and skills acquired at the university. This issue has not been given enough attention recently, which is why when students get employed it is often found that their knowledge and skills gained at the university do not meet the requirements of the employers.*

*The object of study in this report is the possibilities for assessing students' knowledge and skills through the use of web-based computer tests consisting of both practical tasks and different types of test questions, allowing a comprehensive assessment of knowledge and skills acquired at the university. The report outlines the advantages and disadvantages of the different types of test questions used to assess students' knowledge and skills. Emphasis is placed on the search for opportunities through the use of computer tests to achieve an objective assessment of student's knowledge and skills in the field of Accounting.*

## 1. INTRODUCTION

The training of higher education specialists in the field of Accounting and Finance has recently undergone significant changes. These changes are dictated by the constantly changing economy, the emergence of new reporting units, new approaches to reporting, control, and analysis of business activities, introduction of new courses (e.g. Audit, Management Accounting), introduction and implementation of international accounting standards, etc.

All this created the need for the application of new approaches and methods of teaching, the introduction of new forms of study (e.g. distance learning), and the COVID-19 pandemic situation during the last year has accelerated the introduction and widespread use of e-learning platforms.

In light of the above, the purpose of this study is to examine students' theoretical knowledge and practical skills in "Financial Control", Program "Accounting and Auditing", University of Economics-Varna.

The interest in this topic is driven by the fact that in the last semester, due to the pandemic situation, students studied entirely in an electronic environment, through e-courses in the Moodle platform, which is another challenge for both students and teachers assessing their knowledge and skills.

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## 2. RESEARCH METHODOLOGY

The interest in this topic is further fueled by the fact that, in recent years, e-learning courses (on the Moodle platform) have been increasingly used in student education, which represents a further challenge for both students and teachers in assessing their knowledge and skills.

Distance learning issues have been studied by many researchers since the 1970s (Peters, 1983; Moore, 1973; Holmberg, 1983; Keegan, 1993; Garrison, 2000). According to Peters (1983), the emergence of distance education is associated with the period of industrialization, when the need for the availability of large numbers of highly skilled professionals arose. In fact, this period marked the beginning of the massification of education, when it began to change from elitist (accessible to a small number of people) to mass (accessible to more people).

One of the most characteristic features of distance education is the physical distance between the teacher and the learner. The existence of distance between the learner and the teacher is seen as one of the positive aspects of this form of education, as it enables the learner to acquire new skills such as: greater decision-making independence, autonomy and independence, which will allow them to adapt more easily to a real work environment when they enter the labor market (Holmberg, 1983; Moore, 1973).

In the vast majority of research currently devoted to distance education, the latter is seen as a contemporary form of learning, despite the presence of distance between the teacher and the learner (Peters, 1983) and a practical lack of communication between learners. Moreover. Garrison (2000) believes that the lack of physical contact (in an auditorium) between the learner and the teacher can be compensated by developing appropriate interactive learning materials based on modern information and communication technologies and by creating an appropriate communicative environment, both between the teacher and the learners and between the learners themselves.

In the modern stage, different forms and methods are used to assess students' knowledge and skills, such as oral answers, written tests, colloquia, control papers, etc. Each of these forms and methods has its advantages and disadvantages, so in many cases, a combination of them is used to obtain a picture of the level of student's knowledge and skills. Since the end of the last century, testing has been added to these forms of assessment. With the development of information and communication technologies, the use of tests has increased. Due to the presence of many positive aspects, this method finds wide application in the assessment of knowledge and skills through the use of e-learning platforms such as Moodle. Unlike the traditional methods of knowledge assessment mentioned above, it is the test form of assessment that is characterized by the presence of scientifically based assessment criteria (Wilson, 2005).

One of the main prerequisites for the widespread use of the test form of knowledge assessment is the development of information technology and the increasing number of students. By using different types of test questions, different types of student knowledge and skills can be assessed. In this sense, the American psychologist Benjamin Bloom (Bloom et al., 1956) developed and proposed a detailed classification of educational objectives: (a) knowledge - memorization of knowledge; (b) understanding - acquisition of skills, the learner to understand the acquired knowledge; (c) application - acquisition of skills, the learner to put the acquired knowledge into practice; (d) analysis - acquisition of skills, the learner to analyses the acquired knowledge; (e) synthesis - acquisition of skills, the learner to develop new ideas based on the acquired knowledge; and (f) evaluation - acquisition of skills, the learner to argue for a decision or own position on a particular issue.

Tests of the following types can be generated programmatically: true/false, multiple choice, missing word, numerical, open-ended (essay type), etc. In the first type of question, the student has to answer whether a statement is true or false; in the second, he/she has to choose the correct answer among several alternatives; in the third, he/she has to fill in the missing word in a given place in the sentence correctly among several indicated; in the fourth, he/she has to perform certain calculations and indicate a specific answer; and in the fifth, he/she has to answer a short theoretical question in writing.

Test assessment has entered Bulgarian education relatively quickly as a well-established method in Western educational systems for assessing students' knowledge and skills. The reason for its introduction is its advantages, the most important of which are the following (Cohen & Swerdlik, 2009):

- Simplicity - the use of computer technology makes it possible to reduce the routine work involved in developing and checking examination papers;
- Time-saving - the computer-based test allows a significant number of students to be tested and assessed in a short period;
- Objectivity of the assessment - the test questions generated by the software allow all students to be placed under the same conditions, to solve a test with the same level of difficulty, which excludes the possibility of subjectivism on the part of the teacher.

The testing system used in Bulgaria to assess knowledge, including the use of computer-based tests, is rather mechanical and has many shortcomings, many of which manifest themselves in practice. The most important of these are:

- Assessing knowledge using computer-based tests involves a different type of learning than the way students prepare by developing questions, solving problems or case studies;
- Quizzes require a textbook (preferably electronic) that clearly states the answer to the question;
- Only students' reproductive knowledge, such as listing facts, defining concepts, reproducing formulae, etc., can be assessed through computer-based tests with multiple-choice and true/false questions. This type of assessment does not allow us to check students' productive knowledge (understanding of facts, use of concepts, understanding of principles) and the extent to which students are able to apply what they have learned in practice. For this purpose, it is necessary to develop examination tests, including other types of questions, such as open-ended (essay type), numerical questions, etc.

The focus of this study was:

- To check the extent to which students have mastered the theoretical knowledge taught;
- To check whether students are able to make sense of facts, define concepts and principles specific to the discipline being studied;
- To check whether students have acquired practical skills and can apply the theoretical knowledge they have acquired to solve practical problems.

The need to include case studies in the form of numerical questions as well as test questions of different types was driven by the fact that different types of questions can test different types of student knowledge. For example, multiple-choice questions, which require students to select the correct answer from several alternatives, can test students' reproductive knowledge. In this way, students' ability to list facts, define concepts, reproduce formulae, etc. can be tested.

Students' productive knowledge, i.e. the extent to which they are able to make sense of facts, understand and interpret concepts and principles, can be tested through open-ended questions to which students have to give a specific answer. To this end, short theoretical questions should be

formulated from the material studied, which students can answer freely on the Moodle platform. The problem with this type of question is that the student's answers should be evaluated by the teaching team, which should assign a certain number of points to each theoretical question based on the completeness of the answer given. This type of question allows the teaching team to check how well the students have mastered the technical terminology and how fluently they can interpret the underlying theoretical propositions.

Students' practical skills, i.e. the extent to which they can apply the theoretical knowledge they have acquired, can be tested by including practical case studies (e.g. in the form of numerical questions) in the exam version.

Regarding the possibility of using computer-based tests to assess student's knowledge and skills, it should be noted that the assessment team needs to have an electronically based learning platform. Before proceeding with the implementation of a computer-based test to assess knowledge and skills, the teaching team should adopt a certain approach, specifying in advance the type of student knowledge to be tested: theoretical, practical, or a combination of both. Only after a certain concept has been adopted and the type of knowledge to be tested and assessed has been specified, it is possible to determine the type of questions to be included in the electronically based examination to test the student's knowledge and skills. Our argumentation will be based on the Moodle platform, as one of the most common platforms for e-learning courses in Bulgaria, which also allows to conducting e-learning exams by including exam tasks and different types of exam questions.

The fact that accounting, which also has a control function, originated as a purely practical activity, and that only a few centuries later the first attempts were made to clarify its logic and principles theoretically, shows that in the study of Accounting and Auditing (or other similarly named specialties), in addition to theoretical knowledge, practical skills should be acquired, aimed at the possibility of applying the acquired theoretical knowledge in practice. This circumstance makes it necessary to include modules with practical tasks in the development of examination options for assessing the knowledge and skills of students in the discipline of Financial Control. In this way, it will be possible to assess the extent to which students are able to apply the theoretical knowledge they have acquired to real-life practice.

These requirements can be fully realized through the capabilities of the Moodle platform. It allows for the development of exam versions with case studies to be solved by the students and re-submitted to the lecturer for assessment via the platform. It is also possible to create an electronic computer-based test with different types of questions to verify the theoretical knowledge acquired during the training. The latter can be checked by including different types of questions such as true/false, missing word, multiple choice, etc. Considering the specificity of the study material of the Financial Control discipline, which is practice-oriented, we believe that in order to test the theoretical knowledge of the students of this discipline, the test should include questions of the "true/false" type and questions of the "multiple choice" type.

It is the practical training in the discipline of Financial Control that requires the highest relative share in the structure of the evaluation of students' knowledge and skills, in order to assess the students' ability to solve practical problems. Secondly, students' ability to understand basic concepts and interpret basic theoretical concepts should be assessed. Thirdly, their ability to list facts, define concepts, reproduce formulae, etc. should be assessed.

## 3. RESULTS AND DISCUSSION

The study was carried out on the basis of the results obtained in the examination of the discipline Financial Control by all the students who appeared (43 people). The examination test was combined and contained three types of questions:

a) multiple-choice questions (46 items), where students must choose the correct answer from four alternatives given;
b) true/false questions (20 questions), where students have to indicate whether the statement is true or false;
c) numerical questions (7 questions), which are practical cases to test the students' ability to apply the theoretical knowledge acquired during the semester.

The different types of questions have different relative weights in determining the final grade, as different questions assess different types of student knowledge. Numerical questions have the highest weighting (5 points for a correct answer). Each correct answer to true/false questions is worth 2 points and each correct answer to multiple-choice questions is worth 1 point. No points are deducted if students do not answer a question or if the answer to a question is incorrect. This is the reason why the total number of points exceeds 100, as the Moodle platform recalculates the number of points each student receives to 100 based on the number of correct and incorrect answers given to each question type, and the different number of points the correct answer to each question is worth.

The reliability of the test has been checked using the internal consistency index by calculating Cronbach's coefficient. The α coefficient was proposed by the American scientist Lee Cronbach in 1951 and its application makes it possible to determine the contribution of each question to the overall reliability of the test. Test-retest reliability represents the stability of measurement results, i.e. the possibility of obtaining similar results in a repeated test under similar conditions. The internal consistency of a test also expresses the relationship between each of the questions and the overall result obtained, indicating the extent to which the individual questions do not contradict each other. The internal consistency coefficient of the test (calculated based on the statistical methodology embedded in the Moodle platform) is 74.96%. The value obtained gives us a reason to define the test as reliable since it is generally accepted that in order to define a test as reliable based on this coefficient, its value must exceed 70%. Of course, there are specialists (Boateng et al., 2018) who recommend a higher range of Cronbah's coefficient (85-90%) for greater certainty, but other factors, such as the number of questions included in the test, must be taken into account when determining reliability.

The value of the standard error should also be considered when analyzing the results obtained by students. Its determination is based on the idea that the result achieved in solving the test is due to the student's knowledge and skills as well as a certain amount of luck. The standard error can be used to eliminate the influence of luck. The value of the standard error (determined on the basis of the statistical methodology embedded in the Moodle platform) is 6.8%. This means that if the average student pass rate is 58.25%, then with a standard error of 6.8%, the actual student pass rate is in the range 51.45-61.21%.

The results obtained from the different components of the test variant are shown in Tables 1,2 and 3.

In the first part of the examination - solving practical problems - 7 examination cases were included in the form of numerical questions, based on the material studied during the semester. As can be

seen from the data presented in Table 1, only 6 students (13.95% of all students) failed the numerical (practical) questions by not answering any of the numerical questions correctly. The majority of students (28 students or 65.12% of all students) scored between 6 and 20 points, which can be considered a very good result. Nine students (20.93%) scored up to 5 points, which means that they answered only one of the numerical (practical) questions correctly and their result can be considered unsatisfactory. This means that about 1/3 of the students (34.88%) have not acquired sufficient skills to apply the theoretical knowledge they have acquired in solving practical situations. Unfortunately, none of the students answered the 7 numerical questions correctly, but it can still be concluded that the students have, to a large extent, acquired the necessary skills to be able to apply theoretical knowledge in real practice during their studies at university.

**Table 1.** Results obtained by solving the numerical (practical) questions

| No. | Points obtained by solving numerical (practical) questions | Number of students | Performance level (%) |
|---|---|---|---|
| 1 | 0 | 6 | 13.95 |
| 2 | 1-5 | 9 | 20.93 |
| 3 | 6-10 | 10 | 23.26 |
| 4 | 11-15 | 11 | 25.58 |
| 5 | 16-20 | 7 | 16.28 |
| 6 | 21-25 | 0 | 0 |
| Total | | 43 | 100.00 |

**Source:** Own research

**Table 2.** Test results obtained (true/false questions)

| No. | Test scores | Number of students | Performance level (%) |
|---|---|---|---|
| **1** | 0-10 | 1 | 2.33 |
| **2** | 11-20 | 13 | 30.23 |
| **3** | 21-30 | 23 | 53.49 |
| **4** | 31-40 | 6 | 13.95 |
| Total | | 43 | 100.00 |

**Source:** Own research

**Table 3.** Test results obtained (multiple choice questions)

| No. | Test scores | Number of students | Performance level (%) |
|---|---|---|---|
| **1** | 0-10 | 0 | 0 |
| **2** | 11-20 | 4 | 9.30 |
| **3** | 21-30 | 16 | 37.21 |
| **4** | 31-40 | 22 | 51.16 |
| **3** | 41-46 | 1 | 2.33 |
| Total | | 43 | 100.00 |

**Source:** Own research

When analyzing the results, it should also be taken into account that some of the numerical questions were slightly different from those solved in the seminar sessions during the semester, which may have further hindered some of the students.

The true/false questions contained specific statements to test the extent to which the students had mastered the specific terminology and conceptual apparatus of the discipline of financial control. The literature suggests that these are some of the easiest questions to answer, as there is a 50% chance that a student will answer correctly even if he/she does not know the correct answer. When analyzing the data from Table 2, it can be seen that the majority of students (23 students,

representing 53.495% of the total population) scored in the range of 21-30 points, which indicates that these students have a very good theoretical background and a significant mastery of the specific concepts and terminology of the discipline. It is noteworthy that 6 students (13.95%) scored in the range of 31-40 points, which indicates that these students have an extremely good theoretical background in the discipline.

The multiple-choice questions were formulated based on the material studied during the semester. These questions were designed to test the students' general theoretical background in the discipline of Financial Control, and the results of the test showed that this type of question did not cause any difficulty for the students. This can be supported by the fact that practically no student scored less than 10 points on this type of question. From the data presented in Table 3, it can be seen that the highest score, in the range of 31-40 marks, was obtained by 22 students, or 51.16% of all those tested, 16 students (or 37.21%) obtained a score in the range of 21-30 marks, which can also be considered as a very good result. There were no students who scored less than 10 points and only 4 students (9.30%) can be considered as not theoretically prepared as they scored in the range of 11-20 points, which can be considered as unsatisfactory. It is also noteworthy that only one student (2.33%) scored in the range of 41-46 marks, which is close to the maximum. This can be considered as quite normal, considering that the discipline of Financial Control can be defined as one of the disciplines that form the image of the discipline of Accounting and Auditing, which is characterized by specific terminology and issues, which implies that students make maximum efforts to master it.

An analysis of the results obtained in the Financial Control exam shows that the students have largely mastered the theoretical knowledge taught and have the necessary practical skills to apply their knowledge in practice. The data show that about 30% of the students (7 students who obtained the highest score in the numerical questions; 6 students who obtained the highest score in the true/false questions and 1 student who obtained the highest score in the multiple choice questions) possess critical thinking skills and can propose alternative solutions in non-standard practical situations. The latter is a very good testimony to the learning of the discipline.

## 4. CONCLUSION

As shown in the results from the examination in "Financial Control" students have largely acquired the theoretical knowledge and have the necessary practical skills to apply their knowledge in practice. The data show that nearly 22% of the students have critical thinking skills and can offer alternative solutions in non-standard practical situations. It is a strong attestation of the training in the respective course.

At the same time, the results from the examination show that upon completion of their training in "Financial Control" course, a large part of the students do not have systematic knowledge of the studied issues. Knowledge is used independently, and most students are not able to apply knowledge in some courses, such as "Financial Accounting", "Theory of Control" and "Financial Control" when solving specific practical tasks.

When solving practical tasks, students easily deal with those similar to the tasks solved during the semester and those that require direct application of the provisions of the current legislation. With regard to practical tasks that require creative thinking and the application of a set of knowledge from various disciplines, students have difficulties in finding the best solution.

To minimize these weak points, it is appropriate to introduce more elements of training in the educational process, which should be mainly practical. During the semester, students should be assigned independent coursework and homework to be discussed with the teacher during the last hours of the semester. This, as well as the regular meetings with business representatives, will make university education relevant to practical needs.

Students should be encouraged to do internships in a real work environment during their studies. It is useful for students to participate in at least two internship programs during their studies, and they should avail of the opportunities provided from the internship programs and projects funded by the European Union. This, in turn, will improve students' practical skills and enable them to more easily adapt to the employers' requirements in real-life concepts.

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