Effort Estimation Techniques for the Content Development of E-Learning Application

[1]Nara Sreekanth, [2] Dr. R P Singh
[1]Research Scholar, 2 Research Guide
[1]SSSUTMS, Sehore,India, [2]SSSUTMS, Sehore,India

_____

Abstract— **E-Learning provides the analytical study of the different effort estimation techniques that help the estimators to identify the different phases of the content development process where the particular estimation technique can be applied. This study analyzes the various software engineering methods, approaches and models which are used to estimate the effort for the content development of the educational projects in the e-Learning domain. The design and development of the content require the expertise inputs from the different fields like subject matter experts, instructional designers, graphic designers and programmers. here is no set of software development life cycle process where the typical functionality based estimation models like function point analysis The software as it has been developed so far, and the forms of interface needed, are being evaluated with practitioners to determine the extent to which it meets their needs and expectations, and achieves the intention of enabling them to develop further their conceptions of learning and teaching.**

IndexTerms— Learning Design, Estimation Techniques, Content Development
_____

I.INTRODUCTION

The use of digital technologies is now widespread and increasing, however isn't perpetually optimized for effective learning. Teachers in education have very little time or support to work on innovation and improvement of their teaching, which frequently means that they simply replicate their current practice in a digital medium. Here we makes the case for a learning design support environment to support and scaffold teachers' engagement with and development of technology increased learning, based on user requirements and on pedagogic theory. To be able to adopt, adapt, and experiment with learning designs, teachers need a theory-informed way of representing the critical characteristics of good pedagogy as they discover how to optimize learning technologies.

We explain the design approach of the Learning Design Support Environment project, and how it aims to support teachers in achieving this goal. The project described here is designed to promote the use of digital technologies for learning and teaching in higher education, in a way that better exploits what they can do for the lecturer's own context. Recognizing that academics are usually not trained as teachers, and that they are given little time or support to learn about either conventional teaching or learning technologies, we have set out to investigate the extent to which a specially developed computational environment could support the process of designing conventional, digital, and blended learning.

II.ELICITING PRACTITIONERS' CONCEPTIONS OF LEARNING DESIGN

For any design tool to have value for practitioners, it must at least support and facilitate the ways in which they set about their normal practice, even though the aim is to enhance it. Our research study therefore began with extensive interviews with ten 'informant practitioners' (IPs) in order to elicit their conceptions of learning design, and to probe further the findings from previous studies. IPs were selected for having at least 5 years experience in learning and teaching and the use of TEL, and from roles that represented subject lecturers, staff developers, and learning technologists, summarized in Table 1.

These criteria placed the selected IPs in a strong position to provide us with a comprehensive range of user requirements, and to articulate clearly the requirements of early-career lecturers or of seasoned academics who have not yet engaged with TEL. For *The Learning Designer* to scaffold teachers from current practice to optimal practice, it is important to have a good model of what the latter should be, and to be aware of what users might find difficult, or the misconceptions they may hold.

ID	Role	Teaches students
IP1 (M)	Manager of learning technologists	PhD only
IP2 (M)	Staff development; director of PGCHE	Y
IP3 (F)	Subject lecturer	Y
IP4 (M)	E-learning consultant	
IP5 (M)	Subject lecturer	Y
IP6 (M)	Lecturer in professional development	Y
IP7 (F)	Subject lecturer, project officer in HEA subject centre	Y
IP8 (F)	Manager of learning technologists; staff development background and PGCHE	
IP9 (F)	Lecturer in academic skill development and business studies	Y
IP10 (M)	Subject lecturer; director of online MSc course	Y

Table 1 Informant Practitioners Recruited In The First Year Of The Project.(HE, higher education; HEA, higher education academy; PGCHE,post-graduate certificate of higher education.)

They were analyzed by one researcher on the basis of the themed questions, to generate a broad set of practitioners' conceptions of learning design, and to provide detailed information for user scenarios for designing the interface. Three other members of the team collectively reviewed this distillation of categories and quotes, to ensure computational interpretability, and the interface designer then took the user requirements analysis and scenarios to specify the detailed graphical user interface architecture. The following sections summarize the critical requirements elicited from this group of target users that relate to their conception of the learning design process.

III. Formal representation of a learning design

Learning design has been represented computationally through the IMS LD specification in order to provide a pedagogically neutral form of representation that identifies actors, roles, and a sequence of activities, without any imposition of theory or evaluation. This creates the opportunity for the creation and sharing of designs, but does not in itself assist the evaluation and improvement of the designs.

That can only be done by implementation in practice, with evaluation data being collected and analysed by the designer in a separate process.

The information recorded in a learning design that conforms to the IMS LD specification does not need to capture or analyze the pedagogy. However, a learning design support environment has to represent a learning design in a more explicit way, in order to be able to evaluate the pedagogical properties of that design. The properties required are is represented in table 2

Learning outcome	To develop the skills of interpretive pluralism	
Sequence of activities		Time
Tutor presentation	1. Read/view the text/presentation illustrating the importance of interpretive pluralism	10
Resource-based individual activity	2. On your own explore multiple perspectives from an archaeologist, a classicist, and a modern historian on the origin, purpose, meaning, and references of the Altar of Pergamon, and note down the key points made.	30
Individual practical activity	3. On your own, answer the factual MCQs about the origin, purpose, meaning, and references of the Altar of Pergamon, where the feedback will refer you back to the different interpretations. Summarize the different interpretations.	15
Small group discussion	4. In pairs discuss your summaries of the different interpretations and note down your agreed summary of the differences between them	35
Group activity	5. Discuss with the whole group the ways to interpret and evaluate multiple interpretations, making use of your notes from the previous activity	10
Total learning time in minutes		100

Table 2 A text-based representation of a learning design for a topic-specific learning outcome

• *Learning outcome*, *sequence of activities*, and *assessment*. These must be aligned for effective pedagogy
• The *sequence of TLAs*. These must be classifiable according to their different pedagogical and logistical properties, defined in the knowledge base of *The Learning Designer* (and editable by the user).
• The *time* for each TLA. This makes it possible to estimate the proportions of different kinds of learning experience afforded by the sequence, and hence, provide an overall evaluation of its pedagogic value.
• The *tools and resources* required by the learners. These alert the user to the type of topic-specific content they will need to provide for their specific instantiation of the learning design.
• The *designer's reflection*. This provides an opportunity for the user who is sharing the learning design to pass on any additional reflection to potential reuses.

Visual representation of a learning design

The visual representation of a learning design is intended to give the user some purchase on how well their design is shaping up. Because we can assign to the components of the learning design formal definitions based on the educational literature, it is possible to make them interpretable by *The Learning Designer* software. For example
• A 'tutor presentation' is defined as providing a learning experience that is 100% learning through acquisition.
• A social constructivist type of 'small group discussion' is defined as providing 90% learning through discussion, and 10% learning through acquisition, where proportions depend on the group size.
• A collaborative learning group activity is defined as providing 10% learning through acquisition, 20% learning through discussion, 40% learning through practice, and 30% learning through production, where again the proportions depend on the group size.

IV. RESULT AND DISCUSSION

The analysis of the learning experience in Table 2 is shown in the middle column of Table 3, where the TLAs (tutor presentation, individual activity, etc.) have been interpreted in terms of their pedagogic properties (such as 90% discussion + 10% acquisition), and these are aggregated across the whole session. Now suppose the user replaces the multiple choice question resource with an online adaptive resource capable of eliciting and prompting reflection on the learner's own construction of their ideas, and then the analysis shows a different distribution of learning type. This will show more emphasis on learning through practice because the learner is developing their own ideas, and less on learning through acquisition, where the learner would be reading about others ideas. The new analysis is shown in the third column of Table 3.

Type of learning	Percentage of time (version 1)	Percentage of time (version 2)
Acquisition	43	27
Inquiry	26	27
Discussion	25	18
Practice	3	18
Production	3	10

TABLE 3 Comparative analysis of the nature of the learning experience provided by two versions of a learning design.

These values are accessible and editable by the user by viewing the properties of their selected teaching-learning activities. This approach is an attempt to capture what the academic community means by effective pedagogy so that it becomes possible to represent pedagogic decisions in an explicit way, and to provide feedback to a user on the learning design they have in mind. We may wish to offer more collaborative learning, smaller group sizes, more active learning at the expense of lectures, etc., and these

are quantitative statements, which can therefore be modeled quantitatively, recognizing that the quantification will be approximate and context specific. Currently, *The Learning Designer* presents this analytical feedback in the form of a pie chart (see Fig 1), which provides a visual impression of the distribution of types of learning, rather than numbers, avoiding an unwarranted precision.

Alternative representations of a learning design

The text-based template is a standard way of representing a learning design, but some projects, such as LAMS and interoperable content for performance, have also developed more graphical forms of representation: viz. diagrams consisting of boxes corresponding to learning activities, linked by arrows to denote the sequence in which they are performed, and color coded to differentiate between different types of activity.

To represent fully the pedagogical properties of a learning design, it is important, as the micro world component M2 suggests, for the user to have access to multiple representations of the underlying properties of the domain model. Given that a learning design plays out over time, we need to include a time-based representation as well. *The Learning Designer* therefore offers the alternative format of a timeline, with defined time intervals for each TLA, e.g. resource-based individual activity, collaborative project, online discussion, etc. Figure 1 shows the prototype version of this form of representation, which has been undergoing evaluation with potential users. Users can select from the palette on the right the types of TLA they want to place on the timeline and adjust the duration by resizing the object.
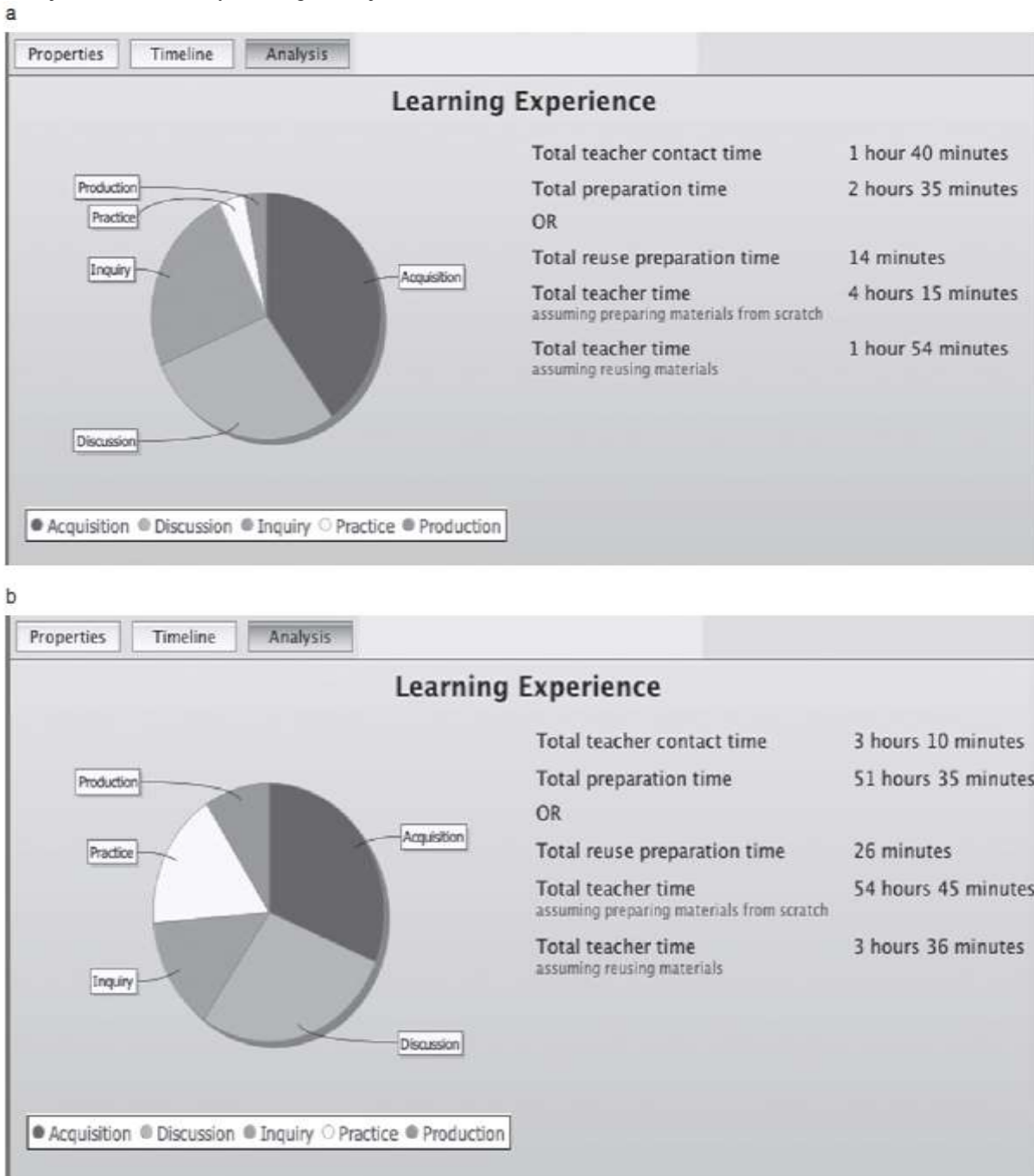

FIGURE 1 A pictorial representation of the analysis of the learning experience the user's design is likely to provide. As the user selects learning activities and timings, *The Learning Designer* calculates and displays the resulting change in the learning experience as a pie chart and estimates of teacher time needed (an adaptive resource requires a lot of preparation), enabling alternative designs

to be compared. When users see a learning design support environment in action, it prompts very detailed comments and reflections on their own current practice. As a device for eliciting user requirements, therefore, the version designed in response to the initial requirements gathering inaugurates a further extensive data analysis and redesign process that will be reported on in later publications. At this stage, the focus is on the intelligibility and acceptability of the approach.

V. Conclusion

The principal aim of the work is to have a positive impact on teacher-designers' practice in designing technology-enhanced learning. We aim to make it easier – and more appealing – for them to draw inspiration from good practice by other teacher-designers, and to gain access to the fruits of scholarly research in their own teaching and learning. We also want to encourage teachers to experiment with new tools and pedagogical approaches in their learning designs, and to engage in critical reflection on their practice in order to evaluate their success in improving students' motivation and learning outcomes.

References

[1]   Dondi, C, Delrio, C. (2006). Technology Osupported lifelong learning: The need for a new vision and implementation models. Proceeding of the 10th World Conference on continuing Engineering Education(WCCEE) April, 19-21, 2006, Vienna University of Technology, Vienna, Austria.

[2]   Cowley, J., Chanley, S., Downes, S., Holstrom, L., Ressel, D., Seimens, G. and Weisburgh, M. (2002). Preparing students for Elearning. Elearnspace, October 14-10, 2002. Creative Commons Licence http://www.elearnspace.org /articles/preparingstudents.htm

[3]   Chang, E. and West, M. (2006). Digital Ecosystems: A Next Generation of Collaboration. Environment for the Digital Networked Economy, integration and Web-based Application and Services, 4 - 6 December 2006, Yogyakarta Indonesia.

[4]   Ximbiotix (2006). Enabling Beneficial Relationships http://www.ximbiotix.com/desktop/the-digital-ecosystem /about-the-digital-ecosystem.cfm

[5]   E. C. (2005). What is an European Digital Ecosystem?, Information Society and Media Directorate-General, Network and Communication Technologies, ICT for Enterprise Networking, Brussels, February 2005

[6]   Brodo, J. A. (2002), Today's Ecosystem of e-learning, Vice President, Marketing

[7]   Collier, G, Piccariello, H, Robson, R. (2004). An Ecosystem Model and Scenario for Higher Education. Issue 21. Available from http://www.educause.edu /ir/library/pdf/ERB0421.pdf [Accessed: 19 September 2006].

[8]   DigitalEcosystems.org,(2006). Digital Ecosystems: The New Global Commons for SMEs and local growth. Available from: www.digitalecosystems. org/doc/papers/d5-intro-for-the-press.pdf [Accessed: 19 September 2006].

[9]   Syntel (2006). Building your own digital ecosystem: a holistic approach to enterprise integration.

[10]   Bandura, A. (1977). *Social learning theory* . Englewood Cliffs, NJ: Prentice Hall. Bixler, B. &   Spotts, L. (2000). *Screen design and levels of interactivity in web-based training* [WWW document]. URL http://www.clat.psu.edu/homes/jds/john/research/ivla1998/ivla98.html(13th June 2003).

[11]   Bloom, B. S. (1956). *Taxonomy of educational objectives, book 1, cognitive domain* . New York: Longman. Bransford, J. D., Sherwood, R. D., Hasselbring, T. S., Kinzer, C. K. & Williams, S. M. (1990). Anchored instruction: why we need it and how technology can help. In D. Nix & R. Sprio (Eds), *Cognition, Education and Multimedia* . Hillsdale, NJ: Erlbaum Associates, 115–141.

[12]   Clark, R. (1999). *Developing technical training* . Washington, DC: International Society for Performance Improvement.

[13]   Clark, R. (2003). *Building expertise. Cognitive methods for training and performance improvement* . Washington, DC: Book of International Society for Performance Improvement.

[14]   Clark, R. & Mayer, R. (2002). *E-Learning and the science of instruction. Proven guidelines for consumers and designers of multimedia learning* . San Francisco, CA: Jossey-Bass/Pfeiffer.

[15]   Vengatesan K., and S. Selvarajan: Improved T-Cluster based scheme for combination gene scale expression data. International Conference on Radar, Communication and Computing (ICRCC), pp. 131-136. IEEE (2012).

[16]   Kalaivanan M., and K. Vengatesan.: Recommendation system based on statistical analysis of ranking from user. International Conference on Information Communication and Embedded Systems (ICICES), pp.479-484, IEEE, (2013).

[17]   K. Vengatesan, S. Selvarajan: The performance Analysis of Microarray Data using Occurrence Clustering. International Journal of Mathematical Science and Engineering, Vol.3 (2) ,pp 69-75 (2014).