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The Effectiveness of Kinesthetic Approach in Developing Mathematical Function Graphs Recognition and Understanding at University Level

This research paper investigates our belief as educators that kinesthetic approach can be used to develop students' recognitions and understanding of mathematical function graphs with the help of a competitive dancing game.

Given that some students need to use other senses as a preparation to abstract and symbolic thinking, we developed Augmented Reality kinesthetic digital resources around standard mathematical function graphs using Microsoft Kinect sensor and some programming of Unity 3D Development Kit, Microsoft Kinect (SDK) - Software Development Kit - and CindyScript the programming language associated with Cinderella - Dynamic Geometry Software, linked through a UDP (User Datagram Protocol) connection. The software recognizes students' body gestures as input representations for mathematical function graphs.

Aiming at verifying the resources effectiveness in developing recognition and understanding of mathematical function graphs among freshmen students at UCBL1, a quasi-experimental design with pretest and posttest is considered. The test consists of 40 items that are equally distributed among the two levels of achievement: recognition and understanding. 20 items are designed at each level in isomorphic pairs that are administered randomly as whether pretest or posttest. The items type for the test are multi-choice questions of 4 choices. The test items were written in verbal and nonverbal, symbolic and graphical ways.

The experiment with freshmen students is going to be implemented at the beginning of summer semester 2015-2016 at INSA de Lyon- UCBL1. The experimentation is intended to be conducted as a challenge where volunteer teams of freshmen students will have to compete by achieving highest scores and be rewarded by some goodies. The learning gain represented in students' recognition and understanding using the prepared achievement test is going to be computed and correlated with the scores in performing the kinesthetic game in order to look for evidence of a relation between their engagement and achievements.