

STEAM EDUCATION MEETS EXERCISE: INTRODUCING THE RUN CHALLENGE PROJECT IN THE MIDST OF THE COVID-19 CRISIS

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Abstract

Internationally and nationally, efforts to promote active, health-promoting and sufficient mobility are increasingly becoming the focus of attention. This is being triggered by, amongst other things, a growing lack of exercise, intensified climate protection efforts and the increasing burden of motorized private transport (e.g. the increase in pollutant emissions, land sealing, noise and traffic jams). Walking and cycling, as the most natural forms of active mobility, conserve resources, are socially just, promote health and are self-sufficient. According to the latest physical activity guidelines (U.S. Department of Health and Human Services, 2018), individuals should undertake at least 150 minutes of exercise per week.

The Space21Future run challenge will be critically analysed to identify how physical activity and STEAM education can be combined during the challenging Covid-19 period and the massive restrictions in schools in order to create motivating lessons for children and adolescents. The underlying idea is that micro:bits can be programmed with block-based language, so that they serve as a pedometer. A software called 'Move-Effect' is then used to enter the respective kilometres covered for the challenge. The concept itself is inclusive: children who have not yet received micro:bits from the schools can also participate with their smartphones, where the distance metrics are tracked via Google Maps or similar software. This paper analyses the data from the accompanying research for the Space21Future run challenge. The strengths and weaknesses of the project are clearly identified with the aim for this case study to inspire similar cross-school and cross-curricular challenges that will foster self-efficacy and offer a forward looking perspective to young people, but also to educators, especially in times of crisis.

Keywords: Active Mobility, Microbits, STEAM Education.

1 INTRODUCTION

This paper introduces the Run Challenge Floridsdorf +, which was initiated by the team of the Edu Lab Space21Future. Floridsdorf + means that although the project is intended to be held in the Viennese district of Floridsdorf, all schools in Austria, Germany and the German speaking parts of Switzerland and Luxembourg are invited to participate. The project is supported by the Centre for Applied Games Studies of the Danube University Krems. The Move Effect tool (<https://bgm.moveeffect.com/>) was used for protocoling the steps, in cooperation with Moveeffect GmbH, which developed the platform. Move effect was conceptualised in the initial phase by the Centre for Applied Games Studies within the framework of an FFG grant. Another essential tool for the Run Challenge are micro:bit controllers, which were used to programme pedometers. Additional software such as MathCityMap (<https://mathcitymap.eu/de/>) have also been embedded in the Run Challenge Floridsdorf+ as part of educational material.

Space21Future refers to "a learning environment that enables children and young people to build their (digital) abilities and future outlooks" and should be interpreted as "Space towards one future." Additionally, the number 21 refers to Vienna's 21st district, specifically Floridsdorf, where the Lab is located. The district of Floridsdorf funded the original equipment for Space21Future as part of a district-wide digitalization strategy. To emphasize the importance of this subject, this initiative was also included in the "21 Projects for the Twenty-First District" initiative. Additionally, the City of Vienna and its various municipal departments, as well as the Vienna Department of Education, supported this project. Currently, the Lab is managed by three part-time teachers. The initial year's team includes Michael Fleischhacker, the project's creator and well known for his campaign "Flipp den Fleischhacker," Alexander Pfeiffer, a media researcher, and Sandra Stella-Pfeiffer, an experienced media and games

educator. Stephen Bezzina, from the B&P Emerging Technologies Consultancy Lab Ltd., situated in Malta, provides adaptive learning guidance to the team.

The Space21Future was developed and funded just before the Covid-19 crisis, with its opening occurring during Austria's first major lockdown. This meant that new concepts had to be developed, if the pupils were not allowed to go to the Lab, as school trips were forbidden, then the Lab has to go to the pupils. This was realised through so-called "Lab2Go" boxes and challenges. The first successful challenge was around the game Minecraft and the topic of artificial intelligence and robots, the second challenge is the Run Challenge Floridsdorf+ and currently the Space Adventure Challenge is being carried out. Furthermore, the Esport School League is actively supported.

The Run Challenge Floridsdorf+ is also supported by Thomas Wernbacher, Natalie Denk and Simon Wimmer. They are media and games scholars at Danube University Krems. They accompany the project Run Challenge Floridsdorf+ and were involved in the conceptual design of Move Effect as part of the already mentioned FFG project.

2 THEORETICAL BACKGROUND

The aim of the Challenge is to promote physical activity among children, which is especially important in times of the Covid-19 crisis and the closed school-gyms in Austria or Germany and/or almost non-existent self-initiated sports activities during the time of home-schooling [1]. The clue is that the active sport is linked to a makerspace element, namely the programming of a micro:bit controller into a pedometer and the recording of the sporting activity with the help of the Move Effect platform, which also provides the gamification framework in addition to the protocol function.

The teachers are registered as administrators who verify and register the results of their students. In addition to the school-versus-school challenge, the primary goal is to walk around the world together. Micro:bit controllers can be ordered by schools in Austria via the school book campaign.

From a media education point of view, the report of the World Economics Forum provides an orientation to which skills could be improving through the Floridsdorf+ Run Challenge, in regard to programming and using the micro:bit controllers and submitting the results to the teacher, that will later be needed in the world of work [2].

- Analytical thinking and innovation
- Complex problem-solving
- Technology use, monitoring and control
- Technology design and programming
- Reasoning, problem-solving and ideation
- Troubleshooting and user experience
- Systems analysis and evaluation

Following Jenkins [3], the following positive effects might be facilitated via the Run Challenge.

- Play - the capacity to experiment with your surroundings as a form of problem-solving
- Simulation - the ability to interpret and construct dynamic models of real world processes
- Appropriation - the ability to meaningfully sample and remix media content
- Collective Intelligence - the ability to pool knowledge and compare notes with others toward a common goal
- Networking - the ability to search for, synthesize, and disseminate information

In addition, we have initiated that secondary schools program micro:bit controllers for primary school pupils and explain how the challenge works, so that older primary school children can also participate. All of this is Covid-19 compliant and in accordance with the distance rules.

3 METHODOLOGY

The project set milestones and checked whether the goals were achieved. Milestones include the number of participating schools, the number of participating children, the number of micro:bits

programmed, the number of educational exercises carried out and, of course, the number of miles achieved with the final goal of circling the globe once.

The children's ambition and achievements were evaluated through participative observation.

4 RESULTS

Despite the difficult situation in the context of the Covid-19 crisis, thanks to media support from Viennese radio stations and newsletters to teachers, almost 100 teachers registered for the Challenge with their class, respectively those children in their class who had voluntarily chosen to participate. In the end, about 1200 pupils participated in the project.

The schools could decide for themselves the extent of their involvement. Some schools did a workshop hour around the topic, other schools regularly log their results and integrate the Floridsdorf+ Run Challenge with different school subjects. The connection with the MathCityMap app was particularly successful, meaning that pupils had to visit various locations near the school and solve mathematical puzzles. This combined the Maths lessons with the Run Challenge successfully.

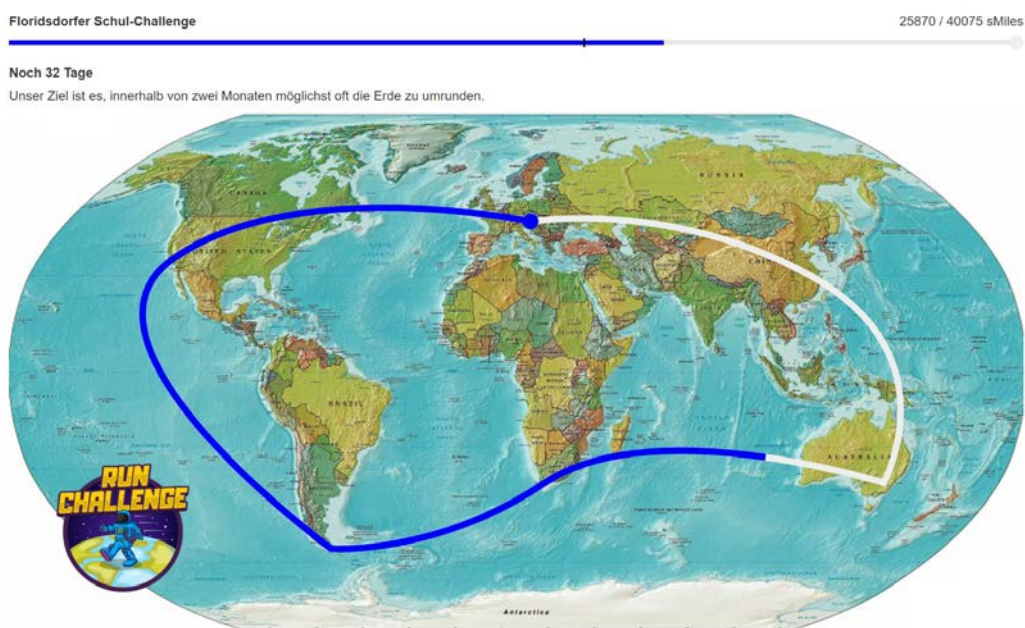


Figure 1. Screenshot Move Effect, Floridsdorf+ Run Challenge.

The observation analysis showed that the engagement of the students was high to very high. Furthermore, students solved problems that were not apparent in the planning of the challenge. For example, a suitable outdoor protection for the pedometer. The children took the initiative and asked if suitable bags could be made in the handicraft lessons. The instructions on how to make these bags were then shared between the pupils.

The children enjoyed the connection of the different school subjects because it was inclusive and not obvious and intrusive. Especially the aforementioned project with Mathematics took some of the fear out of what is considered a very difficult school subject.

It was particularly remarkable that the children seemed to be more motivated by the common goal of circling the world than by competing against each other. At the time of submitting this chapter, 40,000 miles have been reached. The round-the-world trip in the next 27 days therefore seems within reach.

5 CONCLUSIONS

Challenges like the Floridsdorf+ Run Challenge were able to bring some perspective back to the children, especially during the Covid-19 crisis. They got moving and linked this to STEAM-relevant topics. The children had fun and found it to be an experience-oriented learning activity.

What was particularly remarkable was the possibility of not only carrying out the Challenge across schools, but also working towards a common goal of collecting the miles. Setting the gamification goal as a common event was seen as one of the key elements by the participating educators.

In any case, the Floridsdorf+ Run Challenge has shown that applied STEAM lessons can be well combined with other subjects, such as sports and exercise. And these innovative forms of teaching and learning can be the key to success in preparing our children for the future. Challenges like the Floridsdorf+ Run Challenge were able to bring some perspective back to the children, especially during the Covid-19 crisis. They got moving and linked this to STEAM-relevant topics. The children had fun and found it to be an experience-oriented learning activity. What was particularly remarkable was the possibility of not only carrying out the Challenge across schools, but also working towards a common goal of collecting the miles. Setting the gamification goal as a common event was seen as one of the key elements by the participating educators.

In any case, the Floridsdorf+ Run Challenge has shown that applied STEAM lessons can be well combined with other subjects, such as sports and exercise. These innovative forms of teaching and learning can be the key to success in preparing our children for the future.

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