Biology achievement of learning outcomes in e-learning

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ABSTRACT

In the context of global social changes in the education system, it is important to change the approach to acquiring basic students' competencies, with special emphasis on the development of their natural and digital literacy. Today's students, members of always on line generation, are characterized by the intensive use of the Internet for social interaction as well as for education. Precisely for this reason, it is necessary to implement ICT in teaching practice, and one of the options is e-learning. For the purpose of achieving learning outcomes, according to the cognitive levels of applied teaching and learning, traditional learning and e-learning methods, a research in teaching Nature and Biology in elementary schools, using a sample of eight classes, was conducted. The research results show the same success of the experimental and control groups of students in achieving the outcomes, and e-learning proved to be just as successful as the traditional curriculum, where contemporary teaching strategies were used. Therefore e-learning can also be used in situations such as illness, student's absence for multi-day competitions, life in distinguished environments, in cases where there is no possibility for students to attend regular classes. The research has shown that both control and experimental groups were equally successful / unsuccessfully in solving the tasks of the first, second and third cognitive level. The results can be used by the creators of educational policy, and serve as a guideline for teachers- practitioners at devising their teaching.

Keywords: e-learning; ICT in teaching; cognitive levels; teaching Nature and Biology

INTRODUCTION

It is necessary to include Information and communication technology in the educational process, as well as to apply it in all forms of learning. The precondition for the abovementioned is the realization of various subjective (having informationally and informatically competent teachers) and objective factors (having the necessary infrastructure and material conditions). In order to do this, it is mandatory to constantly develop the digital competences of teachers. Researching the competences of Biology teachers for creating computer contents (Bulić and Novoselić, 2016), it became obvious that Biology teachers do not sufficiently apply ICT in teaching, and in the work they mostly use only Power Point presentations and their permutations. The use of ICT in education has led to the emergence of e-learning. It is characterized by the physical separation of teachers and students, without the existence of a face to face contact (f2f). The research conducted shows that students do not understand all the biological concepts equally well (Lukša, 2011), some teaching contents do not interest them (Garašić, 2012; Bulić, 2018). The knowledge tests the students were exposed to are mostly testing reproductive knowledge, i.e. the 1st cognitive level. The aim of the research is to determine whether the experimental group students (applying e-learning) have statistically significantly better results compared to the control group in solving written tests by cognitive levels.

METHODS

The conducted survey included 162 pupils of the 5th, 6th, 7th and 8th grade of elementary school (second and third education cycle). Teaching contents set up on the Moodle platform were designed using ADDIE teaching model. The experimental group students were instructed to work on Moodle.

During tuition, the control group students were in Biology classroom and worked with the teacher using modern teaching methods. The experimental group students were in the computer classroom and did not have face to face (f2f) contact with Biology teacher. The experimental group students had an access to electronic educational contents from home at any time and for as long as they wanted.

Preparations for both experimental and control group were the same, with the same required educational outcomes. Instruments used in the research were: a prior knowledge test, a written test I and a written test II. A total of 4 prior knowledge tests were composed, based on which the students were divided into a control and an experimental group. Four written testsI were conducted. They were written by the students after the first course. After the second course was completed, four written tests II were composed by the students. The written tests included the tasks of the first, second and third cognitive levels.

RESULTS

The data indicate that experimental and control group students solved the tasks of the first, second and third cognitive levels equally well or equally poorly. For the fifth grade students, the experimental group achieved better results by solving the tasks of the second and third cognitive levels in relation to the control group. The sixth grade experimental group students had better results regarding the tasks of the first and third cognitive levels. The tasks of the other cognitive level were resolved better by the control group. The results of the 7th and 8th grade students show that there is no statistically significant difference between the control and the experimental group in solving tasks on cognitive levels. The maximum value at all cognitive levels in all classes, both in control and in the experimental group, is 100, which means that there were students who had 100 percent correct answers.

DISCUSSION AND CONCLUSION WITH TEACHING IMPORTANCE

Other researches (Begić et al., 2016) also show that students deal best with the first cognitive level tasks. Radanović et al. (2013) provided recommendations on the structure of a written competency knowledge assessment regarding the cognitive level of tasks. The structure of the written knowledge test applied in the research was such that it contained most questions of the first cognitive level, then the second, and the least of the third.

The research results should be a guideline for educational policy, i.e. to strengthen the digital competences of teachers in order to enable them to apply e-learning in teaching. It is also necessary to strengthen their skills in shaping the questions of all cognitive levels used to examine the required educational outcomes.

LITERATURE

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