Nurturing Learning Motivation for Diverse Students through Augmented Reality (AR) and Virtual Reality (VR) Technologies in an Integrated Classroom: A Pilot Study

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Background
The traditional teaching strategies and classroom settings are no longer to cater different needs of diverse students (including autistics) in an integrated classroom. Integration is perceived as a catalyst process leading to inclusive education (Stable, 1991, p. 10). Stable suggested that integration is most useful for the diverse students to learn better in an integrated classroom. Students’ learning motivation is affected by various external factors in the social world that affects students’ cognitive processes and motivational beliefs. Social influences include factors associated with cultures, values, experiences and beliefs through the behaviors of important socialization influences in peer support, individual situations and previous performance outcomes. Through an interactive, experimental and stimulating learning in a classroom, students’ motivational beliefs are centered on goals, task-specific self-concepts, self-efficacy and problem-solving skills. At the same time, Vocational and Professional Education and Training (V/PET) presses on the mastery of hands-on skills and practices in the workplace. V/PET students (especially for SEN students) have to acquire both knowledge and skills simultaneously before they are able to deal with problems experienced in the workplace. The advancement of Augmented Reality (AR) and Virtual Reality (VR) is to open up a new learning strategy to "explore the trainers to real-life (and potentially dangerous) situations with minimal risk" (Park, 2014).

Objectives
This study examines how diverse students’ learning motivation has been changed by students themselves with Augmented Reality (AR) and Virtual Reality (VR) technologies.

Method
This is a multiple case study of five V/PET students during a pilot study of using AR and VR technology in a classroom in December 2015. The male students, including two Special Educational Needs (SEN) students, were selected from the programme of Building Services Engineering and were formed in a learning group. One of the SEN students was an autistic student; another was diagnosed with dyslexia. Five students had completed the first year of this programme. They both were the first time to use AR and VR technologies to learn in their classroom. This study adopts an interpretative approach. Data was collected through observation, semi-structured interviews and lesson observations. Data was analyzed to construct a narrative for each student. The students provided a tick-tack for their desired pseudonyms.

Case Studies

Case Study 1 (Tim with Autism)

Student: 17-year-old male with AS
Characteristics: Tim was alone in the classroom, never talked to his classmates, and loved drawing on the paper in every lesson.

Interview after the pilot study:
Tim effectively communicated with his groupmates during the AR & VR activities, such as looking at models and seeking for help. He said, "My groupmates taught me how to use the controller to go forward and to use the fluid pipes... I didn’t know... it was interesting for me to see other classmates how to solve the problem."

Findings:
For a student with ASD, Tim may learn by himself through practical experiences and by observation. Stimulating learning through AR & VR activities may help ASD students to learn better.

Case Study 2 (Bob with Dyslexia)

Student: 17-year-old male with dyslexia
Characteristics: Bob slept during the lesson all the time.

Interview after the pilot study:
Bob was interested in the AR & VR activities and asked for another activity. He said, "Oh, it is a game or lesson? It was attractive. I could work with my groupmates and made decisions together."

Findings:
For a student with SLD, Bob may feel comfortable when he can work with peers, rather than alone. During the collaborative learning, he felt comfortable and found his learning interests. He was engaged to be an active learner. The AR & VR learning classroom opens up a new possibility to arouse learning interests and to promote collaboration between students and students.

Case Study 3 (Cheung)

Student: 17-year-old male
Characteristics: Cheung loved playing video games and used to learn from the internet.

Interview after the pilot study:
Cheung said: "I really felt the situation. I could lead my groupmates in the AR & VR classroom. I told them what I heard from the pump. I could solve the problem with my groupmates."

Findings:
For a student with different characteristics, Cheung may contribute their own potentials to the group through AR & VR activities and group discussions. Some students may feel more comfortable to cope with problems with peers.

Case Study 4 (Jack)

Students: 17-year-old male
Characteristics: Jack loved telling jokes in the lesson.

Interview after the pilot study:
Jack expressed, "I got lost at the beginning of the activity. I could follow my groupmates. All groupmates were helpful!"

Findings:
The personal experience and knowledge interact with contextual factors, such as school, students and teachers, is the process of developing students’ thoughts and beliefs; and hence changes their learning motivations.

Case Study 5 (Hugo)

Students: 16-year-old male
Characteristics: Hugo was good at drawing and playing card games.

Interview after the pilot study:
Hugo stated: "It was a tool for us to learn better through some interactive activities. Groupmates and I get a signal before entering the AR and VR Showcase. It was a new workplace in front of me."

Findings:
The application of using AR and VR technology with instructional design of learning materials, activities and pedagogy may increase students learning interests and motivation. In a innovative classroom, students may engage in forms and levels of learning that are not anticipated by current cognitive theory (Brando et al., 2003, p. 278). Diverse students are engaged in an integrated classroom, however.

Conclusion
This pilot study was able to effectively support diverse V/PET students to learn better. Diverse students could be integrated into an learning environment and were able to learn from each other through the AR and VR activities and group discussions. Students were more engaged when they could apply their experiences and knowledge to the AR and VR classroom situations. This personal experience of students interacted with contextual factors, such as peers and technological activities, in the process of the enhancing of students’ learning motivation.

References: