Problem Centric Objectives for E_Learning Modules

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Abstract

Sharable Content Object Reference Model (SCORM) is in vogue for developing and launching courses in E_Learning environment. After the introduction of several Information and Communication Technology (ICT) based courses, launched in E_Learning environment, conflict with respect to same course contents of different nomenclatures, has led to misunderstanding of individual course objectives. Course Objectives play an important role in the TeachingLearning process of Technical courses, in particular to ICT courses offered in the E_mode. This paper as a result of a few research studies, attempts to explore the application of Problem Centric approach for specifying Instructional objectives for such conflicting courses. As a case study, the paper presents a survey report, derived through a Ph.D research work, using feedbacks on course objectives, for two conflicting courses, namely M.Sc (CS) and MCA courses. Feedbacks were obtained from both Academic experts as well as Managers of ICT Industries. Concluding remarks have been drawn from both the feedbacks received on the Instructional objectives of these courses.

I. INTRODUCTION

Instructional design for any specific course is a construct referring to the principles and procedures by which instructional materials; lessons and whole systems can be developed in a consistent and reliable fashion (Acker, S.R., Pearl, D.K., Rissing, S.W., (2003)). The principles and procedures can be applied to guide designers to work more efficiently while producing more and appealing instruction, suitable for a specific course. Instructional design is a field of theory and practice, involving the design and implementation of a curriculum for a specific course. Hence the Instructional design for a specific course must reflect the Objective of that particular course.

Louisiana State University (2005) has presented Bloom's taxonomies in a pyramidal representation for Instructional design, as presented by Fig 1

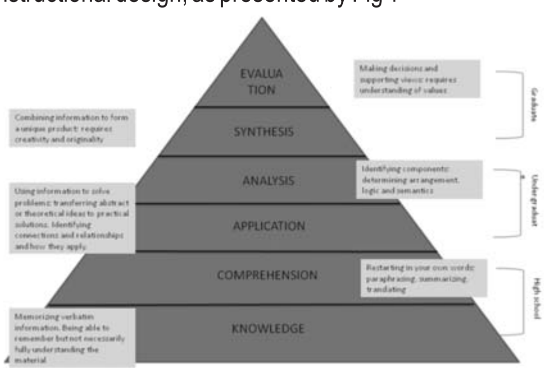


Fig 1. Bloom's Traditional Learning Domain (Cognitive)

Generally the syllabus of any ICT subject is designed according to this model, namely the easier portions are covered in the lower Units while tougher portions are kept in higher units and so on (see Fig 2).

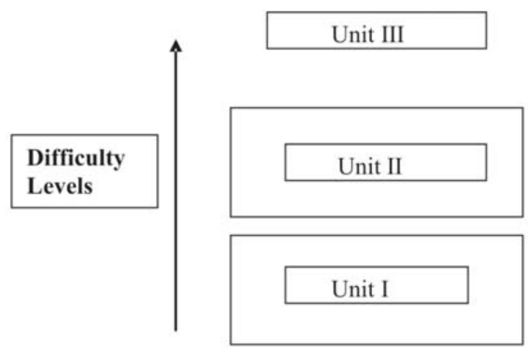


Fig 2. Traditional Learning Hierarchy

One could notice the correlation between Figs 1 and 2.

Some of the Instructional design theories available are listed: Cognitive Education, Open Learning Environment, Constructivist Learning, Learning by Doing, Collaborative Problem solving, Problem-Based Learning, Problem Centric Instruction etc.,. These theories are not mutually exclusive, but overlap and often have a number of common elements. David Merrill's model of Instructional design is recommended for the design of Computer related courses, as it is based on Information Processing Theory and it is Problem Centric (Nordhoff, Helga I 2002). Problem Centric Instruction is hence most suitable for courses of Engineering Technology and Applied Science, in particular to ICT.

David Merrill's Model

Merrill divides the instructional event into four phases, namely Activation, Demonstration, Application and Integration. Central to this instructional model is a real-time Problem (Merrill, M. David (2002)). The model is shown in Fig 3.

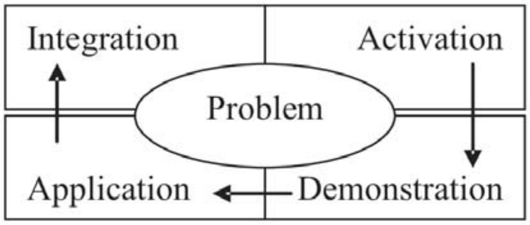


Fig 3. David Merrill's Instruction Model

Each phase is explained below

- **ACTIVATION** - **Activating Ability -** To recall the prior knowledge or experience and create learning situation for the problem. In other words, to activate the mental model for the problem.
- **DEMONSTRATION** - **Demonstrative Ability -** To demonstrate or show a model of the skill required for the problem.
- **APPLICATION** - **Problem Solving Ability -** To apply the skills obtained to the problem.
- **INTEGRATION** - **Analytical and Synthesizing Ability -** To provide capabilities and to show acquired skill to a new situation.

Each phase or taxonomy is used for defining the required course objective. Each phase or taxonomy is termed as 'Competency' or 'Ability' in this paper, as each one refers to a specific ability or skill in any problem centric subject. As stated earlier, these abilities may be subjected to analyses, for their presence or for the requirement there of, for a specific course, so as to describe it's Instructional Objectives.

SCORM

Sharable Content Object Reference Model (SCORM) is a collection of standards and specifications of web based E_learning. It defines communications between client side content and a host system called the runtime environment (commonly function of a learning management system). SCORM also defines how content may be packaged into a transferable ZIP file. SCORM published by the Advanced Distributed Learning (ADL) project, is a de_facto standard for E_learning content (Sum Total Systems (2005)). SCORM is an XML based framework used to define and access information about learning objects, so they can be easily shared among different Learning Management Systems (LMS). Some advantages of SCORM are: Published once, pay everywhere; Content can last longer because it is easier to justify ongoing compatibility with standard content.

SCORM Modules using Merrill's Approach

Institutionalized Science as well as Technical Stream is offering same or similar disciplines under different nomenclature. For example, Computer Science and Computer Application streams are offering similar courses, such as M.Sc (CS) and MCA. Several computer-related subjects of the same nature are being adapted and followed in these two courses. They are being offered virtually without any modification in their respective subject contents. This has resulted in lack of prescription of “Objectives” for a specific course, in particular with respect to its levels of competencies (Doyle, E. (2001)). It is found that the unit content and list of reference books of many subjects of these streams are exactly the same in many cases. For example, it is found that the unit content and reference books for the subject “C Language” is the same for these courses. It would be erroneous if such subject modules are designed through SCORM and launched with the same module for two different courses in an E_Mode.

From the elaboration of Merrill's approach in Instructional design and SCORM model in E_Learning, it is clearly demonstrated that subject contents in the form of Concepts or Problems designed as per Merrill's approach, would easily fit in SCORM, when the subject is launched in E_Mode. However, the course objective should be well defined, especially in conflicting courses such as M.Sc (CS) and MCA. Each concept or problem of the subject module should be based on Merrill's approach as shown in Fig 4.

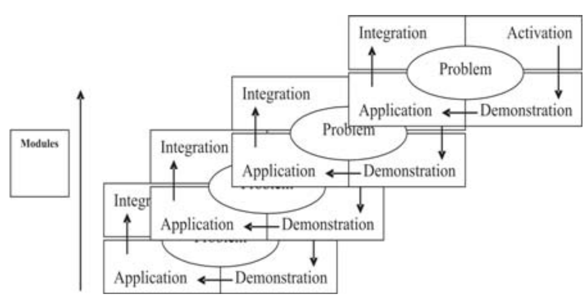


Fig 4. Model for E_Learning Environment in SCORM

Case Study

The case study elaborated in this paper aims at arriving at the percentage of the four phases (taxonomies) of the Merrill's model, for the two conflicting courses viz., M.Sc (CS) and MCA offered in E_Mode. The intended study is social in nature and a survey with interview schedule was designed for obtaining feedbacks. The sampling is based on 'Purposive Sampling' referred in by Sharma B.A.V. (1963). The purposive sampling is selected by some arbitrary method, because it is known to be representative of the total required data, or it is known that it will produce well-matched groups.

The number of samples considered is listed below:

Total number of respondents:

i) Academia = 85

ii) ICT Industries = 120

iii) Regions covered = In and around Chennai

iv) Courses considered = M.Sc (CS) and MCA

The study is limited to the Cognitive Domain of Pedagogy and within the purview of Merrill's taxonomies. In addition, the study is restricted with several other limitations, which are listed below:

- ❖ Respondents would be from the State of Tamil Nadu
- ❖ Courses considered are to be offered through E_Mode
- ❖ Two conflicting courses viz., Computer Science and Computer Application are considered
- ❖ The Interview schedules are limited to respondents selected from two groups, viz., Academia and ICT Industries.
- ❖ The instrument for the Interview schedule was designed in such a way, that the responses to the feedbacks would be directly indicating the required levels of competencies in percentage for both the courses.
- ❖ David Merrill's taxonomies would be considered as the required competencies.

Interviews were conducted with both types of respondents, ie., from Academic experts and captains of ICT Industries. The feedbacks were directly fed in a Statistical Analysis package (SPSS (2000)) and the final results are tabulated and debated next.

Analysis and Interpretation of Results

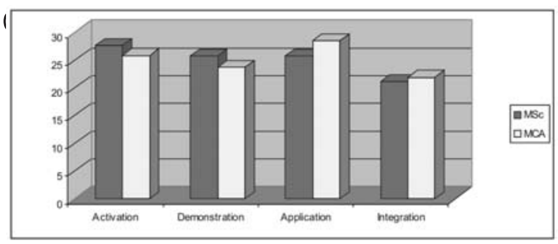
Academic Respondents:

Table 1 and Chart 1 give the average value for each competency needed for MCA and M.Sc (CS) courses, as received from the respondents belonging to Academia.

Table 1. Responses from Academia

Abilities (Problem Centric)	MCA %	M.Sc %
Activation	25.8	27.66
Demonstration	23.61	25.76
Application	28.47	25.76
Integration	22.14	21.14
Total	**100**	**100**

The values are re produced in the form of a Chart.



It is evident from the results shown, that the difference between the two courses and the difference among all the required abilities do not seem to have much gap. The maximum required competency is 'Application' in the case of MCA, as expected from the course title itself, while the minimum required competency is 'Integration' for the same course. However, the maximum required ability is 'Activation' for the M.Sc (CS), while the minimum required is 'Integration' for this course. The academicians have expressed that, "…. while MCA is a terminal course, M.Sc (CS) pass outs could go in for teaching jobs and hence 'Demonstrating' ability is emphasized to a great level".

Industry Respondents:

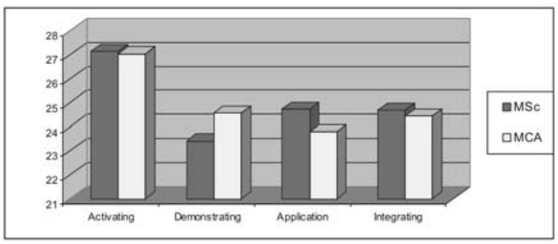
Table 2 and Chart 2 give the average value for each competency needed for MCA and M.Sc (CS) courses, as received from respondents belonging to Industries.

Table 2. Responses from Industries

Abilities (Problem Centric)	MCA %	M.Sc %
Activation	27.03	27.14
Demonstration	24.57	23.40
Application	23.78	24.71
Integration	24.42	24.67
Total	**100**	**100**

The values are re produced in the form of a Chart.

Chart 2. Responses from Industries.



The findings from the Industry (respondents) look strange and interesting. Although the maximum required ability for both the courses is 'Activation', contrary to the previous report, the 'Application' ability is needed to be more for M.Sc (CS) than for MCA and 'Demonstrating' ability should be vise versa. When this strange contradiction was pointed out to the respondents, they indicated the following reasons: "….The MCA pass outs had more Analytical/Verbal and Mental abilities and may hence be placed in in-house Training divisions of the concerns, so as to enable them in imparting better training to programmers Hence the responses".

From the above analytical studies, some important conclusions and recommendation have been derived and presented.

Concluding Remarks and Recommendations

- ❖ Conflicting courses in E_Mode must clearly define their individual course objectives in their respective curriculum.
- ❖ David Merrill's model may suite well for designing Instructional objectives for ICT related courses.
- ❖ The combined results show that, the maximum required ability from both the courses should be 'Application'.
- ❖ Curriculum for M.Sc (CS) needs to stress more 'Demonstrative' ability, so as to enable the pass outs to incline for teaching jobs.

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