Planning stage of a gamified educational tablet application covering primary science topics

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This work outlines the preliminary steps of a project that covers the design, development implementation and evaluation of an educational tablet application planned for primary school students in science classes. The outline includes the design of the application unit and evaluation criteria for examining students' understanding during and following their interaction with the app. The application is designed to cover primary school science topics on; 1) living things and life, 2) nature of matter, 3) physical events, and 4) earth and universe. Each topic is planned to proceed from elementary level competencies (currently specified for 3rd grade) towards more advanced levels as the students move through progressive levels of the application. At present, elementary level competencies on living things and the nature of matter are being designed. The design includes a number of game elements and dynamics in an attempt to improve student engagement during the learning process. As such the game environment consists of a succession of islands in which the students are required to complete a series of puzzles that resemble scavenger hunt games. Each island represents a different setting (eg. farm, seaside, cave, castle, forest etc.) from which the students are expected to collect a number of items enclosed in the puzzles. In order to move on to the next island, the students must complete all the puzzles and use some items from these puzzles to create a meaningful tool that they may need during their journey between islands. The evaluation criteria are based on two main dimensions: 1) cognitive demand of each puzzle in the application (the degree of cognitive load each puzzle imposes on the information processing system) and 2) visual representation of the settings defining each island in the application (real-life vs. game-like representation). Each dimension is examined to understand how students with diverse characteristics interact with, engage in, and learn from the application. The cognitive demand of puzzles is to be assessed in terms of the number of items (sum of correct, incorrect and irrelevant responses) included in each puzzle. Visual representation of the settings defining each island will be classified into two categories depending on whether it represents a real or fantasy setting in terms of the game like visuals (castles, pirates, palaces, ruins, caves etc.) included in the representation of each setting. Learning gains will be assessed in terms student scores obtained from the closing puzzles included application. Student engagement will be assessed in terms of the number of puzzles the students are willing to complete during a single free-time session. An in-depth observation is planned to take place following the addition of each new stage (a new island setting) to the game environment. Both quantitative and qualitative data will be used to examine how different student groups enjoy, benefit and interact with the application. Such a cross examination between student and application characteristics is

expected to provide valuable information on how cognitive load and visual aspects defining unique screens in an application might guide and shape our decisions during the design process.