

Digital Learning Across Boundaries: Augmented and virtual reality supporting changemaking in an international context

Research Questions

Digital Learning Across Boundaries: Developing Changemakers is a three year Erasmus+ project involving ten schools and universities across five European countries. This research focuses on one strand that involved English and Danish partners collaborating on the theme of using technology to support physical activity, or exergaming, during designated 'international days'.

- Can digital technologies such as VR and AR help school pupils to develop changemaker attributes?
- How is changemaking demonstrated in practice by pupils through the use of digital technologies?
- Does technology-supported changemaking support the development of intercultural awareness?

We present emerging evidence to support the use of VR and AR tools with mobile devices for

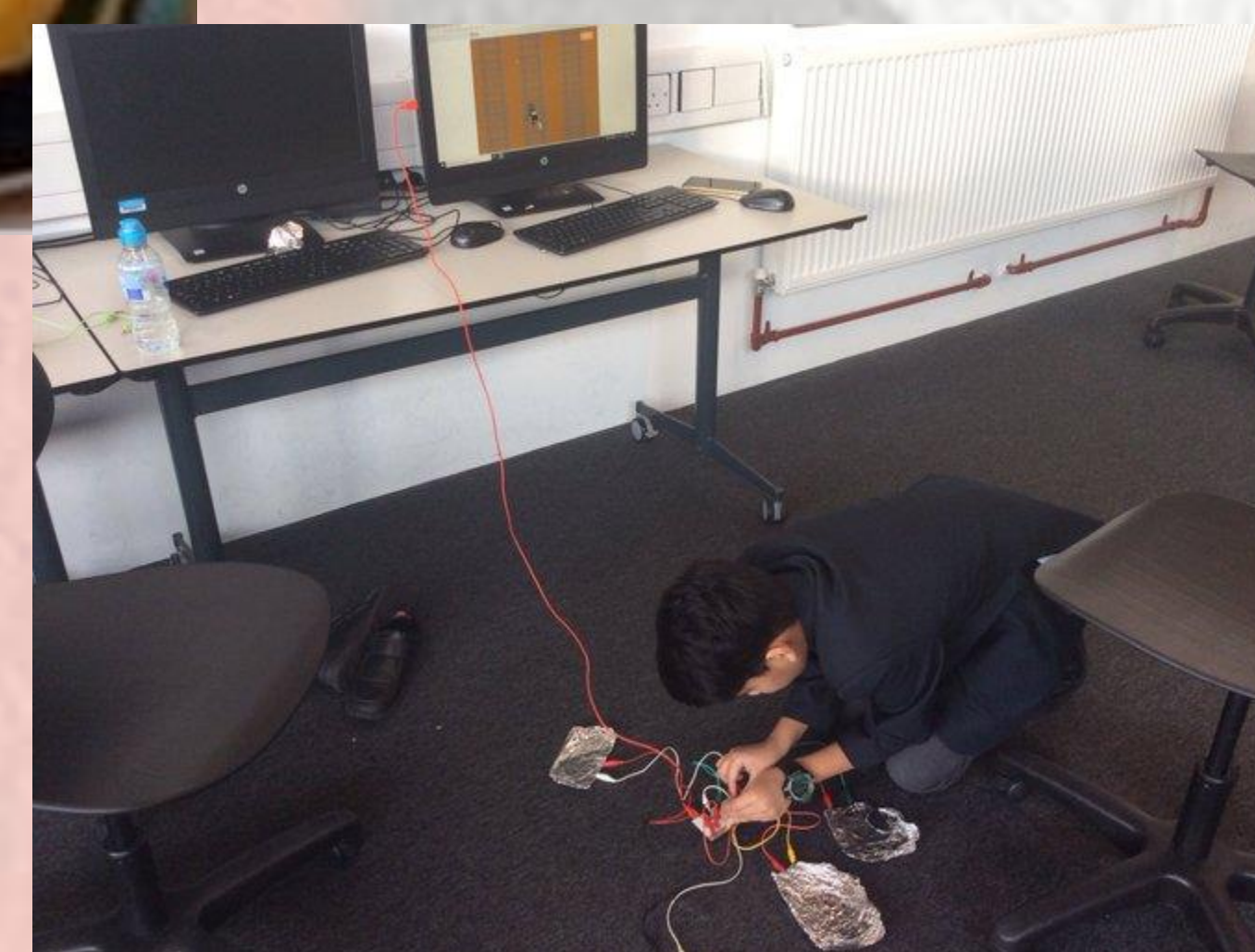
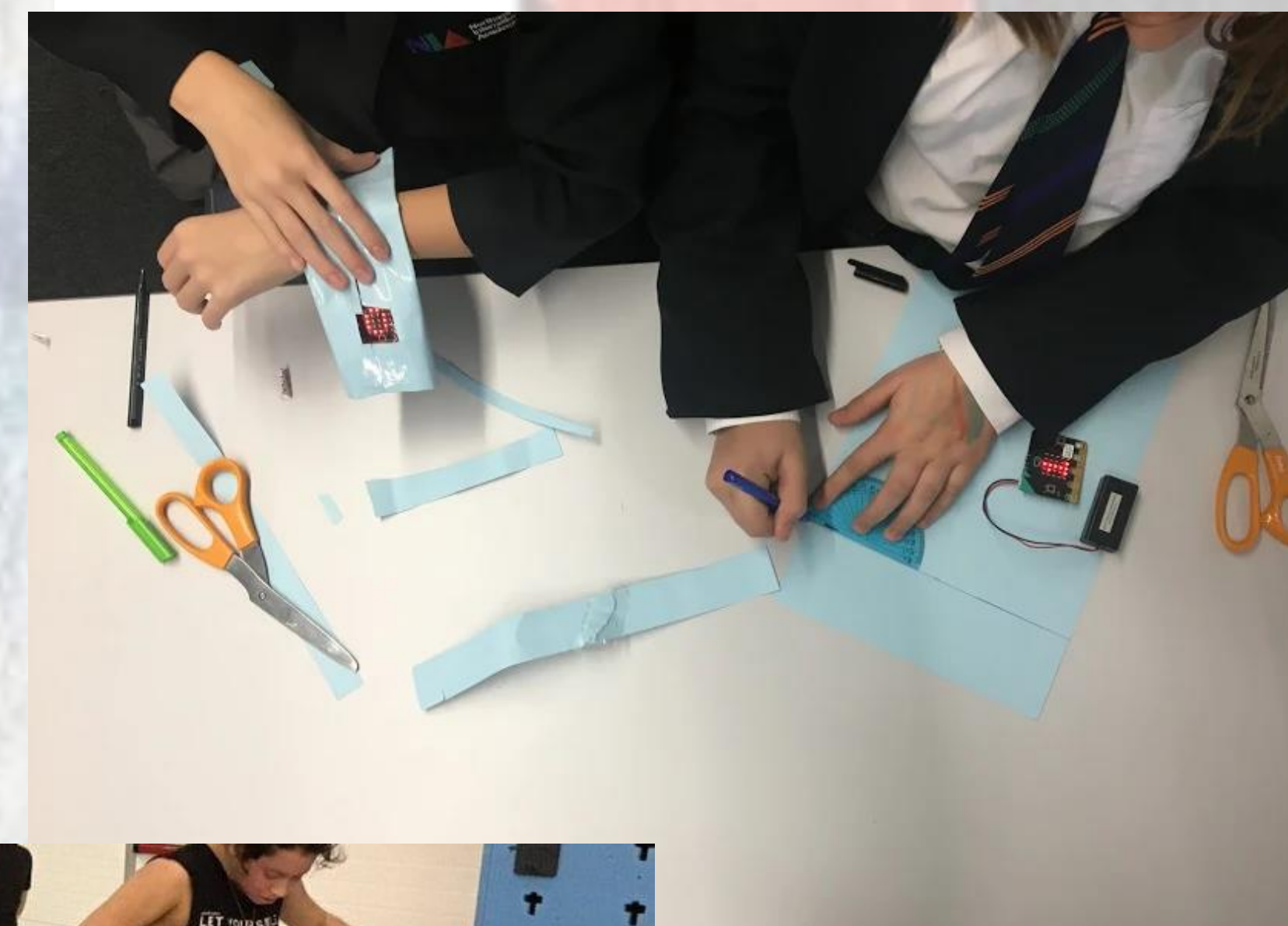
- developing empathy and intercultural awareness through collaboration and immersion in different spaces
- developing an understanding of the changemaker process through blending digital and physical learning environments

Literature Review

- The review focuses on the potential and usage of augmented reality (AR) and virtual reality (VR) in a physical activity setting and how this can contribute to both social innovation and changemaking
- 'Exergaming represents a combination of physical activity and gaming, and AR and VR have opportunities to enhance this experience through immersion in the activity (Faric *et al.*, 2019)
- Changemaker attributes can be defined as a means by which change can be elicited through designing, refining, implementing and evaluating (Thorogood *et al.*, 2018)
- There is the potential to develop creativity and intercultural awareness and a range of skills, including collaboration, critical thinking, resilience and problem solving through using AR and VR (Hughes & Mayes, 2018; Dziedziewicz, Gajda and Karwowski, 2014)
- The developing attributes above link broadly to the notion of changemaking, drawing upon the skills needed for effective social innovation (empathy, tolerance, respect and appreciation) all of which closely align with changemaker attributes (Thorogood *et al.*, 2018)

Methodology

- Ethnographic approach to study social interactions to give a broad understanding of cultural and social structure providing a rich insight into participants' views and actions (BMJ, 2008)
- Sample included two classes of year 7 students supported by two class teachers, six students and four lecturers
- Focus on home country children and their responses to interactions with children, teachers, academics, and students in other participating countries
- Insight into children's understanding and application of changemaker attributes
- Data gathered through several mediums: recorded focus group interviews with the children taking part in the project; analysis of videos and pictures of the challenges in which the children participated; children's comments elicited by student's observation; field notes made by students



Data Analysis

- Deductive method of coding using a list of thirty-seven changemaker attributes, both negative and positive (Maxwell and Armellini, 2018 & Rahman, Herbst, and Mobley, 2016)
- Evidence of developing changemaker attributes during the initial coding phase and how this influenced the way children tackled the problems they were set
- Patterns established within the initial codes allowing them to be categorised into subsets
- Three main concepts identified from the data analysis (see table below)

Concept	Quotes
Changemaker attributes	'We haven't changed the world forever, but we have made a difference and shown people that we can help with the future'
Changemaker impact	'Things you use in regular day with technology can be used in different ways to help enhance your life physically'
Intercultural awareness	'Talking to other countries was a good idea because ... we can watch how other countries compare to ours Seeing how they are doing their tasks will help us to understand how we can do our better'

Findings

- Children developed Changemaker attributes
- They worked collaboratively with empathy and drive
- They worked in a resourceful and responsible way
- Changemaker impact on the use of AR and VR on physical activity
- Awareness of different cultures achieved with sensitivity and curiosity
- Intercultural impact on tackling problems

Conclusion

- Data suggests that AR and VR can be used to develop changemaking attributes and an understanding of the changemaker process - 'Change works if someone makes a difference in the world. It could be someone that puts a piece of plastic in the right bin but it would still be something that would make a change'
- Children demonstrated a range of skills associated with changemaking and could articulate the skills they had developed and the various benefits and challenges that these bring
- Intercultural awareness demonstrated through a commitment to explore settings and solutions, empathise with their international peers and offer culturally sensitive prototypes - 'We can adapt to the way that they learn in their school and they can adapt to how we learn in our schools'
- Future opportunity to explore the use of AR and VR further in the context of an extended international study