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Advantages of Using the Flipped Classroom Model in Science and Social Studies Instruction

Extended summary

The aim of this research was to determine to what extent the implementation of the flipped classroom model impacts students' results at final testing in the area of living nature, more precisely, at the level of knowledge reproduction, understanding, and application relative to traditional teaching. The flipped classroom model is a combination of home learning based on video and digital technologies and interactive group activities in the classroom (Lo&Hew, 2017). Students learn new content independently by using modern technology to search and study different teaching materials (websites and video-lessons, textbooks, multimedia content, animations, texts/hyper texts, photos, etc., all of which were prepared by a teacher in advance) (Cekić-Jovanović, 2020). The classroom becomes a space for a greater interaction where the emphasis is on exchanging opinions, solving problem tasks, and collaborative learning. Global practice (Hidayat&Praseno, 2021) has shown that Edpuzzle is a comprehensive web application offering various didactic and methodological possibilities that can be used in the flipped classroom. The experimental program applied in this research was developed using this application. The research was conducted using a quasi-experiment with parallel groups. The sample of the teaching content comprised the segments of the teaching content for the school subject Science and Social Studies, while the sample of participants included 61 students of the third grade of elementary school (30 students respectively in control and experimental groups). In the experimental group, the selected content was taught using the flipped classroom model, whereas the frontal form of classroom interaction was used in the control group, with a min-

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imal use of modern technology that was limited to Power Point presentations. The students of the experimental group demonstrated a significantly better achievement than the students in the control group. The results showed that there is a statistically significant difference in the total number of points on tasks measuring the level of reproduction between the E group students (Mdn=14) and C group students (Mdn=13), while $U=172.000$, and $p<.001$; then the level of understanding $U=233.000$, $p=.001$ ($p<0.05$) and the level of practical use $U=118.500$, $p<.001$. The E group students were more successful in solving open and closed type tasks that required naming the basic concepts of the living nature, identification and reproduction of facts and principles, as well as the generalization related to the specificities of the flora and fauna in specific communities. They were also better in the tasks related to connecting facts and explanation of definitions referring to the content on mainland and water communities. They were more successful at stating the laws and the well known examples of food chains in certain living communities. It turned out that they understand better the significance of the specific elements of living communities within the scope of larger communities (eco systems), they are more adept at realizing the interconnectedness of the shapes of the area, living conditions, growth of plants and animals, and the impact of man on the communities. In addition, the E group students adopted the general knowledge and demonstrated a better insight into the core correlations among the contents related to the living nature (interconnectedness of plants, animals, humans, and the elements of non-living nature). They also scored more points in the tasks where they were required to apply the knowledge in new situations and solve new problems. They cited new examples of food chains by creatively connecting the previous knowledge about eating habits of animals and the specifics of the living communities. By using abstraction and hypothetical thinking, they successfully identified the cause-and-effect relationships between the links in food chains, showing an inclination for further research and providing new examples and explanations.

The conclusion of the research is that the application of the flipped classroom model in teaching the content of the Science and Social Studies has a positive effect on increasing the quality of students' acquired knowledge. The obtained results can be attributed to the specificities of the applied model, in which a timely and continuous feedback is continually present, both during work in the Edpuzzle application and from elementary school teachers during research activities in the classroom. In addition, the multimedia content and the individualization of the students' pace of progress, during the preparation of homework in which they watched interactive video lessons and answered the questions, probably had a positive effect on the motivation to learn and the independence of the students. Acquiring knowledge at the reproduction level while doing homework gave the students more time for work in class. During class work, with the mentoring role of the teacher, the students were more active in research activities, which enabled them to deepen, expand, and understand the content better, through a better and more intensive teacher-student communication. The results can also serve as a starting point for researchers who want to examine this issue more comprehensively, taking into account the possibility and need to check the results of the flipped classroom in different working conditions, learning environments, within other teaching subjects, at higher levels of education, in evaluating the motivation of students and teachers to use this model, and in other contexts as well. The limitations of the presented quasi-experimental research refer to the size

of the sample of the respondents and the duration of the experimental program. Therefore, it would be good to conduct a similar research on a larger sample of respondents in the form of a longitudinal, long-term study in order to collect more data, and the obtained results could contribute to a more in-depth analysis of the mentioned teaching model, not only regarding the contents of the living nature, but also of other teaching areas.

Keywords: flipped classroom, Science and Social Studies instruction, the quality of students' knowledge, hybrid instruction

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