

# Orchestrating the Technology-Enhanced Embodied Learning Classroom via Learning Stations Rotation: A case study

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**Abstract.** This work presents a case study of orchestrating a technology-enhanced embodied learning experience in an authentic classroom. As new technologies (e.g., motion-based technologies, natural user interfaces) and emerging pedagogies (e.g., embodied learning) find their way into the classroom it is extremely important to advance our knowledge of how to improve practice with respect to planning and orchestrating the classroom environment. This case study presents researchers and teachers' efforts in orchestrating a technology-enhanced embodied learning classroom in elementary education demonstrating the strategies and methods adopted.

Keywords: Embodied Learning, Classroom Orchestration, Learning Stations Rotation

## 1 Introduction and theoretical background

The emergence of natural user interfaces, mixed reality technologies and full body interaction technologies is thought to have created new opportunities for embodied learning pedagogies. However, research on technology-enhanced embodied learning is mostly conducted in controlled laboratory and idealized settings therefore, lacking a clear focus on investigating the efficacy of such pedagogies in authentic educational environments (Karakostas, Palaigeorgiou & Kompatsiaris, 2017). Some recent work on technology-enhanced embodied learning in authentic classrooms points to issues of classroom orchestration and relevant factors contributing (positively or negatively) to the learning experience (e.g., Ioannou, Georgiou, Ioannou, Johnson-Glenberg, 2019; Georgiou, Ioannou & Ioannou, 2019).

Orchestrating learning in the technology-enhanced classroom is not a novel topic. Yet, as technology and pedagogy evolve, so does the need for new methods and techniques for teaching and learning. Orchestration is defined as “the process by which teachers and other actors design, manage, adapt and assess learning activities, aligning the scaffolding at their disposal to achieve the maximum learning effect, informed by theory while complying pragmatically with the contextual constraints of the setting”

(Prieto, Holenko-Dlab, Abdulwahed, Gutiérrez & Balid, 2011). Currently, researchers and practitioners are lacking methods and strategies of orchestrating the technology-enhanced embodied learning classroom, as both embodied learning technology (e.g., motion-based technologies, games) and embodied learning pedagogy (e.g., embodied are relatively new to the educational arena (e.g., Kosmas, Ioannou & Zaphiris, 2018; Kosmas, Ioannou, Retalis, 2017; Ioannou & Ioannou, 2018). In this spirit, the overarching research question of this study is: *What methods and strategies can be used for technology integration and orchestration of embodied learning in an authentic classroom?*

## 2 Method

### Participants

Participants were fifty-two 1<sup>st</sup> graders (aged 6-7 years old) who were enrolled in three classrooms in a public primary school and five in-service teachers (three mainstream teachers, a speech therapist teacher and a special education teacher).

### Procedures

Via a co-design process, researchers and educators endeavored to co-design the technology-enhanced embodied learning environment in an authentic school classroom with mixed ability students. A *learning stations rotation model* was adopted which allows students to rotate through stations on a fixed schedule. Students were assigned in mixed ability groups of four. The domain was language and all activities were directly linked to the curriculum goals of the unit (i.e., spelling of words of different length).

Four stations were set in each classroom. Two of the stations utilized technology and the other two utilized conversational paper-and-pencil tools. The technological stations comprised of (i) a kinect-based learning game from Kinems (see “Lexis” game at <https://www.kinems.com/>) projected on a portable screen-surface and (ii) a learning game played on the interactive whiteboard which was already fixed in the classroom. Both games were about language learning – a missing letter game – allowing children to practice their skills on word spelling by dragging letters into words, using the hands and arms. The paper and pencil stations were also related to word spelling (crosswords, spelling games and word and pictures matching games). Overall, the stations were conceptually connected and the activities built on each other to promote learning in the domain of language, linked to the school curriculum.

At the beginning of the session, the researchers introduced the use of the Kinect camera (new to the students) and the Kinect-based application (how to grasp items). Students were already familiar with the use of the interactive whiteboard and of course, paper and pencil activities in groups. The lesson lasted approximately 80 minutes. The lesson plan was replicated in three different classrooms ( $n=52$  students). Data were gathered via a group interview with the participating teachers at the end of the learning intervention. The group interview aimed at understanding teachers’ experience of orchestrating the technology-enhanced embodied learning experience, enacted via the *learning stations rotation* model.

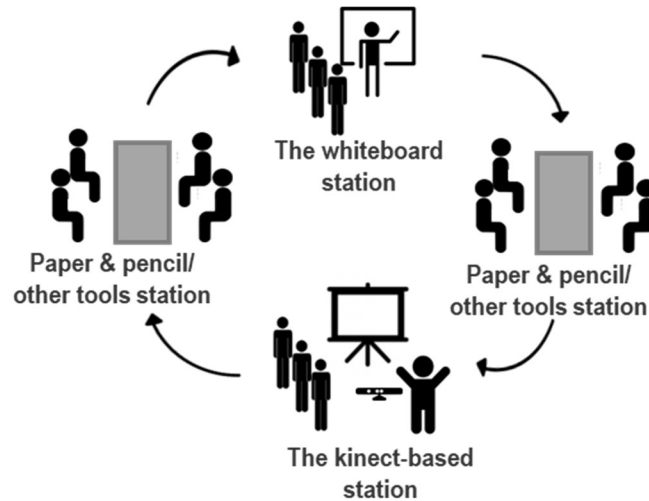


Fig. 2. The *learning stations rotation* model for embodied learning in the classroom

### 3 Findings

According to the participating teachers *design/planning* was the most important factor for the successful technology integration and orchestration of embodied learning. Teachers evaluated the *co-designing* process as a positive factor contributing to the success of the technology-enhanced embodied learning experience. Using the learning stations rotation model was also perceived as crucial. The teachers thought that *rotation between stations* with a *variety of activities* kept students' interest and engagement at high levels and promoted *active learning*. As the teachers further explained, during the lesson the teacher *became a coach* in supporting and scaffolding the learning activities, rather than delivering information. According to them, teacher *monitoring and scaffolding* (e.g., hints and prompts) as well as *peer feedback* contributed positively to students' learning. The teachers further evaluated the *integration of the technology* as educationally beneficial.

### 4 Discussion

Technology-enhanced embodied learning can be an engaging experience for the learners. However, it requires new strategies and methods for classroom planning and orchestration. The *learning stations rotation* model and associated classroom orchestration strategies presented in this paper could be further refined based on classroom implementations across varying schools and in different domains.

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