Interactive Self-Assessment Questions Within a Virtual Environment

Chris Evans, Brunel University, UK
Luis Palacios, Brunel University, UK

ABSTRACT

This study considers the impact that different levels of interactivity have on the memory and understanding. In particular, it focuses on the use of interactive self-assessment questions (ISAQs) as a mechanism to help students learn better. An ISAQ is a computer-based multiple-choice or text-entry question that requires input from the learner, and provides feedback based on that input. This study extends some of Mayer’s (1990) multimedia design principles and considers their applicability in this context. The study also takes into account whether the incorporation of ISAQs has a measurable impact on learning as indicated by their performance in tests. The study considers three different types of ISAQs, designed to engage either memory or understanding, in an effort to determine which one is the most effective. It considers the effect of adding interactivity in the form of memory (retention) and understanding (transfer) self-assessment questions in a learning-object content management system used by undergraduate students at Brunel University in West London, UK. It was predicted that both types of ISAQ would increase the performance of learners in tests but with different degrees. The results indicate that transfer tests have a significant impact on retention.

Keywords: Feedback, Interactive Self Assessment Questions, Interactivity, Retention, Transfer

1. INTRODUCTION

Interactive Self-Assessment Questions as a mechanism for student’s feedback has a relevant and important effect in learning. Feedback used as a procedure to indicate the learner of when and how their learning experience can be improved has long been recognized as an important instrument for improving education (Marieke et al., 2008). Their research on the effectiveness of different types of feedback specific feedback content (elaborate versus global) and feedback timing (immediate versus delayed) for learning genetics in a web-based learning environment showed a significant positive effect of global feedback on learning outcomes for higher prior knowledge learners.

Feedback is usually related with assessment as a constructive response to coursework and exams (Gibbs, 1999). It is specifically a mechanism for providing either the teachers or the learners with vital information for improv-
ing their teaching/learning methodology and
determines where mistakes have been made to
reflect on them and becoming more effective,
self-assessing, self-directed learners (Angelo
& Cross, 1993).

High-quality individualised and meaning-
ful feedback is expensive to provide. It takes
time to design and implement (World Economic
Forum, 2002) as research in the Open University
has demonstrated, however, its effectiveness
in improving learning has made valuable its
implementation (Gibbs, 2003). It compensates
the effort by actively engaging the learner and
increasing the depth of student understanding
in terms of increased performance in problem
solving transfer questions (Evans & Gibbons,
2007). Different implementation has been used
to maintain or increase these positive effects
while diminishing the burden on cost and
workload. For example Gibbs (2003) describes
a two-stage test used in medicine that imple-
ments formative and summative assessment.
In the first test, it is formative assessment only
used to inform the students, grab their attention
and provides remedial feedback that provides
diagnosis and remedial suggestions for changing
future actions. The second test, on the same topic
area, two weeks later, implements summative
assessment only, with marks but no feedback,
to determines what has been learnt.

ISAQs to be effective must be embraced
to pedagogical methods to elicit performance
and designed following well established design
principles (Mayer, 2001).

These principles applied to the design of
web learning content create the playground to
foster deep learning where interactivity play a
vital role in student education (Evans & Sa-
bray, 2002). Basic characteristic of interactivity
is learner control of the pace of a multimedia
presentation which establishes that students
learned better when they were allowed to control
the pace of presentation of a narrated animation
(Mayer & Chandler, 2001).

The interactive e-learning systems de-
veloped for this study were constructed, and
delivered using a browser-based proprietary
Learning Content Management System (LCMS)
called ForceTen. The technology employed in
this virtual learning environment is object
technology. It is tagged with metadata based on
the SCORM standard to describe the elements
of content (Palacios, 2008). Learning Objects
(LOs) as the main component in this virtual
environment are defined (Figure 1) as a re-usable
self-contained digital entity, with embedded
metadata resources and a learning strategy, that
might interact with other objects, encapsulate
other resources (information instances), in
an interconnected and platform independent
environment (Palacios, 2002).

An Information Object (IO) is a general
term used to represent several real entities (or
groups) with some similar properties, rather
than one individual. Learning strategies are the
methods that students use to learn and/or the
pedagogy teachers use to convey a particular
lesson. These range from techniques for im-
proved memory or better study skills, to an
institutional curriculum designed for some
specific course of academic studies. In general,
a learning strategy helps to implement methods
and adopt techniques that increase effectiveness
in any aspects of the general cognitive process
of acquiring skills or knowledge. Granularity
and reusability properties are essential parts
of the learning object concept. Looking at Figure
1, it can be noticed that LOs differs from IO
due to the fact that information can be com-
municated without an intention to teach.

This paper approach focus in the concept of
ISAQ described by Evans and Gibbons (2007)
as computer-based multiple-choice or text-entry
questions that require input from the learner, and
provide feedback based on that input. The study
hypothesises that adding interactivity in the form
of retention and transfer self-assessment ques-
tions incorporated in a computer-based system
will increase learning. The prediction is made on
the basis that ISAQ helps the learner to identify
misconceptions, create mental schemas that can
be added to existing knowledge by providing
constructive feedback and integrate them to
form new skills or attitudes. The study looks at
retention and transfer as considered by Mayer
(2001) where retention is the power to recognise
Related Content

Knowledge Sharing Adoption Model Based on Artificial Neural Networks
[www.igi-global.com/article/knowledge-sharing-adoption-model-based/50301?camid=4v1a](www.igi-global.com/article/knowledge-sharing-adoption-model-based/50301?camid=4v1a)

ICTs and Their Impact on Women's Roles and Evolution within Developing Societies
[www.igi-global.com/chapter/icts-and-their-impact-on-womens-roles-and-evolution-within-developing-societies/110290?camid=4v1a](www.igi-global.com/chapter/icts-and-their-impact-on-womens-roles-and-evolution-within-developing-societies/110290?camid=4v1a)
Thirst for Business Value of Information Technology
[www.igi-global.com/article/thirst-business-value-information-technology/41012?camid=4v1a](www.igi-global.com/article/thirst-business-value-information-technology/41012?camid=4v1a)

Don't Talk Back!: Community Broadcasting and the Public Sphere in Nigeria
[www.igi-global.com/chapter/dont-talk-back/187922?camid=4v1a](www.igi-global.com/chapter/dont-talk-back/187922?camid=4v1a)