Chang, M. et al. (Eds.) (2019). Proceedings of the 27th International Conference on Computers in Education. Taiwan: Asia-Pacific Society for Computers in Education

Exploring the Possibility of Leveraging Spherical Video-based Immersive Virtual Reality in Secondary Geography Education

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Abstract: This work-in-progress poster discusses our preliminary work on exploring the possibility of harnessing spherical video-based immersive virtual reality (SV-IVR) in learning and teaching of Physical Geography. In particular, it focuses on delineating (i) the rationale behind our initiative, and (ii) the proposed direction of how to adopt SV-IVR in the context of formal schooling in Hong Kong.

Keywords: Spherical video-based immersive virtual reality, physical geography, school education

1. Spherical Video-based Immersive Virtual Reality (SV-IVR)

Immersive virtual reality (IVR) is regarded as an important technological innovation to be adopted in schools in the next triennium (Freeman et al., 2017; Jane et al., 2017). However, creating high-fidelity animation-based IVR is quite expensive (Hernández et al., 2016), which hinders its widespread adoption in formal schooling (Liu et al., 2017). On the contrary, spherical (360-degree) video-based IVR (SV-IVR) can offer teachers a viable and affordable alternative to incorporate immersive virtual learning elements into their teaching practice (Elmezeny et al., 2018). While the educational use of SV-IVR is still an emerging research area, not much attention has been paid to its application in formal school education (Hwang et al., 2018).

2. High-school Physical Geography Curriculum in Hong Kong

In order to align with the educational reform for promoting student-centredness in school education in Hong Kong (Education Bureau, 2010), the statutory high-school geography curriculum has been revamped. The new curriculum lays more emphasis on theme-based and enquiry-oriented learning (Curriculum Development Council, 2014). Among the six themes in the curriculum structure, three are related to Physical Geography (PG), such as, "River and Coastal Environments." In each theme, there are several geographic modules, each of which consists of a focal enquiry question, for example, "What are the challenges posed by the management of river and coastal systems? How & why?".

In line with the advocacy made by many geography educators and researchers (e.g., Anderson, 2009; Bonnett, 2008; Gabler et al., 2009), the new curriculum highlights that providing students with authentic outdoor enquiry-oriented learning experiences in interacting with the real-world environments is crucial to learning and teaching of the PG-related themes. Unfortunately, due to practical problems, such as safety issues, weather instability, and constraints in time, money and manpower, it is always challenging for teachers to organize outdoor enquiry-based fieldwork for students (Jong, 2015, 2019; Geng et al., 2018). In fact, studies on teachers' implementation of the new geography curriculum have revealed that generally the classroom activities are still teacher-centred and textbook-driven (e.g., Yeung, 2016).

3. Enquiry-based Learning and Teaching of PG with SV-IVR

We aim to leverage SV-IVR to tackle the problems discussed in the previous section. Normally, Geography teachers in Hong Kong use a 12-day teaching cycle to cover a geographic module, with four lessons evenly distributed in each cycle. The present proposed pedagogical design (see Figure 1) is grounded on Pedaste et al.'s (2015) 5-phase enquiry learning model: Communication, Orientation, Investigation, Explanation and Reflection. An important piece of our coming work is to conduct empirical research to evaluate the pedagogical effectiveness of the proposed pedagogy.

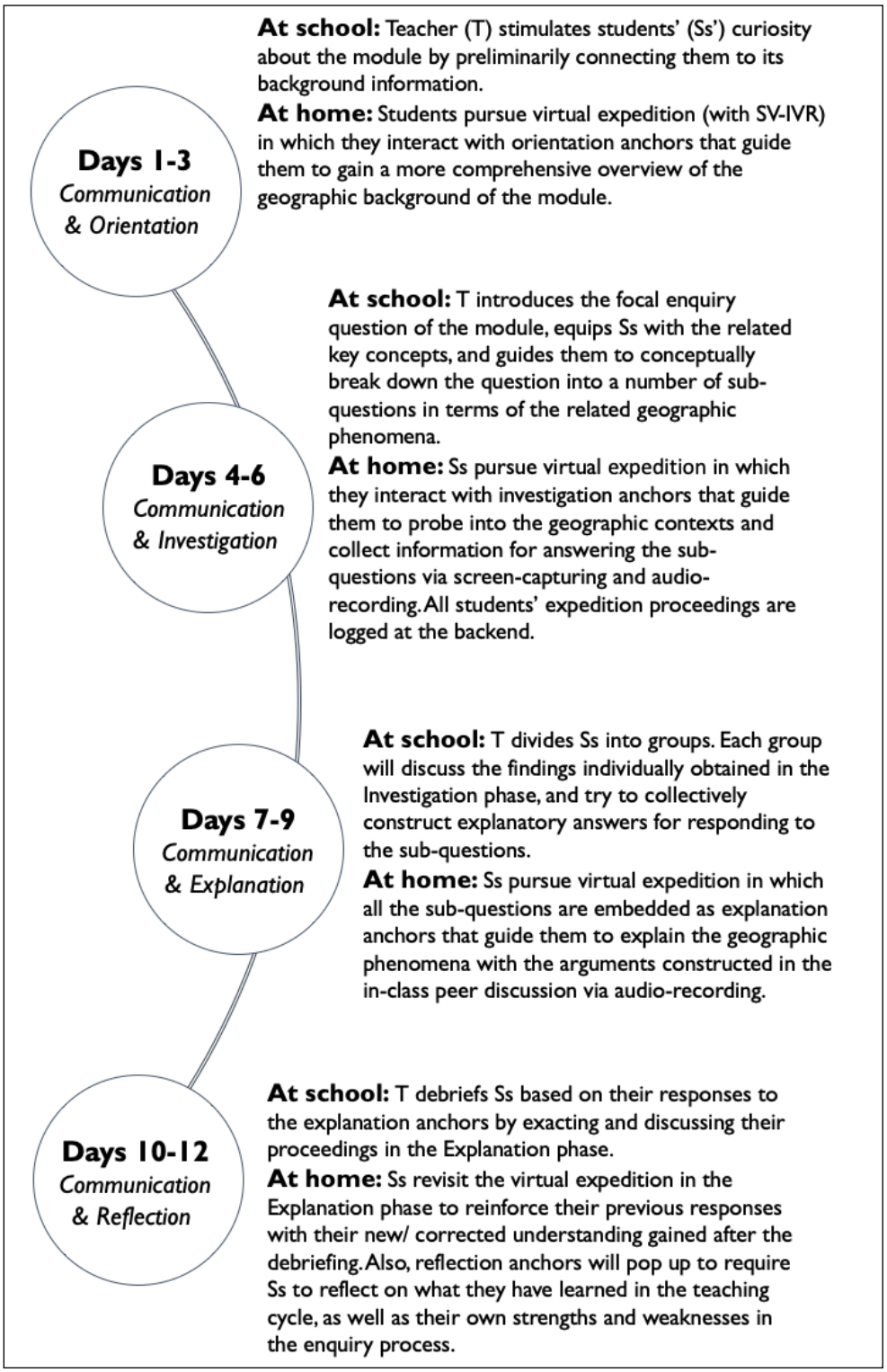

Figure 1. Design of Enquiry-based Learning and Teaching of a PG-related Module with SV-IVR.

Acknowledgement

The work described in this paper was substantially supported by a grant from the Research Grants Council of Hong Kong Special Administration Region, China (Project No.: 14612119).

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