FOLIA 343

Annales Universitatis Paedagogicae Cracoviensis

Studia ad Didacticam Biologiae Pertinentia 11 (2021)
ISSN 2083-7276
DOI 10.24917/20837276.11.17

Małgorzata Nodzyńska-Moroń, Martin Bílek

Outdoor Education in Times of the Pandemic – The Use of ActionBound Application

Introduction

Outdoor education is an organized process of students' learning through independent observation, experience, and experimentation during outdoor activities. In the case of outdoor science activities, nature is the means, background, and pretext for learning. According to Hofmann (2011, pp. 310-311), outdoor education is *"A comprehensive form of teaching, including various teaching methods, for example, observation, experiment, design method, cooperative methods and methods of empirical pedagogy. From the point of view of the organizational form, outdoor education uses field exercises, nature walks, excursions, thematic trips, and expeditions, while the importance of such teaching lies primarily in the work of students in the field, outside the school".*

Background

The term "outdoor education" is sometimes understood very broadly. This includes both actual outdoor activities, e.g., field trips, visiting zoos and botanical gardens or educational gardens, physical activities (e.g., swimming, climbing, skiing). But outdoor education is also understood as education outside the school walls (e.g., visiting museums, monuments, science centres).

Scientific research shows that outdoor education can contribute to many positive changes in students. Thus, outdoor education improves learning outcomes - increased test scores, better student attitudes towards school, better school behaviour, better attendance, and overall better student achievement have been noted. In addition, outdoor education effectively engages the intelligence of children and contributes to increasing teaching efficiency (American Institutes for Research, 2005; Blair, 2009, Dyment, 2005, Lieberman, & Hoody, 1998). German research has shown a significant improvement in the learning of reading, writing and math in children attending "forest kindergarten" (Gorges, 2011). Outdoor education also has a positive impact on the development of critical thinking skills understood as a process of deliberate self-regulatory assessment and decision-making, i.e., the problem-solving skills

included the ability of students to interpret, analyse, evaluate, infer, explain, and self-regulate (Ernest & Monroe 2004).

Outdoor education also improves the physical, mental, and social health of students and reduces the stress level of students and teachers (Bell, & Dyment, 2006; BTCV, 2009; Dyment, & Bell, 2008; Kuo, & Faber Taylor, 2004; Muñoz, 2009; Wells, & Evans, 2003).

Outdoor education supports the emotional, behavioural, and intellectual development of students. Research has shown that students learning outdoors develop self-esteem, independence, self-confidence, creativity, decision-making and problem-solving skills, empathy for others, motor skills, self-discipline, and initiative (Chawla, 2006; Kellert, 2005; Lester, & Maudsley, 2006). Research by Blair (2009) and Dyment (2005) showed that students prefer this type of learning over traditional learning.

Outdoor education helps students better understand their natural and human communities, leading to a sense of place, developing stronger environmental attitudes and civic behaviour (Chawla, 2006; Wells, & Lekies, 2006).

As can be seen from a short review of the literature, outdoor education brings many benefits for students. The question then arises: is this type of education possible during the pandemic? We shall get a positive answer to this question when we use the ActionBound application. It is an interactive tool that runs on smartphones and tablets as an application to build and guide routes through information, missions, images, directions, coordinates, and questions. This application allows the use of games created by others or the teacher's own creation of field games full of various challenges and tasks for students. Students can move around the indicated area (map and GPS option). They can also answer scored questions to test their theoretical knowledge. We can attach any image, photo, movie, or sound file to the question. When creating a question, we can decide on the number of points that can be obtained by the student, the time limit for answering and the number of chances for a correct answer. We can add hints to the questions. The correctness of the answers to the questions is assessed by the application - so that the students immediately get feedback. Students can take part in challenges set by the teacher. Their task may be, for example, to enter a longer answer, take and attach a photo, video, or audio recording. The correctness of the challenge is not assessed by the application - the author of the field game (teacher) will see the materials sent by the students on their profile in the ActionBound application. The application also allows you to conduct a short poll / vote on any topic among the players. As teachers, we can also provide students with the necessary information in the form of text, drawings, videos. ActionBound app works like a game. So, we can win or lose. Along the way, tasks are proposed that, if completed successfully, will earn points.

The teacher can plan individual activities of the students in the field and then send them a link or QR code to the trip. Students alone (or younger children with their parents) explore a given area, pay attention to the elements indicated by the application, perform subsequent tasks…. The teacher has an insight into the individual activities of their students, so they can evaluate the student's work during the trip. The research confirms that students appreciate this type of activity

(Rosdiana, Busono & Yosita 2020). But the question arises: Will teachers be equally eager to create such virtual tours?

Research problem

In times of the pandemic, teachers will be eager to use the new tool that will allow them for out-door education. It was also assumed that younger and better-educated teachers would be more willing to use the new tool. It was also assumed that teachers from larger cities and with shorter work experience would be more willing to introduce changes - and use the new tool. It was assumed that science teachers would be more likely to use the new tools than humanities and arts teachers.

Research methodology

Research sample

The research on teachers' attitudes to this tool was conducted in September and October 2020. 110 secondary school teachers participated in the study. 78% were women (which corresponds to the percentage of female teachers in Poland). The youngest teachers were under 30 (10%) and the oldest over 55 (5.5%). The most numerous groups were teachers between 40 and 45 (22.7%) and between 45 and 50 (also 22.7%). The teachers' work experience is shown in Table 1.

Tab. 1. The teachers' work experience

up to 5 years	from 5 to 10 years	from 10 to 15 years	from 15 to 20 years	from 20 to 25 years	from 25 to 30 years	from 30 to 35 years	over 35
16.4	10	11.8	21.8	21.8	10.9	7.3	0

The most of the surveyed teachers (71.8%) had a master's degree, 19.1% had additionally completed postgraduate studies and 9.1% had a PhD degree. Most teachers (41.8%) taught in medium-sized cities (from 20,000 to 100,000 inhabitants). Then, in large cities (over 100,000 inhabitants) - 27.3%. In small towns (up to 20,000 inhabitants) 19.1% of teachers were teaching, and 11.8% of them were teaching in rural areas.

The course of the research

The teachers who had never encountered ActionBound before took part in a 3-hour workshop. They were divided into 4 groups; each teacher had a computer at their disposal. During the workshop, the teachers got acquainted with the tool and then tried to create a trip on their own.

Collecting data

After the classes, the teachers filled in the on-line questionnaire. We used a proven questionnaire that was adapted for use in a survey of in-service teachers

by Table 1 in Chroustova, Bilek and Sorgo (2015). It was decided to investigate the relationship between gender, age, teacher's professional experience, type of subject taught, the size of the city in which they conduct classes and expected results (PE), effort expectations (EE), attitudes towards use (ATU), behavioural intentions (BI) to be applied by ActionBound application.

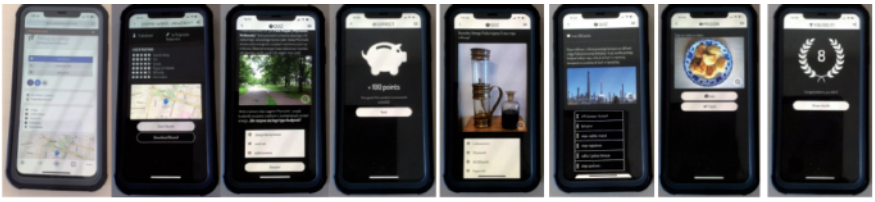

Fig. 1. Examples of screens in the game

Results and discussion

The obtained results concerning 4 areas: Performance Expectancy (PE), Effort Expectancy (EE), Attitudes Towards Using (ATU), Behavioural Intention (BI) are presented in Table 2.

Tab. 2. Teachers' answers to questions (a five-point Likert scale was used).

	I totally agree	I partially agree	I have no opinion	I partially disagree	I completely disagree
(PE1) I find ActionBound useful for teaching.	34	41	25	7	3
(PE2) Using ActionBound will allow me to complete my tasks faster	11	42	44	10	3
(PE3) Using ActionBound for teaching will increase my productivity	10	39	51	7	3
(PE4) If I use ActionBound I will increase my chances of getting knowledge	11	44	44	8	3
(EE1) The use of ActionBound would be clear and understandable to me	26	40	35	5	4
(EE2) I could use ActionBound efficiently	28	42	28	9	3
(EE3) I find ActionBound easy to use	24	46	28	9	3
(EE4) Teaching with ActionBound is easy for me	22	33	41	11	3
(ATU1) Using ActionBound is a bad idea	3	13	33	20	41
(ATU2) ActionBound makes learning more interesting	20	45	36	6	3
(ATU3) Working with ActionBound is fun	16	51	35	4	4
(ATU4) I like working with ActionBound	13	38	45	8	5

	I totally agree	I partially agree	I have no opinion	I partially disagree	I completely disagree
(BI1) I want to use ActionBound within the next 6 months	28	34	32	10	6
(BI2) I predict that I would use ActionBound within the next 6 months	29	37	29	8	7
(BI3) I am going to use ActionBound next semester	29	34	35	4	8

The obtained results show that teachers have a positive attitude in all four examined areas. The sum of positive opinions for individual questions ranges from about 50% to 75%. (The structure of the ATU1 question was inverted, so most answers disagreeing with it is there). Therefore, it can be concluded that the 3-hour workshop convinced teachers to use this tool in education.

In computing the correlation between the data, the Spearman's rank correlation coefficient was used, which, inter alia, is used to describe the strength of the correlation of two features when these features are qualitative, allowing them to be ordered according to the strength of this feature. The formula for the Spearman's rank correlation coefficient

$$r_s = 1 - \frac{6 \sum_{i=1}^{n} d_i^2}{n\ (n^2 - 1)}$$

where:
d_i^2 - squares of differences between the ranks of the corresponding feature values x_i and y_i,
n - number of data pairs (number of rows in the table).

Tab. 2. Interpretation of Spearman's rank correlation coefficient.

r_s	Interpretation
below 0.2	weak correlation (practically no relationship)
0.2-0.4	low correlation (clear relationship)
0.4-0.6	moderate correlation (significant relationship)
0.6-0.8	high correlation (significant correlation)
0.8-0.9	very high correlation (very high correlation)
0.9-1.0	the relationship is practically complete

A low correlation (clear relationship) between gender and the subject taught has been demonstrated (women are more likely to teach humanities than men, and men are more likely to learn science and technology). A negative low correlation (clear relationship) between the teacher's age and the size of the city in which they teach

was shown (which means that older teachers teach in smaller towns). The same correlation was found for the teacher's seniority and the size of their town (which means that teachers with longer experience teach in smaller towns). It is related to a very large (practically complete) correlation between the age of the teacher and his seniority as a teacher. No correlation was found between the rest of the teacher description data.

A low correlation (clear relationship) has been shown between gender and questions:

- PE2 *Using ActionBound will allow me to complete my tasks faster*,
- EE4 *Teaching with ActionBound is easy for me*,
- ATU4 *I like working with ActionBound*.

In these three questions, women slightly more often than men expressed positive opinions about this tool. In the remaining questions, no correlation between gender and the answers to the questions was noticed.

A low correlation (clear relationship) has been shown between ages and the question ATU1 *Using ActionBound is a bad idea*. So, the older the teachers, the more often they agreed with this opinion.

Work experience correlates with only two questions. A low correlation (clear relationship) has been shown between seniority and the answer to the ATU1 question (this is related to the strong correlation between the age of teachers and their seniority). A negative low correlation (clear relationship) has been shown between seniority and the question BI1 *I want to use ActionBound within the next 6 months*. This means that older teachers are less willing than their younger colleagues to apply the newly learned tools in school practice.

It turned out that the teacher's level of education did not have any impact on the answers to individual questions (Spearman's correlation coefficient 0.1).

All questions regarding Performance Expected (PE1, PE2, PE3) are negative low correlation (clear relationship) with the subject being taught. It follows that science teachers are more negative about this tool effectiveness than humanities teachers. There was also a negative low correlation (clear relationship) with the subject being taught and the questions BI2 (*I predict that I would use ActionBound within the next 6 months*) and BI3 (*I am going to use ActionBound next semester*). It follows that science teachers are more negative about the planned use of ActionBound than humanities teachers are. On the other hand, a positive low correlation (clear relationship) between the subject taught and the ATU1 (*Using ActionBound is a bad idea*) question indicates negative attitudes of science teachers. The only positive low correlation (clear relationship) is between the subject being taught and the ATU4 question (*I like working with ActionBound*).

Negative low correlation (clear relationship) concerns the city size and the question PE2 (*Using ActionBound will allow me to complete my tasks faster*), PE3 (*Using ActionBound for teaching will increase my productivity*), PE4 (*If I use ActionBound I will increase my chances of getting knowledge*) and ATU2 (*ActionBound makes learning more interesting*) questions. This means that the bigger the city, the less readily the teachers confirm these claims.

The research has shown that teachers are steadfast in their beliefs. Correlation of answers within individual question groups (PE, EE, ATU, BI) is high. The highest one for BI group is 0.9, which means that the relationship is practically complete. For PE and EE question groups it is from 0.6 to 0.7 (it means high correlation - significant correlation). The correlation that is most varied for the ATU group is from 0.4 to 0.7. In this case we can talk about two correlation levels: moderate correlation (significant relationship) and high correlation (significant correlation).

During the teachers' work on their suggestions for trips using the ActionBound application, their observations were also made. All teachers achieved education success - they created an educational trip in this application. It was noticed that most teachers (70%) had no major problems with using the application. About 20% of teachers required only small prompts from the tutor or colleagues. Only about 10% of teachers had clear problems with using the program (some teachers were disturbed by the language of the application: English or German). Although the trip created in the application was not required to be multidisciplinary, the teachers spontaneously asked their colleagues for help in coming up with activities related to a different subject. So, as a result, interesting multidisciplinary trips were created, combining knowledge in humanities, natural and artistic subjects as well as physical challenges. The obtained research results are in good correspondence with the results of Chroustova, Bilek and Sorgo (2017) focused on the detection of differences between users and non-users of educational software among chemistry teachers. The compared results demonstrate the necessity of developing separate didactical models addressing different levels of software usage among teachers.

Conclusion and Implication

The obtained results allow us to state that, regardless of gender, education and age, most of the surveyed teachers (50 to 75%) appreciate the role of the ActionBound application in the preparation of the trip and plan to use it in the near future. Teachers are also positive about the application and find it easy to use. The ActionBound application is a good solution for times of the pandemic when we cannot learn outdoors with students. But it also seems to be a good solution to support traditional science (after the pandemic). Because we can support this activity with individual students' trips that were previously prepared by the teacher in this application. Such a solution can help with many organizational problems that arise during traditional education.

The provided research has some limitations that should be taken into consideration. The first of them is the number of participants and their motivation to take part in continuing education. Often participants are highly motivated teachers and they accept innovations more positively. The next limitation is related to the fact that the questionnaire was addressed only to Polish teachers. It was related to cultural and geographic differences and the research can be repeated also in other countries in the European Union to expand the scope of this topic.

We hope that the tool supporting education in times of the pandemic will remain in education permanently.

References

American Institutes for Research. (2005). *Effects of outdoor education programs for children in California*. Palo Alto, CA.

Bell, A.C., & Dyment, J.E. (2006). *Grounds for action: Promoting physical activity through school ground greening in Canada*. Evergreen.

Blair, D. (2009). The child in the garden: an evaluative review of the benefits of school gardening. *Journal of Environmental Education*, 40(2), 15–38.

BTCV. (2009). *Evaluation findings: Health and social outcomes 2009*. BTCV.

Chawla, L. (2006). Learning to love the natural world enough to protect it. *Barn*, 2, 57–58.

Chroustová, K., Bílek, M., Šorgo, A. (2015). Development of the Research Tool to Identify Factors Affecting the Use of Chemistry Educational Software. *Problems of Education in the 21st Century.* Vol. 68, 6–21.

Dyment, J. (2005). *Gaining ground: The power and potential of school ground greening in the Toronto District School Board*. Evergreen.

Dyment, J. E., & Bell, A. C. (2008). Grounds for movement: Green school grounds as sites for promoting physical activity. *Health Education Research*, 23(6), 952–962.

Ernest, J. & Monroe, M. (2004). The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research*. 10 (4), 522.

Gorges, R. (2011). *Waldkindergartenkinder Im Ersten Schuljahr*. Archived May 16, 2011, at the Wayback Machine.

Hofmann, E., Trávníček, M., & Soják, P. (2011). Integrovaná terénní výuka jako systém. In Smíšený design v pedagogickém výzkumu. Sborník příspěvků z 19. výroční konference České asociace pedagogického výzkumu. Brno: MUNI.

Kellert, S.R. (2005). Nature and childhood development. In *Building for Life: Designing and Understanding the Human-Nature Connection*. Washington, D.C.: Island Press.

Kuo, F.E. & Faber Taylor, A. (2004). A potential natural treatment for attention deficit / hyperactivity disorder: Evidence from a national study. *American Journal of Public Health*, 94(9), 1580–1586.

Lieberman, G.A. & Hoody, L.L. (1998). *Closing the achievement gap: Using the environment as an integrating context for learning*. SEER: Poway, CA.

Lester, S., & Maudsley, M. (2006). *Play, naturally: A review of children's natural play*. Children's Play Council.

Muñoz, S.A. (2009). *Children in the outdoors: A literature review.* Sustainable Development Research Centre.

Rosdiana A.F., Busono R.R.T. & Yosita L. (2020) Student learning motivation on Action-Bound application implementation in construction and building utilities subject. In ICIEVE 2019, IOP Conf. Series: Materials Science and Engineering. IOP Publishing.

Wells, N.M., & Evans, G. W. (2003) Nearby nature: A buffer of life stress among rural children. *Environment and Behaviour,* 35(3), 311-330.

Wells, N.M., & Lekies, K.S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments,* 16(1), 1–24.

Outdoor Education in Times of the Pandemic – The Use of ActionBound Application

Abstract

Education in times of the pandemic requires the use of new solutions. One of the biggest challenges is the implementation of out-of-body education. The article proposes a tool that allows the teacher to plan a trip (with various tasks and challenges). This application then allows the student to complete the task on their own, i.e. to go on a trip (with all the challenges planned by the teacher). The article describes the results of the study by 110 teachers who have been trained in the use of this application. The obtained results allow us to state that, regardless of gender, education and age, the vast majority of the surveyed teachers (50 to 75%) appreciate the role of the ActionBound application in the preparation of the trip and plan to use it in the near future.

Keywords: outdoor education, pandemic, information technologies, ActionBound application.

Prof. Małgorzata Nodzyńska-Moroń
Institute of Biology, The Pedagogical University of Krakow, Poland
email: malgorzata.nodzynska@up.krakow.pl
ORCID: 0000-0002-8606-5846

Prof. Martin Bílek
Department of Chemistry and Chemical Education, Faculty of Education, Charles University in Prague, Czechia
email: martin.bilek@pedf.cuni.cz
ORCID: 0000-0002-1076-4595