Chapter 4
Syllabus Coverage Evaluation in Test Paper Models

ABSTRACT

A syllabus is a detailed instructional plan of materials, resources, teaching methods, and evaluation plans primarily designed to inform the students about the standards, requirements, and learning outcomes expected out of them in the course. It also expresses an "informal agreement" between the instructor and the students in completing the delivery of the content of the syllabus throughout the course. A syllabus also informs the coverage of contents to other educational institutions so that they can determine if it is equivalent to a similar one offered at their institutions. A modularized syllabus contains weightages assigned to different units/modules of a subject. Different criteria like Bloom's taxonomy, learning outcomes, etc. have been used for evaluating the syllabus coverage of a test paper.

RELATED WORK

Bloom's taxonomy has been commonly accepted as a guideline in designing reasonable examination questions belonging to various cognitive levels. The hierarchical models of Bloom's taxonomy are widely used in education fields for constructing questions, for distributing questions across different cognitive levels of taxonomy and for achieving student cognitive mastery (Swart, A.J. 2010; Starr, C.W., Manaris, B. and Stalvey, R. H. 2008; Jones, K. O. and Harland, J. 2009; Yusof, N. and ChaiJ, H. 2010 & Scott, T. 2003).

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Learning outcomes (O'Neill, A., Birol, G. and Pollock, C. 2010) illustrate what learners will be able to do on achievement of a particular learning experience. Providing with well- articulated learning outcome in a subject avoids students uncertainty and anxiety about what they are expected to know, assists students to prepare for assessment and allows instructor to design assessment questions that are in alignment with the intended learning of the subject. For course learning outcomes to be a useful tool for guiding student learning, these learning outcomes must list not only the modules that students will be responsible for learning in the course but also the cognitive level at which the students will be assessed for each of these modules. 0ne benchmark currently used to rank the cognitive level of learning outcomes is the cognitive domain of Bloom's taxonomy. The implemented tools were able to compare the learning outcomes and the examination questions of the subject, investigating whether the cognitive skill level of each learning outcome as written matched the level at which it was assessed (Wen-Chih, C. and Ming-Shun, C. 2009; Thompson, E., et.al.2008). To the best of our knowledge, existing work in test paper evaluation has failed to assign priority to the unit-weightages/module weightages while computing syllabus coverage of a test paper. Hence, we have focused on the problem of evaluating syllabus coverage of an examination test paper by analyzing the questions on different criteria such as the unit-weightages, taxonomy, learning outcomes, etc. Partition-based grouping algorithm has been designed for handling multiple conditions in the grouping problem of syllabus coverage evaluation.

Syllabus coverage evaluation adopts a similarity coefficient-based comparison of questions of a test paper against the university prescribed syllabus file in order to verify the effectiveness of an examination test paper for theoretical courses such as software engineering, information technology, etc. Each unit/module in the syllabus file is given a weightage that corresponds to the number of lecture hours to be allotted to the instructor to teach that unit. The weightage also indicates the importance assigned to that unit which is used by the instructor to decide on the depth to which the topics in that unit should be covered, considered by the paper-setter to decide on the allocation of marks under each unit and used by the students to allocate time-schedule for each unit while preparing for an examination. Similarity measure is computed using a similarity matrix which is a two-dimensional matrix representing the pair-wise similarity of keywords of question content with keywords of unit/module content. Text pre-processing techniques are used for extracting the keywords from question content and unit content. In this chapter, two different approaches have been considered for syllabus