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USING AN APPLICATION ACTIONBOUND IN A PHYSICS LESSON IN ELEMENTARY SCHOOL

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ABSTRACT

The paper deals with the description of the Actionbound application, both its web interface and the description of the mobile application. The application itself was originally designed to play geolocation games. However, it can also be used for educational purposes, because it can be filled with any content. The paper describes its use in a physics class in the sixth grade at primary school. In class, the application was used for group work.During the class there was an increase in motivation and significant support for group work. Pupils worked biased in class, fully dedicated to solving problems. After working in class, they downloaded the application to their personal devices.

KEYWORDS

tablet, physics, education, motivation, group work

1 INTRODUCTION

Digital technology

Digital technologies are increasingly penetrating our everyday lives and are also being promoted as essential teaching aids in our schools. We can call digital technologies desktop and laptop computers, tablets, mobile phones, digital cameras.

According to Beauchamp, Parkinson (2008), their use leads to increased interest in scientific phenomena. The results of this research show that the use of digital technologies in the teaching of science subjects leads more easily to the achievement of the set learning goal. The benefit of meaningful use of digital technologies is mainly in increasing pupils 'interest in scientific phenomena and there is also an improvement in pupils' communication skills.

This is also confirmed by Slussareff, Boháčková (2016), when at the end of their work they say that the pupils themselves claim that they can now better communicate with each other and that they will continue to be interested in the topic being covered.

Digital technologies in Physics teaching

The educational field of Physics belongs to the educational area of Man and Nature. FEP ZV (2017) for this educational area states that education in the given educational area aims to form and develop key competencies by leading the student to explore natural facts and their context using various empirical methods of cognition (observation, measurement, experiment) and different methods of rational reasoning.

Furthermore, the FEP ZV defines key competencies as a set of skills, knowledge, abilities, attitudes and values, important for the personal development and application of each member in society. They are formulated quite broadly so that they can be affected by every field of education, the competencies related to digital technologies are completely missing in the current version. Mention of them can be found in the communicative competence - the student uses information and communication tools and technologies for quality and effective communication with the outside world.

Digital technologies, which are promoted in the everyday life of students, can retroactively influence the content of the educational field of physics (and all other educational fields).

The categorization of mobile applications is described by several authors, but from different perspectives and points of view. Naismith et al. (2014) divides mobile applications into six categories based on general pedagogical theories and approaches, also adds one category for organizational tools (behaviorism, constructivism, situational pedagogy, collaborative teaching, informal education, support for teaching organization). Traxler (2009) divides the more general level of the m-learning strategy according to the actual use of mobile tools, where he focuses on the influence of technology on the course of the pedagogical process. We do not find a direct division of applications with it, which, however, is understandable given the time of the research. Similarly, Waard (2014) categorizes according to the degree of simplicity of implementing mobile devices into the learning environment. In its categorization we can also find the part dedicated to the application, where it is divided into native mobile applications, web applications and applications developed directly according to the needs of the educational institution. Waard also introduces one category of devices and applications in which the use of integrated sensors is possible. Artal-Sevil et al. (2015) by dividing free applications into the following categories - communication support, sharing support, organizational applications, classroom support, applications for everyday use and specialized applications. Targeted division of mobile applications was then performed by the authors Chergui, Begdouri and Groux-Leclet (2017) into three basic categories, which are then divided separately. The main three categories are the areas of pupil support, teacher support and mutual cooperation. Apart from mobile applications, a similar breakdown was also made by Klubal (2017) for web applications for education according to activities performed during teaching.

As part of our work, where we focus on the use of mobile devices in teaching physics, we have proposed a division according to what the application is used for.

- Applications for measuring physical quantities. This includes applications that work with sensors directly built into the mobile device or with additional sensors that connect to the device. An example is Phyphox or Pasco Sparkvue.
- Applications used to practice physical phenomena and laws. They can already be filled with content - for example Cat physics or Ball Pass 3D. These are applications that focus only on a single physical phenomenon. The first of these applications practices only the law of impact and reflection. The second practices the law of conservation of energy in a gym environment.
- Applications that are filled with content, but when used, the student applies physical knowledge in a certain way and can also develop their own creativity. Its use can help the student fulfill the competences for the 21st century. Such an application can be, for example, Bridge Constructor Playground. In it, the student builds bridges. It has only limited resources. In order for the bridge to be stable, the pupil must

observe the physical laws (folding and decomposition of forces) and at the same time the pupil can involve his creativity during the construction.

- Applications that the content is filled with by the teacher. Pupils can practice physical phenomena and patterns in them, but also measure (after connection with an application that allows measurement). Such applications offer the possibility of individualizing teaching, adapting to the needs of a particular class, the possibility of use for any physical content. Such an application is, for example, the Science journal or the Actionbound application.

2 DESCRIPTION OF THE ACTIONBOUND APPLICATION

Actionbound applications are among those that a teacher can fill with their own content. The student can go through the assigned tasks himself or he can perform them in a group. The applications that are used for measurement can also be integrated into the application. It can contain different types of tasks, it can be set to run tasks at specified coordinates. The progress of the work and the results remain stored in the application, so the teacher can see at any time which tasks the student failed to complete and which he managed without any problems. The teacher registers, submits tasks and monitors the pupil's results in the web interface (Figure 1), the pupils 'work is used by an application installed on the pupils' (or school's) mobile devices (Figure 3). The application exists for iOS and Android operating systems.

The teacher inserts the content into the application in the Content tab, application settings, ie. whether the pupils perform the tasks each by themselves or in a group, whether the order of the questions is fixed or can be changed, the duration of the game, the name, etc. is done in the Settings tab. It is also possible to set whether pupils see, where possible, the correct result immediately after sending the answer.

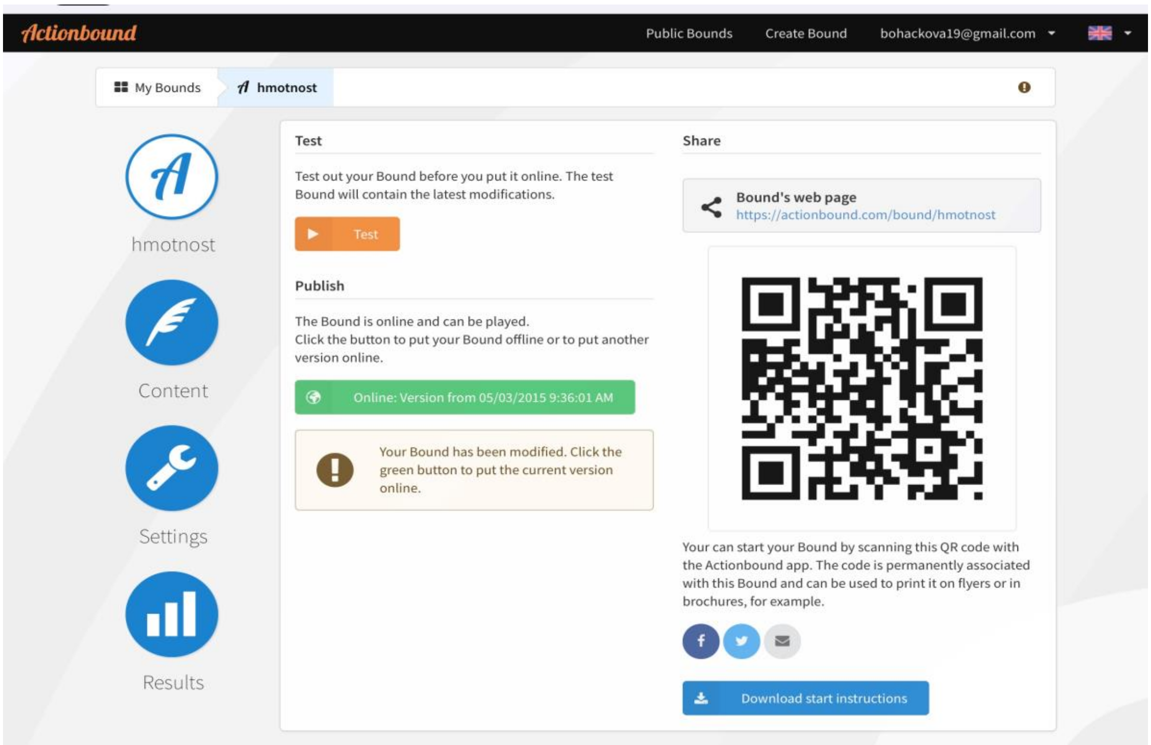

Figure 1 Home page of the application web

In the Results tab, the teacher sees the results (Figure 2). First, he can get acquainted with the overview - how many students solved the game in total, how long it took to solve the game, what is the average time per game, how the students themselves evaluated the game in terms of various aspects, you can get a graphical overview. Then you can get an overview of individual players, such as how long they played the game, which tasks they managed to complete, where they made a mistake, etc.

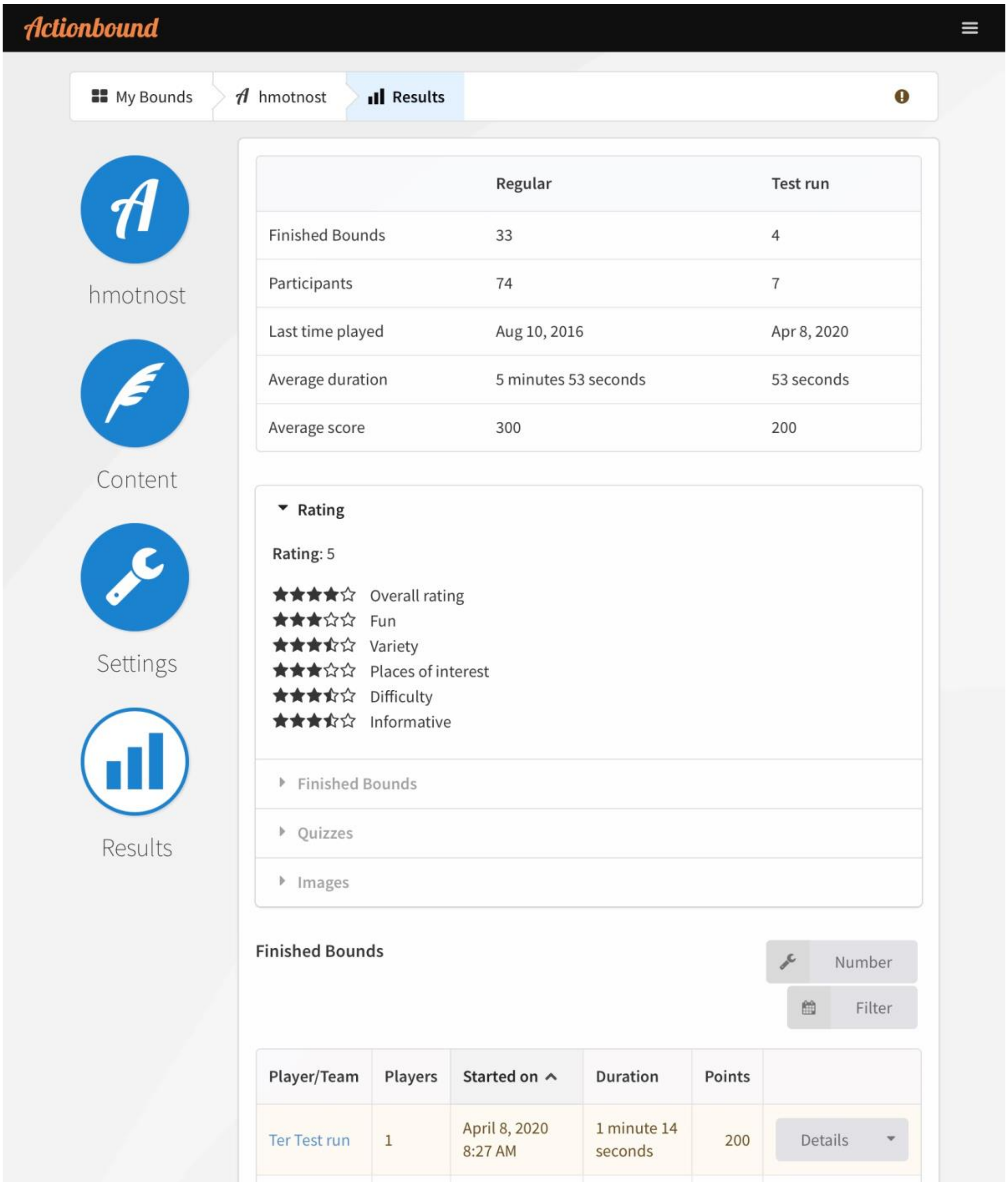

Figure 2 Results tab

The mobile application is used to solve tasks. Pupils launch the application (Figure 3), write down their name or group name (and the names of the individual members of the group) and can start solving tasks. Possible types of tasks: selection from multiple answers (Figure 4), sorting values according to a certain key, taking or recording a video, short answer to a question, yes / no questions. It is also possible to set students to go to a certain place (coordinates are set, GPS is required) where they will complete the task.

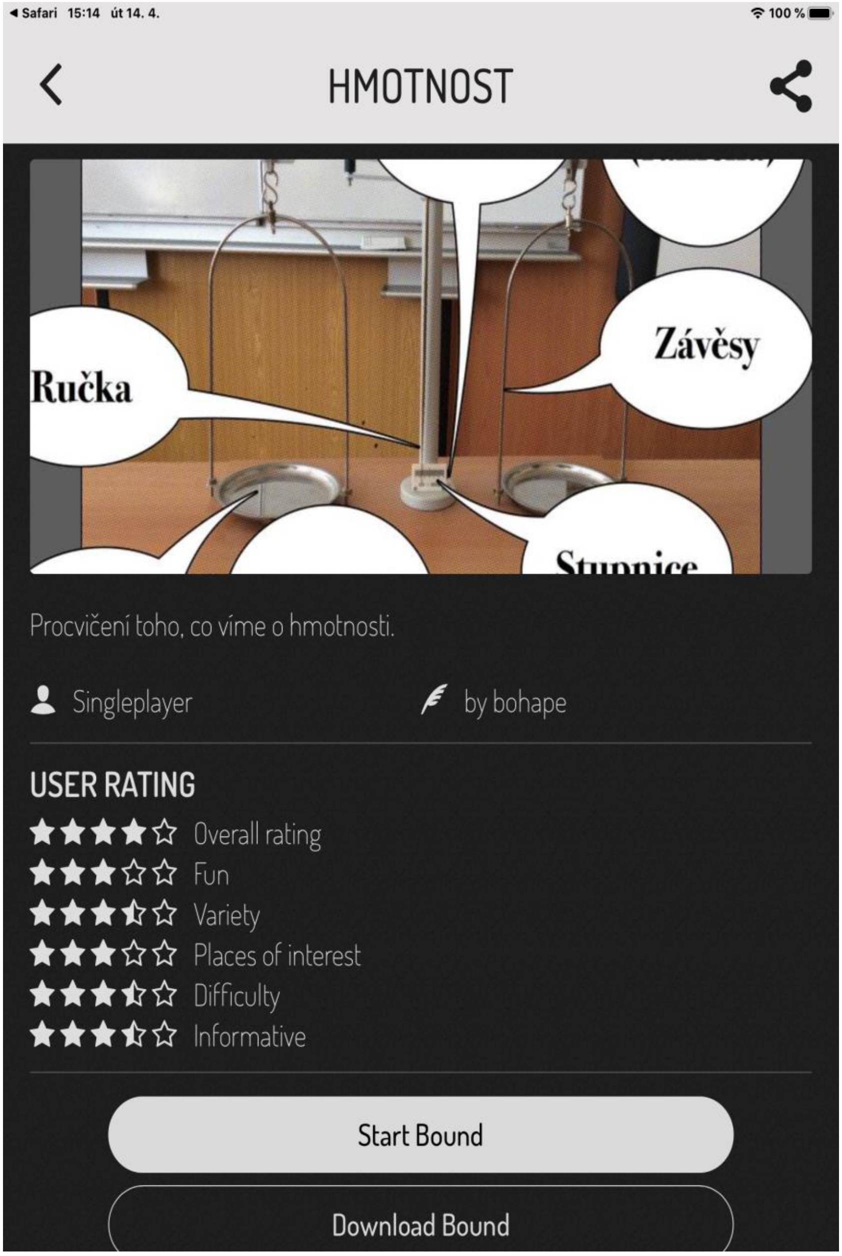

Figure 3 Mobile application first screen

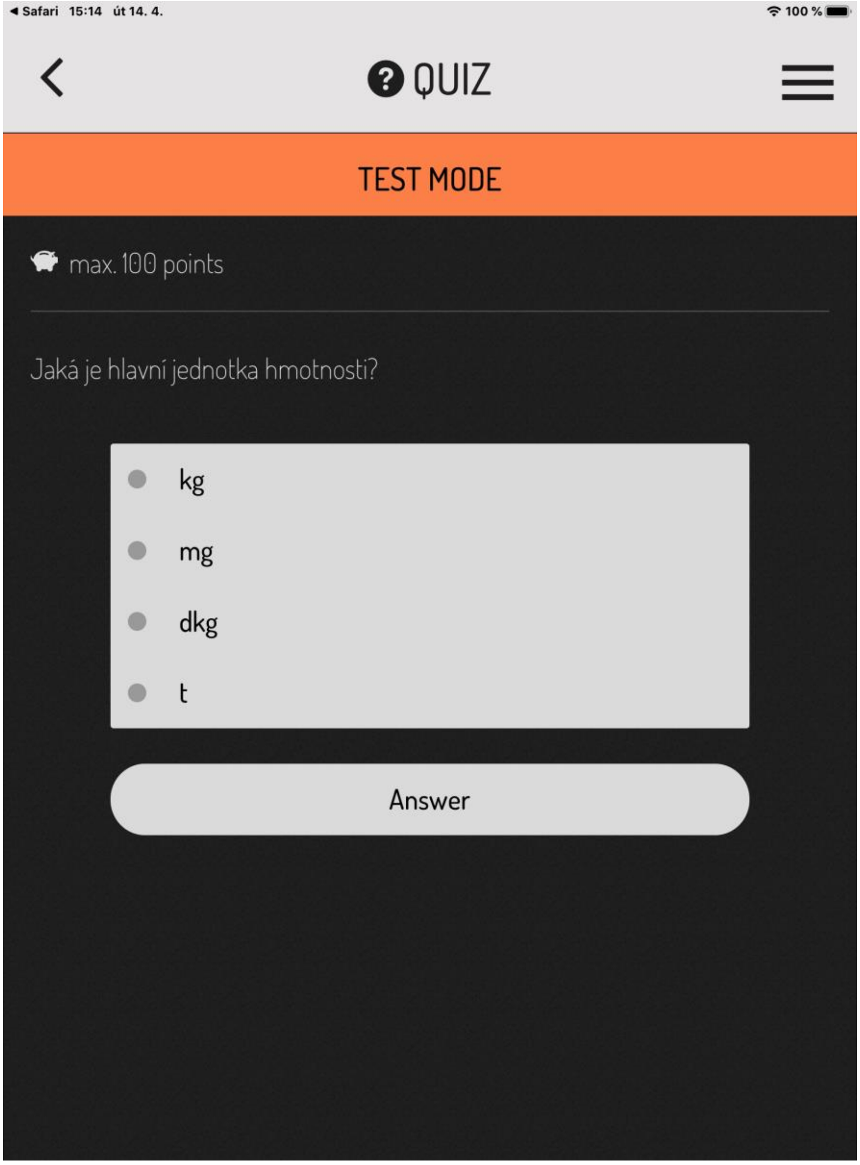

Figure 4 Task type - selection from several options

3 IMPLEMENTATION OF A PHYSICS LESSON

This chapter describes the implementation of the lesson using the Actionbound application.

The aim of this study was to monitor whether the use of the application will increase the motivation of students and whether group work will be supported. The lesson was realized at the second stage of primary school in the sixth grade. The lesson was realized with 26 pupils aged 11 - 12 years. The aim of the lesson was to meet the expected output of F-9-1-01. The partial goal was to find out by observing whether the use of this application has an effect on the motivation of the student at work. During the lesson, it was also observed how the students work together in a group and what is the motivation for their work. Observations were made during the lesson by a teacher's assistant.

The lesson passed, resp. was started and ended in the specialized class Future classroom lab. This classroom is flexible enough, the furniture can be easily moved, it allows teachers to easily carry out group work in groups of different numbers of students, or where students can work on different projects. It is equipped with tablets, two 3D printers, different types of robots and different sensors. It is used in teaching various subjects.

At the beginning of the lesson, the teacher introduced the students to the aim of the lesson. She explained how to load the prepared game into Actionbound. The teacher also agreed with the pupils in which part of the school they would move if they needed to leave the class. Although the whole school is equipped with a wi-fi connection and the school tablets were connected to this network throughout the use, it was not necessary for the functionality of the application, only after completing the tasks (at the end of the lesson) the results had to be sent and therefore be on wi-fi connected.

Furthermore, the students created groups according to their discretion. The whole introductory briefing and group formation took 5 minutes.

The Actionbound application was used, installed on school tablets, but for the opportunity to use their mobile devices was also offered (they could download the application in an hour).

Pupils spontaneously used a pencil and paper at work. They made notes on paper when solving tasks, solved the tasks on paper and only entered the agreed solution into the application.

Pupils discussed the results in the group and tried to find the right solution, no one tried to click or estimate the results at random. The written solution was always the result of a group discussion. They chose very carefully, especially for questions where they had to show creativity (find and photograph a body that has a certain weight).

The students worked very interested, they did not interfere with each other. The assistant observed that if one group was interrupted by another, the groups were able to agree on a volume level. The competence to solve the problem has therefore shifted from teacher - pupil to pupil - pupil, ie. that the students were so impressed by the work that they were able to correct themselves and, if necessary, reduce the noise level at work.

Work with the application took place until the end of the lesson, the fastest group finished work 6 minutes before the end of the lesson, one group finished work 3 minutes after the end of the lesson.

CONCLUSION

During the lesson, the motivation of the pupils and their work in the group was mainly monitored. Motivation to work with the application was very high and natural on the part of the students. There was no need for correction by the teacher throughout the pupils' work. The fact that they could be divided into groups at their own discretion could also have a possible effect on the pupils' motivation.

The offer to download the application to one's own devices remained unused before this lesson, but after the end of the lesson, seven students downloaded the application and installed it on their mobile devices.

The observed lesson took place in a specialised classroom, but could it take place anywhere, the tablets can be easily moved.

The use of digital technologies in the teaching of science subjects certainly makes sense, especially for the motivation of students. Their use supports the cooperation of students in a group.

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