Integrating Learning Design, Interactivity, and Technology

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Student engagement has long been recognized as a serious challenge to learning and teaching in higher education. While increasing and innovative use of interactive digital technologies has been a hallmark of recent changes to higher education practice, the integration of traditional and innovative digital techniques in learning and teaching design and practice remains a crucial issue for university educators. There has been a tendency for new technologies to be added to existing curriculum design and learning and teaching practice in an *ad hoc*, isolated manner, rather than as part of an overarching learning design which incorporates both new technologies and traditional techniques and understanding of pedagogic principles and practice. Through the integration of the RASE (Resources/Activity/Support /Evaluation) pedagogic student-centred learning model, interactivity and applications of technology, this paper seeks to help teachers design more effective courses to enable students to acquire greater autonomy, and to cultivate dispositions to understand.

Keywords: learning design, interactivity, blended learning

Introduction

Student engagement – or the lack of it – has long been recognized as a serious challenge to learning and teaching in higher education. This has been particularly so in recent decades with the rapid growth and reach of higher education, nationally and globally, increasing the demands upon institutions to provide tertiary education to significantly larger and more diverse cohorts of students. One key solution to the challenges of engaging students in-class, online and, in recent decades, remotely through the use of interactive digital technologies, is the concept of interactivity (Gleason & Daws, 2012). A growing body of evidence has shown that interactivity is the key to human learning and intelligence, rather than abstract symbol manipulation, internal representations or information processing centred on the internal mental processes of the individual.

This paper is concerned with the issue of learning design and student engagement. It explores a practical, evidenced-based learning design model with applications of technology to improve student learning outcomes and satisfaction. The pedagogical student-centered learning model used is called RASE. The model has four components: Resources, Activity, Support and Evaluation (RASE) (Churchill, King, & Fox, in press).

The model builds upon theoretical concepts such as constructivist learning environments (Jonassen, 1999), problem solving (Jonassen, 2000), engaged learning (Dwyer, Ringstaff & Sandholtz, 1985-1998), problem-based learning (Savery & Duffy, 1995), rich environments for active learning (Grabinger, 1996), technology-based learning environments (Vosniadou, 1995), interactive learning environments (Harper & Hedberg, 1997; Oliver 1999), collaborative knowledge building (Bereiter & Scardamalia, 2003), Quest Atlantis (Barab, et al., 2005), situated learning (Brown, Collins, & Duguid, 1989), MicroLessons (Divaharan & Wong, 2003; Churchill, 2006), and WebQuest (Dodge, 1995).

The RASE model is based on what is considered important for ensuring quality in teaching and learning and can be used in almost every program and course. Central to the RASE is the notion that content or resources are not sufficient for full achievement of the learning outcomes. In addition to resources, teachers need to consider:

- Activity - for students to engage in using resources and working on tasks such as experiments and problem solving leading through experience towards achieving learning outcomes set
- Support - to ensure that students are provided help, and where possible with tools to independently or in collaboration with other students solve emerging difficulties. This support includes peer, course tutor and technology support
- Evaluation - to provide structured information to guide students' progress and to serve as a tool for understanding what else we need to do to ensure that learning outcomes are being achieved.

The figure below is a visual summary of the RASE pedagogical model.

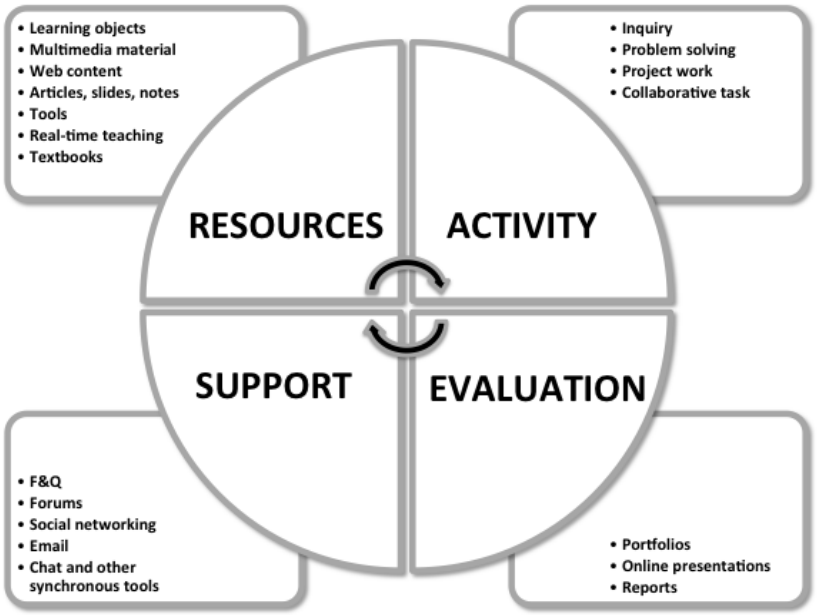

Figure 1: RASE pedagogical model

Resources

Resources include (a) content, e.g., lectures, textbooks, journal articles, digital media, (b) materials, e.g., chemicals for an experiment, paint and canvas, and (c) tools that students use when working on their activity, e.g., laboratory tools, brushes, calculators, rulers, statistical analysis software, word processing software. When integrating technology resources in teaching, it should be done in a way that leads students to learn *with*, rather than just learn *from* these resources.

Activity

An activity is a critical component for full achievement of the learning outcomes. An activity provides students with an experience where learning occurs in the context of emerging understanding, testing ideas, generalizing and applying knowledge. Resources, such as conceptual model learning objects, are elements that student use while completing their activity. The following are two key characteristics of an effective activity:

1. An activity must be ‘student-centered’

- It focuses on what students will do to learn, rather than on what students will remember
- Resources are tools in students' hands
- Teachers are facilitators who participate in the process
- Students produce artifacts that demonstrate their learning progress
- Students learn about the process
- Students develop new literacies

2. An activity must be 'authentic'
   - It contains real-life scenarios and often ill-defined problems
   - It reassembles professional practice
   - It uses tools specific to professional practice
   - It results in artifacts that demonstrate professional competence, not only knowledge

The following are examples of what an activity may be:
1. A design project (e.g., design an experiment to test a hypothesis)
2. Case study (e.g., a case of how a scientist identified new physics regularity)
3. A problem solving learning task (e.g., minimizing friction in a design of a wakeboard)
4. Develop a documentary movie on a specific area of interest (e.g., GM food pros and cons)
5. A poster to promote a controversial scientific issue (e.g., Nuclear energy)
6. Planning a science day in your school
7. Developing software to control mechanical transfer of power
8. Role-play (e.g., defending science experiment with small animals)

Outcomes of an activity can be: a conceptual artifact (e.g., an idea or a concept presented in a written report), a hard artifact (e.g., a model of an electric circuit), a soft artifact (e.g., a computer-based creation). Artifacts produced by students should undergo reviews and revisions before final submission and might involve presentations in class or online. These artifacts must be evaluated in various ways so that students can receive timely feedback to reflect upon and take further actions towards more coherent achievement of learning outcomes. Feedback can be given by eg teachers, peers, invited experts from the community/professions.

Support

'Support' provides students with a scaffold while enabling them to develop learning skills and independence. Support can be broadly categorized into pedagogical, administrative and technical. This section focuses on the pedagogical support. For teachers, 'Support' reduces redundancy and workload. Support might anticipate student difficulties, such as understanding an activity, using a tool or working in groups. Teachers can track and record ongoing difficulties and issues that need to be addressed during learning, and share these with students. Three modes of support are possible: teacher-student, student-student, and student-artifact (additional resources). Support can take place in a classroom and in-online environments such as through forums, Wikis, Blogs and social networking spaces.

Often support can anticipate the needs of students. Depending on the course, proactive support structures such as FAQs can be planned and implemented in the light of anticipated needs. The objective of anticipatory support is to ensure students have access to a body or resources when they need support, rather than just being dependent of asking teachers for help. Here are some specific strategies:
- Build a body of resources and materials which form a FAQ Page
- Create a "How Do I?" or "Help Me" Forum
- Create a Glossary of course-related terms
- Use checklists and rubrics for activities
- Use other social networking platforms and synchronous tools such as chat and Skype

Overall, support should aim to lead students to become more independent learners. Teachers should give frequent, early, positive feedback that supports students' beliefs that they can do well. Students also need rules and parameters for their work. For example, before a student asks a teacher for help, they might first ask their classmates through one of the Forums and/or search the Internet for solutions to their problems.

Evaluation

Evaluation of student learning during the semester is an essential part of effective student-centered learning experiences. The evaluation needs to be formative in order to enable students to constantly improve their learning. An activity should require students to work on tasks, and develop and produce artifacts that evidence their learning. This evidence of student learning enables the teacher to monitor student progress and provide further formative guides to help improve students' learning achievement. Students need to record their progress in completing the tasks set, so they too can monitor their learning and the improvements they make. Rubrics can be provided to enable students to conduct self-evaluation. Evaluation can also be conducted by peers. Here are few points why evaluation is important to student learning:

1. Offers feedback on work and identifies where students are in their learning
2. Offers opportunities for students to improve their work
3. Enables students to become more effective and motivated learners
4. Helps students become more independent and self-directed learners

Putting it all together

The following set of recommendations might be useful to teachers in developing their courses and learning units based on RASE. Before beginning, teachers need to:

- Ensure that specific course learning outcomes are aligned with overall program learning outcomes
- Identify courses required to achieve learning outcomes
- Align assessment, courses and learning outcomes

These should be presented in an overall Course Outline document where details of the course, including learning outcomes, schedule and topics, and information about evaluation/assignments, etc. are clearly presented and aligned with each other. Once done, developing and presenting learning units can include:

- Describe a topic
- Present learning outcomes
- Describe what to expect and what to do if Support is required
- Explain prerequisites and how to build on previous learning
- Describe an Activity
- Explain the tasks within the activity
- Provide instructions about how to proceed initially
- Describe deliverables (artifacts to be produced), provide templates if any, provide examples of deliverables if any
- Present standards for Evaluation and provide rubrics
- Provide self-check and peer evaluation forms as required
- Explain support options

Resources to include, such as:

- Notes, articles and books
- Presentations, demonstrations and recorded/virtual and real lectures
- Interactive material - conceptual models and other forms of learning objects
- Videos
- Software tools
- Support tools

We also need to specify what is expected from evaluation and how it will be conducted, so that students have clear reference points for their work.

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