Optimizing Multimedia Learning Objects for Learning in a Procedural-based Course

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Abstract. The prevalent use of multimedia learning objects in instructions particularly in e-learning platforms has spurred the interests of many studies to investigate their usability and effectiveness. It is, however, equally important to align proven instructional design principles in the design process in order to maximize learning. This study adopted Principles of Multimedia Design to guide the development of a set of learning objects for a procedural-based course, which involved 54 students for 10 weeks. The findings of the study revealed that the students showed positive acceptance of using the learning objects as the learning materials. A majority of them also reported their capability to perform the given tasks. The findings have provided valuable insights on considerations needed for the design of learning objects and confirmed that the redundancy principle within Mayer's principles will not affect the students' cognition largely due to the students' language proficiency.

Keywords: Principles of Multimedia Design, Learning Objects, Visual Learners, Self-Paced Learning, Procedural-Based Learning.

1. Introduction

Learning objects can be accepted as "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning" [1]. The learning objects are created in smaller pieces for the purpose of maximizing the number of learning situations in which the resource can be utilized. Kay and Knaack [2], on the other hand, explain that learning objects are interactive tools that support the learning of a particular concept by enhancing the cognitive process of learners. A suitable learning object should be able to stimulate learners' motivation. In other words, a learning object might be considered less suitable for a learner if it makes his or her learning procedure more difficult or less interesting [3]

Studies pertaining to the areas of standardization, metadata and packaging of learning objects have been widely conducted by major organizations such as those by IMS Global Learning Consortium, Inc. [4] and ADL Initiative and IEEE Learning Technology Standards Committee [5]. Besides these issues, the learning objects are also facing quality artefact issues that deal specifically with the design concept as to how it can function based on its stand-alone yet self-contained object as an effectively high quality learning materials for web-based learning. Recent trends, however, have shifted towards investigating the personalization of learning objects in order to improve their effectiveness in instructions [6, 7, 8]. In order for a learning object to be accepted as appropriate with respect to the learning goal, it requires a greater understanding of how such learning object can be incorporated for instructional purposes. In order to ensure the effectiveness of content delivery from the learning objects to the learners, it must conform to a set of instructional design principles whose primary concerns are the instructional aspects [1]. This study aims to address this gap by investigating how multimedia learning objects can be optimised for learning by considering Mayer's Principles of Multimedia Design [8].

2. Procedural-based Course and Multimedia Design Principles

Procedural-based learning is an approach that combines several sources of information such as demonstrations, real examples and user annotation to allow learners to learn a set of skills or content