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The Integration of Computer-based Training Courses into a

Blended Learning Solution for the Small Organisation

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0. Abstract

This project is concerned with finding a methodology for developing and delivering learning effectively within a blended learning solution for small organisations. Its aim is to provide a practical solution involving more productive use of existing resources. Generic off-the-shelf courseware offers many advantages for a small organisation. The project focuses on how an organisation can get the best value from such courses.

The first hypothesis to be tested was that generic computer-based courses, when used in isolation, do not contain all of the elements that are required to produce a satisfactory learning outcome. To test this a checklist of seventeen criteria was developed based on generally agreed principles on what is required to facilitate learning. The checklist was used to survey fifteen courses. None of the courses surveyed fulfilled all the requirements of the checklist and 80% of them fulfilled seven or less of the requirements. Based on these findings, a solution was proposed to incorporate such courses in a training programme using other training strategies to compensate for the weaknesses identified in the learning effectiveness of the course. A scenario was outlined to illustrate how such a programme might be developed. Strategies for evaluating the benefits of such an approach were outlined.

1. Purpose of Research

There are two research questions posed in the project:

1. Do generic computer-based courses, used in isolation, provide all of the elements that are required to produce a satisfactory learning outcome?
2. Can the learning value of such courses be improved by embedding them in a blended learning solution that is designed to compensate for their deficiencies in the implementation of instructional principles?

The research is directed towards finding practical solutions, firmly grounded in instructional theory, that might be of benefit to small Irish enterprises. Many organisations have invested in programmed CBT courses, but there is evidence that the learning outcomes have not always been satisfactory. This project looks at how to assess if the principles of instructional design have been implemented in generic computer-based courses. It also considers the small organisation can develop its own learning solution using available computer-based courses and combining them with other existing resources in a planned way so as to compensate for identified deficiencies in the courseware.

2.   **Literature Review**

Current research has been investigated under six headings that are pertinent to the work of this project:

- What evidence is there on the effectiveness of computer-based courses in terms of learning?
- Has a synthesis of instructional theory been devised that could form the basis of an evaluation tool for the implementation of learning theory in computer-based courses?
- What are the particular problems or requirements of small Irish companies in relation to e-learning and blended learning?
- What are the research findings in relation to the efficacy of blended learning solutions?
- How can a learning solution be best evaluated for its learning effectiveness?

Much of the criticism of computer-based courses appears to be based on personal evaluation rather than empirical evidence as to whether or not users learn from them. There is little firm evidence as to the value or otherwise of computer-based courses in providing learning. Alessi and Trollip point out that it is difficult to quantify the gains in learning from such courses. Their review of the research suggests that the main areas of agreement on the benefits of computer-based courses relate to timesaving and other logistical benefits rather than any contribution to learning.(Alessi and Trollip, 2001). W. Foshay of Plato Learning Inc maintains that most enterprises use e-learning for predominantly economic reasons and assume effectiveness without any attempt to evaluate it (2001). Summative evaluation of courses has proved to be difficult and rarely attempted (Eseryel 2002).

The first synthesis of instructional theory that gained widespread acceptance and has been the basis for many instructional models is Gagné's Conditions of Learning, first published in 1965. From the 1980s a number of attempts were made to analyse existing theories and incorporate the best of them into large-scale instructional systems. Merrill (2001) has compiled a list of first principles of instructional theory based on a wide-ranging study of theories and models. His first principles correspond to what Riegeluth (1999) describes as basic instructional methods. The premise of his work is that there is a set of principles that can be found in most instructional design theories and models, even though the terms used to describe them may differ. A further premise is that these principles are necessary for effective and efficient instruction and that without them, there will be a decrement in learning and performance.

Merrill (2001) puts forward five first principles and explains a number of corollaries to each of them. The five principles are:

1. Learning is promoted when learners are engaged in solving real-world problems
2. Learning is promoted when existing knowledge is activated as a foundation for new knowledge
3. Learning is promoted when new knowledge is demonstrated to the learner.
4. Learning is promoted when new knowledge is applied by the learner
5. Learning is promoted when new knowledge is integrated into the learner's world

A number of other reviews of research findings on instructional theory were found to be in broad agreement with Merrill's principles. These include the US National Research Council (2000), Michigan Virtual University (2001) and Alessi and Trollip (2001). Merrill' principles also incorporate Gagné's Events of Instruction (Gagné, 1985)

An examination of the Irish SME sector indicates that much of the current debate and literature on e-learning developments has little relevance for the average Irish SME. A survey in 2001 of small Irish enterprises by the Chambers of Commerce Ireland (2002) found that only 12% of the 800 companies surveyed used e-learning on a regular basis although a further 12 % proposed to do so in 2002. 21% of those surveyed indicated that lack of awareness about e-learning products and services was a barrier to increased use of the new technology.

Blended Learning has been described as the 'current orthodoxy within e-learning circles'. (CIPD, 2002). The most widely accepted definition of the term blended learning is the combination of a variety of delivery methods, digital and classroom, for training to produce an integrated learning solution. It has however been pointed out that is hardly a new idea (Ravet, 2003). There are a number of recent studies that suggest that blended learning can be more effective than e-learning on its own. A recent SRI Consulting Business Intelligence survey (2003) found that 70% of respondents found blended learning beneficial. An E-learning Guild survey in 2003 found 73% of respondents felt blended learning was more effective than non-blended learning (E-learning Guild 2003).

A review of the literature on evaluation of learning outcomes revealed some consensus on the need for more development in this area (Clark, 2001, Eseryel 2002). The most commonly used evaluative tool is Kirkpatrick's Four Levels of Evaluation although studies have shown that evaluation generally takes place at level 1 (Eseryel, 2002) which Kirkpatrick states does not provide any evaluation of learning (Kirkpatrick 1996).

3. **Methodology**

The first task of the project was to develop an evaluative tool to assess the learning effectiveness of generic computer-based courseware. The aim is not to assess or grade particular courses but to see if a pattern can be identified which indicates the general strengths and weaknesses of such courses in terms of providing an effective learning experience.

The first principles as enunciated by Merrill formed the basis of the evaluation as it offered the most comprehensive set of criteria and is based on a wide-ranging analysis of current research in learning theory and instructional models (Merrill, 2001). A number of his criteria were reworded or added to, taking account of other analyses of the requirements for effective learning such as the US National Research Council (2000) findings.

The following 17 criteria based on Merrill's five First Principles were used to assess the courses:

Problem-centred
- Gain learner attention
- Show task or problem
- Specify what learner needs to know and do
- Provide progression of problems

Activation
- Stimulate recall of prior learning or experience
- Provide relevant experience
- Encourage recall of structure
- Provide an opportunity to demonstrate previous knowledge or skill

Demonstration
- Show rather than tell, using methods consistent with content
- Provide learner guidance
- Use relevant media
- Provide practice and assessment consistent with objectives
- Provide diminishing coaching
- Use new knowledge to solve varied problems
- Promote development of metacognitive skills

Integration
- Provide opportunity to demonstrate new knowledge or skill
- Provide opportunity to explore new and personal ways to use the new knowledge or skill.

This checklist was used to assess fifteen courses, which were randomly selected. Five courses are demonstrations offered by companies to illustrate their product and the remainder are available on the Internet free of charge. They are all programmed as opposed to presentational courses. Presentational tutorials impart information, as for example through PowerPoint presentations, while programmed courses are designed to instruct by guiding or controlling how the information is assimilated.

All but one course was accessed via the Internet, although some of them are also available on CDROM. The courses are all straightforward tutorials, without any tutor support or other collaborative mechanisms that can be offered via the Web. Ten courses were in IT, covering general topics such as how to use the Web or tuition in specific applications. The other courses covered Finance and Accounting, Health, and Life Skills. The courses are listed in Appendix A of the project.

At least one module or unit of each course was completed. It was assessed against each item in the checklist to establish if the criterion has been fulfilled. There was no effort to grade the standard reached in each criterion. The purpose of the exercise was to establish if each instructional element was present rather than how well it was accomplished. The actual quality of each of these courses is not measured in this study, simply the existence of the various components listed in the checklist.

The results obtained (see data analysis section) suggest that computer-based courses are not likely to provide a complete learning solution when taken in isolation.

4.   Proposed Solution

Generic computer-based courses have many obvious advantages for a small enterprise that cannot realistically develop its own courseware. E-learning companies can provide a level of professionalism in all aspects of course production that could not be matched by a small organisation. It is proposed that in devising a training package those parts of the programme for which appropriate off-the-shelf training is available should first be identified. Courses should then be evaluated in terms of the criteria specified above and then other strategies should be looked at to fill the gaps identified in the learning potential of the courses. In this way, the courses can be customised to suit the organisation's particular needs by being embedded in a specially designed training programme.

A number of alternative training strategies can be identified to fulfil each of the seventeen criteria. These are elaborated in the project and a scenario is outlined to illustrate how such a training programme could be implemented. The other training resources available to the organisation – classroom facilities, Internet or intranet availability, subject matter experts etc, will determine the nature of this training programme. It may not necessarily require additional resources beyond those already used in training. The combination in a structured way of existing resources and off-the-shelf courses can serve to increase the effectiveness of both.

5.   Data Analysis

Results of Evaluation of Courses:

Criterion	Number of courses in which it was found
Provide practice and assessment consistent with objectives	15
Specify what the learner needs to know or do	14
Show content using methods consistent with nature of content	11
Show task or problem	9
Use relevant media	7
Provide learner guidance	6
Stimulate recall of prior learning or experience	5
Gain learner attention	5
Provide relevant experience	4
Provide diminishing coaching	4
Use new knowledge to solve varied problems	4
Promote development of metacognitive skills	3
Provide a progression of problems	3
Provide opportunity to demonstrate previously acquired knowledge or skills	2
Provide opportunity to demonstrate new knowledge or skill	1
Encourage recall of structure	0
Provide opportunity to explore new and personal ways to use the new knowledge or skill	0

Looking at the individual courses, the highest number of criteria filled by any one course was 11 out of 17. One course scored 9 and one scored 8. The remaining 12 courses (80%) scored between 4 and 7.

6. **Conclusions**

The results of this pilot survey confirm the first hypothesis of this project, that generic computer-based courses do not contain all of the elements that are required to produce a satisfactory learning outcome. It must be emphasized that this is a very small-scale survey and the results would need to be validated by a much larger study. However, the results obtained are sufficiently conclusive to suggest that computer-based courses are not likely to provide a complete learning solution.

The principles of instruction underlying the checklist used are supported by a great deal of research but work continues to identify the empirical support that underlies each principle (Merrill, 2001).

Validation of the second hypothesis requires a method of assessing whether learning was increased by the embedding of an off-the-shelf course in a

blended solution designed specifically to complement the attributes of the course. This could not be undertaken in the project and there are practical problems for a small organisation in carrying out such an evaluation. A number of possible methods were explored including comparing a group that completed the blended learning solution with another taking the computer-based training on its own.

The finding that many computer-based courses are inadequate in providing effective learning suggests that much work needs to be done to improve such courses. The solution proposed in this project is offered on the basis that in practical terms organisations cannot wait until such improvements take place. It is based on the premise that existing courses, although flawed, can be useful if provided with supplementary features. Another area of research would be to look at the production processes for computer-based courses and identify why so many fundamental learning strategies are not used.

The solution proposed here indicates a general strategy that could be pursued to extract the greatest possible learning value from generic courses. Its effectiveness in improving learning has not been validated but some of the issues involved in performing such a validation have been discussed. This is an area in which further research needs to be done.

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