Full paper

Design by Numbers – a Rubric to Aid Online Course Design

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Abstract

This paper describes the development of an assessment rubric to aid and assist educators in designing online and blended course content. An existing rubric from Centre for Excellence in Learning and Teaching (CELT) at the California State University has been adapted to suit the New Zealand tertiary environment. Changes included alignment with the New Zealand e-Learning guidelines, incorporating aspects of new learning styles, social constructivist based activities and learner centeredness.

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Keywords: instructional design, e-learning, blended learning, online learning, staff development, course design, rubric, quality assessment.

1 Introduction

Since as early as 1995 ("History of Virtual Learning," 2009; Freed, 1999) Learning Management Systems (LMS) have become a common feature in tertiary institutions. The Moodle LMS currently shows 51228 installed sites for its course delivery system (www.moodle.org/sites). The introduction of an LMS to a tertiary educational institution made it possible for every teacher, even those with low ICT skills, to create an online or blended course site.

Course sites are set up in an LMS which provides tools that facilitate presentation of content, communication, collaboration and assessment. This enables the delivery of the online component of classroom-based or blended learning courses. This flexible delivery provides students an opportunity for participation in further education, previously inaccessible to them, without disrupting their "daily life".

However, to ensure a quality educational experience, care needs to be taken that learning activities and resources are appropriate for the online or blended environment. Teaching methods and materials used in the classroom are sometimes not suitable or need significant adaptation.

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Many teaching staff in institutes of technology are subject matter experts first, with minimal course design and educational theoretical background and little experience working, teaching or learning in an online environment. So to ask these teachers to deconstruct a classroom-based course and re-design it as an effective online or blended learning experience posed them with an enormous challenge.

How is it determined that a course is complete and will deliver an effective online or blended learning experience? Usually this comes down to the individual teacher. Sometimes an instructional designer or a specialist in educational technology may be asked to review or evaluate it, at some point in its development. This is often a subjective and unguided assessment of the maturity of an online or blended course.

Some form of mechanism or system was required to:

a. aid teachers in the design of these courses, and

b. assess and evaluate the courses' level of completeness.

This paper describes the development of an assessment instrument, such as a rubric, specifically refined for judging the level of completeness or maturity of online course design in the authors' context.

2 Background

Recognised internationally (Laurillard,2002, Ravenscroft and Cook, 2007) and in New Zealand (Rosenberg, 2007; Mansvelt, Suddaby & O'Hara, 2008) is that staff development was a large hurdle in uptake of e-learning. Ramaley and Zia (2005) argued that this happened not only when using educational technologies, it happened in 'traditional teaching' as well. It means that when employing educational technologies there was a double hurdle. They state:

"*There is a gap between what the education research community and the learning sciences have discovered about learning and what most of a faculty know or practice. Because faculty develop and implement most of the course content and teaching practices, this gap impacts*

- *the development of materials for interactive technology,*
- *what faculty incorporates into their teaching, and*
- *design of the curriculum.*"

(Ramaley and Zia,2005)

The New Zealand government recognised this fact in their "Highways and Pathways" document, which noted, "*It needs to be acknowledged that many, if not most academics have no training in e-teaching. Unfortunately teacher competence in a traditional campus environment does not automatically translate to success as an e-educator in a very different environment*." (Butterfield, 2002, pp. 42)

2.1 Assessing the online course

A goal of assessing these online courses was to produce courses that share or exhibit equivalence in learning effectiveness to the traditional face-to-face course offering. Aycock, Garnham, & Kaleta (2002) noted that students in a blended online course required a thorough explanation regarding the structure and rationale of the online course as well as the relationship between the face-to-face and online offering. Both course-offering types should be well integrated otherwise there is a danger of running into a discontinuity between the two. The assessment of the online course was not to measure learner outcomes, but rather the quality of the course and how well the courses could be delivered to the student while maintaining face-to-face equivalence (i.e. not the technology doing the delivery but the content delivered).

Literature indicates numerous methods of assessing and evaluating course design with emphasis on interaction and quality. (Fulford & Zhang, 1993; Klesius, Homan, & Thompson, 1997; Zhang & Fulford, 1994; Smith, 1996; Zirkin & Sumler, 1995). However these assessment techniques were not suitable for online based courses as their mode of delivery is web-based technologies, not face-to-face delivery. Equally the online course cannot be assessed by web usability principles such as those determined by Jakob Nielsen (Nielsen, 2000), as it needed to exhibit educational and pedagogical properties.

2.2 Rubrics

In general a rubric is an authoritative rule – when applied to assessment of student work it explains the criteria against which their work was judged (Huba & Freed, 2000; Popham 1997). Often students were given a rubric prior to assessment, so it could act as a guide. In this form the authors saw a possibility for a rubric as an instrument in online course design. It could:

- provide guidance for those teachers designing and developing an online or blended course, and
- act as a tool for periodic evaluation and improvement of course after each iteration

The rubric's criteria were to cover use of tools, instructional design, presentation of materials, learner support and innovative teaching.

It was not to stand alone, but be part of a comprehensive staff support system including technology training and education in online pedagogy, instructional design and project support and participation in an e-learning community of practice.

Although several rubrics existed for assessment purposes, only a handful was designed with online course delivery in mind. The Gold (2006) rubric approached their design with a learner centred approach focusing on student and instructor feedback. Roblyer and Ekhaml (2000) developed a rubric that assessed the interactive qualities of online courses, closely related to social constructivism. The Centre for Excellence in Learning and Teaching (CELT) at the California State University (CSU) developed a rubric (http://www.csuchico.edu/celt/roi/) that covered a broader range of criteria. Quality Matters, an inter-institutional quality assurance in online learning centre, has developed a rubric with similar criteria and dimensions as the CELT rubric.

2.3 The CELT Rubric as a baseline

The CELT rubric was chosen for this research, as its categories and criteria best match the principles outlined in the New Zealand e-Learning guidelines. The guidelines were developed in the collaborative tertiary education project sponsored by the Tertiary Education Commision (TEC) in 2006. They were designed to help institutions improve their e-learning practice.

The CELT rubric consisted of 2 dimensions comprising of 6 categories in one dimension and 3 levels of completion used for the degree of assessment completion. The 6 categories summarised as follow:

1. Learner Support & Resources
2. Online Organisation & Design
3. Instructional Design & Delivery
4. Assessment & Evaluation of Student Learning
5. Innovative Teaching with Technology
6. Faculty Use of Student Feedback

For each of these categories there were 3-6 criteria used to asses the three levels of completion. These levels were:

1. Baseline – limited range of information.
2. Effective – some or narrow range of information.
3. Exemplary – extensive range of information.

To ensure a successful adoption the authors considered the usability of the CELT rubric and identified these main limitations to be addressed;

1. The degrees of completion offer no fine grain assessment/scoring options. There is no provision for the "in-between" result.
2. Each criterion's three levels are relatively verbose requiring more time spent by an assessor when making a selection. Thorough reading of each level was required each time an assessment took place.
3. The criteria do not provide a scope or range of items against which the assessor could check. This can lead to a subjective end result when used by more than one assessor. What determines the minimum or maximum?

2.4 Adapting the rubric for use in New Zealand institutions

The authors wanted to ensure the final rubric was able to provide a result that complemented the New Zealand e-learning guidelines. . Additionally it was desirable that

the rubric recognise new developments in the understanding of the learning experience.

2.4.1 Allow for new learning styles

In addition to the traditional VARK (Visual, Auditory, Read/Write, Kinaesthetic) or VAKOG (Visual, Auditory, Kinaesthetic Olfactory, Gustatory) learning styles differentiation, it was important to consider new and emerging learning styles. Chris Dede (Dede, 2005) in his chapter on planning for neomillennial learning styles gave fair warning not to label groups of students with tags such as Net Generation or GenX based on age. Rather he encouraged recognition of learning preferences in those who lead a distributed, networked life accessing communities and resources online via computers and mobile devices. Dede identified the following as characteristics of a neomillenial learning style:

- Fluency in multiple media; values each for the types of communication, activities, experiences, and expressions it empowers.
- Learning based on collectively seeking, sieving, and synthesizing experiences rather than individually locating and absorbing information from some single best source; prefers communal learning in diverse, tacit, situated experiences; values knowledge distributed across a community and a context, as well as within an individual.
- Active learning based on experience (real and simulated) that includes frequent opportunities for embedded reflection; values bi-centric, immersive frames of reference that infuse guidance and reflection into learning-by-doing.
- Expression through nonlinear, associational webs of representations rather than linear stories (for example, authoring a simulation and a Web page to express understanding rather than writing a paper); uses representations involving richly associated, situated simulations.
- Co-design of learning experiences personalized to individual needs and preferences. (Dede, 2005)

It should be self-explanatory that as institutions adopted blended and online delivery, an increasing number of students would be exposed to these distributed lifestyles and may adopt these learning styles.

2.4.2 Support conversational framework and collaborative learning

Diane Laurillard eloquently stated the case for a shift needed in university teaching so they were ready to deliver education and students suited for the information and technology era. Her conversational framework solution was built around teacher-learner and learner-learner interaction in which topics are jointly explored and knowledge was co-created (Laurillard, 2002). This solution complemented the new learning style proposed by Dede as well as traditional learning styles.

This framework supported David Jonassen's (1998) extensive work around collaborative and constructive learning: "Learning most naturally occurred not in isolation but by teams of people working together to solve problems. Collaborative Learning Environments (CLEs) should provide access to shared information and shared knowledge-building tools to help learners to collaboratively construct socially shared knowledge". (Jonassen, 1998) That was a long way to say "learning is best done in teams by creating communities of learners" (Seitzinger, 2006, pp. 4)

The New Zealand e-Learning Guidelines framework endorsed this with no less than four guidelines encouraging the use of online discussions (e-Learning Guidelines, 2006) and with cause, because it was found that although the net generation used technology for learning, it was the social connections facilitated through technology, that drives learning, says McNeely (n.d.). He suggested that group work was almost a natural fit and well-served by use of message boards (discussion forums) and confirmed this learning through social interaction.

The use of a conversational and collaborative framework was further confirmed by the experiences at the University of Southern Queensland's Faculty of Education. A review of its online courses resulted in a recommendation that learning management systems should encourage social and collaborative learning as an alternative to the sage-on-the-stage model. (Maroulis & Reushle, 2005) The LMS implementation, Moodle, at the authors' institute was specifically built from this social constructivism view point.

2.4.3 Be activity-based

Learning in an online environment was driven by activities and authentic, project-based or problem-based activities can fit this need (Dede, 2005; Maroulis and Reushle, 2005) and the authors agreed that it was crucial that learning activities drive the learning, and assessment should be seen as another learning activity.

Within the e-learning guidelines, ST5 and ST7 made specific mention of creating engaging activities:

- Have activities been identified that allow individuals and groups to learn through experience, including opportunities to demonstrate, reinforce knowledge, develop understanding and practice skills? Are problem solving skills addressed through project and inquiry-based teaching & learning?
- Would the e-learning foster students' curiosity and creativity?

(e-Learning Guidelines, 2006, pp. 24)

Ravenscroft and Cook (2007) went as far as to say "learning is interaction" and concluded that almost any knowledge and information created and refined during interaction would outclass pre-stored information in a course, because of the attached social and experiential significance.

2.4.4 Be learner-centred

Closely linked to the two previous items was learner-centeredness. Again emphasis was placed on this in the e-Learning Guidelines TD1-TD5:

- Are students able to agree some or all of their learning goals in negotiation with teaching staff?
- Do students have any choice in terms of either: what they learn, the particular resources they will study and/or the learning activities they will engage in?

(e-Learning Guidelines, 2006)

Ramaley and Zia (2005), Laurillard (2002), McNeely (2005), Dede (2005),and Ravenscroft and Cook (2007) all argue either implicitly or explicitly for a move away from tools, activities and resources dictated by the teacher and embracing the relative uncertainty of the student's world was part of the learning environment. This meant working within the students' needs for knowledge, adapting to their preferences for devices, tools and resources to use and matching their work and life experiences.

2.4.5 Link to institutional strategy

All of the above matched the authors' institutional e-learning strategy which emphasises:

- Activity-based learning
- Teamwork
- Self-directed, independent learning
- Problem-solving
- Both teacher-student and student-student communication
- Feedback and remediation
- Catering to different learning styles.

Increasingly mention was made of 21st Century skills and the need to incorporate those. This would likely be incorporated in the next iteration of the strategy.

3 Conclusion

The introduction of Learning Management Systems into tertiary education has made it easier to access the tools for teaching online, but staff in tertiary institutions are often not ready to make the best use of this new environment for teaching and learning. The authors had identified a need for an objective instrument to support staff and inform their course design, and have determined that a rubric is an appropriate tool. They chose an existing rubric and adapted it to act as an instrument to guide staff in the initial design of their online or blended course and to act as a tool for review and evaluation.

The rubric covered both the technical and the pedagogical aspects, informed by international and New Zealand educational research and is adapted for the authors' New Zealand and institutional contexts. Adhering to the rubric's criteria at their highest levels should result in an online course that is well-organised, provides adequate learner support, is activity-based, includes collaboration and building of learning communities, has appropriate alignment of activities and tools and focuses on the learners, not content, as well as preparing learners for the 21st century.

The authors recognise that this form of assessment only assesses course readiness before course delivery. It does not measure the quality of online facilitation that occurs during delivery.

4 Future work

To ensure the ongoing refinement of the rubric, the authors will consult with the Innovation in Teaching & Learning group and other teaching experts within the authors' institution.

The authors will examine improvements to usability, making the review process easier.

The objectivity of the rubric will be validated by having different user groups evaluate an existing course with the rubric.

The rubric will be disseminated to other NZ ITPs as part of the validation process and the results collated for a subsequent report.

5 References

Aycock, A., Garnman, C., & Kaleta, R. (2002). *Lessons learned from the hybrid course project.* Teaching with Technology Today, 8(6). Retrieved march, 13, 2009, from http://www.uwsa.edu.ttt/articles/garnham2.htm

Butterfield, S., (Ed) (2002). Highways and Pathways: The Report of the E-Learning Advisory Group. URL: http://cms.steo.govt.nz/NR/rdonlyres/3B455FA8-586B-447B-A239-75C523841021/0/highwaysandpathways.pdf), retrieved January 20, 2008

Dede, C. (2005). *Planning for Neomillennial Learning Styles: Implications for Investments in Technology and Faculty.* In D. G. Oblinger & J. L. Oblinger (Eds.), Educating the Net Generation. EDUCAUSE. Retrieved January, 26, 2008, from http://www.educause.edu/PlanningforNeomillennialLearningStyles%3AImplicationsforInvestmentsinTechnologyandFaculty/6069.

e-Learning Guidelines. (2006). *Guidelines for the support of e-learning in new Zealand tertiary institutions,* Retrieved March ,13, 2009, from http://elg.massey.ac.nz/Guidelines-questions.pdf

Freed, K., (1999), *A History of Distance Learning: the rise of the telecourse*.Retrieved March 13, 2009, from http://www.media-visions.com/ed-distlrn1.html

Fulford, C., & Zhang, S. (1993). *Perceptions of interaction: The critical predictor in distance education*. American Journal of Distance Education, 7(3), 8-21.

Gold, Ph.D., J. (2006). *Rubrics: Effective Assessment Tools for Online Learning.* In T. Reeves & S. Yamashita (Eds.), Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2006 *(pp. 200-204).* Chesapeake, VA: AACE

History of virtual learning environments. (2009). Retrieved March 13, 2009, from http://en.wikipedia.org/wiki/History_of_virtual_learning_environments

Huba, M.E. and Freed, J.E. (2000). *Learner-Centered Assessment on College Campuses: Shifting the Focus from Teaching to Learning,* Needham Heights, Allyn & Bacon.

Jonassen, D. (1998). *Designing constructivist learning environments*. In Instructional Theories and Models (pp. 215-236). Mahwah, Erlbaum.

Klesius, J., Homan, S., & Thompson, T. (1997). *Distance education compared to traditional instruction: The students' view*. International Journal of Instructional Media, 24(3), 207-220.

Laurillard, D. (2002). *Rethinking Teaching for the Knowledge Society*. EDUCAUSE Review, 15-25. Retrieved July 13, 2008 from http://www.educause.edu/ir/library/pdf/FFPIU017.pdf.

Maroulis, J., & Reushle, S. (2005). *Blurring of the boundaries: Innovative online pedagogical practices in an Australian Faculty of Education.* In 17th ODLAA Conference: Breaking the Boundaries: The International Experience in Open, Distance and Flexible Education. Adelaide, Australia. Retrieved July, 13, 2008, from http://eprints.usq.edu.au/629/1/ODLAA2005-MaroulisReushle.pdf.

Mansvelt, J., Suddaby, G. & O'Hara, D. (2008). *Learning how to e-teach? Staff perspectives on formal and informal professional development activity. In Hello! Where are you in the landscape of educational technology?* Proceedings ascilite Melbourne 2008. Retrieved March 13, 2009, from http://www.ascilite.org.au/conferences/melbourne08/procs/mansvelt.pdf

McNeely, B. (2005). *Using Technology as a Learning Tool, Not Just the Cool New Thing*. In D. G. Oblinger & J. L. Oblinger (Eds.), Educating the Net Generation. EDUCAUSE. Retrieved March 13, 2009, from http://www.educause.edu/Resources/EducatingtheNetGeneration/UsingTechnologyasaLearningTool/6060.

Nielsen, J., (2000). *Designing Web Usability: The Practice of Simplicity*, New Riders, Indianapolis, Indiana

Popham, W. J. (1997), *What's wrong – and what's right – with rubrics.* Educational Leadership 55(2) October, pp.72-75.

Ramaley, J., & Zia, L. (2005). *The Real Versus the Possible: Closing the Gaps in Engagement and Learning.* In D. G. Oblinger & J. L. Oblinger (Eds.), Educating the Net Generation. EDUCAUSE. Retrieved March, 13, 2009, from http://www.educause.edu/Resources/EducatingtheNetGeneration/TheRealVersusthePossibleClosin/6064?time=1237096150.

Ravenscroft, A., & Cook, J. (2007). *New horizons in learning design*. In H. Beetham & R. Sharpe (Eds.), Rethinking Pedagogy for a Digital Age: Designing and delivering e-learning (pp. 205-218). Routledge.

Roblyer, M.D., and Ekhmal, L. (2000). *How Interactive are YOUR Distance Courses? A Rubric for Assessing Interaction in Distance Learning*. DLA 2000 proceedings, Callaway, Georgia

Rosenberg, B. (2007). *What's Needed for E-learning to Take Off? Designing a Suitable National and Institutional Policy Runway*. Journal of Distance Learning, 11(1), 6-17. Retrieved January 15, 2008, from

http://uctl.canterbury.ac.nz/uctl/files/staff/07final_Rosenberg.pdf.

Seitzinger, J. (2006, July 31). *Be Constructive: Blogs, Podcasts, and Wikis as Constructivist Learning Tools*. Learning Solutions e-Magazine. Retrieved from http://www.elearningguild.com/pdf/2/073106DES.pdf.

Smith, C. K., (1996, May). *Convenience vs. connection: Commuter students' views on distance learning,* Annual Forum of the Association for Institutional Research, Albuquerque, New Mexico. (ERIC Document Reproduction Service No. ED 397 725)

Zhang, C., & Fulford, S. (1994). *Are interaction time and psychological interactivity the same thing in the distance learning television classroom?* Educational Technology, 34(6), 58-64.

Zirkin, B. & Sumler, D. (1995). *Interactive or non-interactive? That is the question! An annotated bibliography.* Journal of Distance Education, 10(1), 95-112.

Owing to document limitations only the categories and the primary criteria of the adapted rubric have been provided in Appendix A for reference.

6 Appendix A

Adapted CELT rubric to Aid and Review Design of Blended and Online Courses

1. Learner Support & Resources
Links to information for online learner support and links to campus resources. • Library, link • Ref to Learning Services • How to get help
Programme & course specific resources are provided. • Textbooks/ readings • Programme information • Learning objectives • Contact information: teacher, school, programme
Access is provided to resources to support course content • software, • plugins • important websites, • databases needed • instructions on how to use the above
Students provided with information on the role the online environment will play in the course.
There is opportunity for students to give feedback on the ease of use of the online technology and the accessibility of the course.
2. Online Organisation & Design
Course structure • construction of course complete • clear layout • easy to navigate
Visual Design • useful headings, bullet points and keywords • colours & fonts create clarity • images are of appropriate size
Organisation of Information File Management • files are organised into folders for easy retrieval and updating • file names describe file content Resource Management • resources on course page(s) organised and consistent
Presentation of text in the course • Text is of appropriate length for its function (preamble is short, does not take up course page real estate) • Text is of appropriate size (headings are not too big) • Emphasized text is either bold or in colour (not in all caps or underlined) • Scanned text is of high quality • Where possible, text is chunked into short paragraphs
Learning resources Can be downloaded Are available in different formats (ie podcast plus transcript)
All resources used in the course adhere to copyright policy (documents, articles, videos, images, audio files, animations, etc)
3. Instructional design & delivery

Interaction / communication opportunities between student and : • lecturer • peers • content • technology • environment (work/life)
Description of learning objectives within course i.e. Topical learning objectives are defined
Alignment of learning objectives & learning activities
Mix of learning activities cater for variety of learning styles • visual, textual, kinaesthetic, auditory • neomillenial or 'digital native/immigrant' • others
Learning activities are directly related to assessment activities and provide student with aid for assessment.
Critical thinking & reflective activities
Problem- or project-based activities
Learning activities for collaboration and/or sharing and co-construction of knowledge are used throughout the course
Motivational activities or techniques are used throughout the course
Course is learner-centred. Learner has choice in • Projects/Activities • Negotiation of learning goals • Time and place/tool of participation • Application of learning to own context
Instructor uses both formal and informal student feedback on an ongoing basis in planning of instruction and assessment
Course aids in the development of 21st century skills
4. Assessment and Evaluation of Learning

Assessment of student readiness (for mode of delivery and course content)
Opportunities for students to receive feedback from teacher about their own performance
There is opportunity for student self-assessment and/or peer feedback opportunities
There is opportunity for students to give feedback to faculty on course content and tools.
Assessment format chosen is best fit for course content and learning environment eg • Authentic assessment techniques like portfolios, online collaboration, project-based work • Automated quizzes • Use of online tools for assessment
5. Innovative Teaching with Technology
Use of appropriate and/ or varied technological tools
A variety of multimedia elements and/or learning objects are used and are relevant to accommodate different learning styles throughout the course.
The course uses the internet as a resource to effectively engage students in the learning process in various ways throughout the course
Development of digital literacy is encouraged through use of internet, online databases and other information resources