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PBL Approach: A Model for Integrated Curriculum

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Abstract

This paper describes the process of developing a generic model for integration across the curriculum. Authors have introduced PBL approach in order to design the course work for the integrated curriculum in Science and Technology Education in the Teacher Education Programme. In this research the authors have envisaged a conceptual framework for implementation of integrated curriculum. The PBL approach has been implemented in a teacher education course for both online and on-campus students. This is a work in progress the model is still being developed. In this paper the authors have presented the process of redefining the conceptual framework for the integrated curriculum design through implementation, evaluation and reflection.

Curriculum Integration vis a vis Problem Based Learning Process

Curriculum integration in schools and the professional development for curriculum integration has been introduced in schools and training institutions in New Zealand since 1999. The TKI (Te Kete Ipurangi - The Online Learning Centre) website provides a discussion forum for teachers and educators on curriculum integration. A reference lists and frequently asked questions on curriculum integration is available at this site (TKI). Response to the question of "What is Curriculum Integration?" Nolan and Harwood provided the following explanation: Curriculum integration is the process of experiencing and understanding connections and, because of this, seeing things whole. James Beane (1997) identifies four aspects or meanings of integration thus defined which can and, we would agree should, feature at some point in any programme that might claim to be truly integrative. These are integration of experience, social integration, integration of knowledge (and skills) and integration as curriculum design. In this paper the authors focused on the aspect of integration from all these prospective and tried to generate a generic model for curriculum integration.

A model showing the relationship between the integrative curriculum and teaching-learning continuum (adapted from Brown & Nolan, 1989) has been developed (fig.1). Authors have realised that in order to train pre-service teachers of primary education to be able to implement the curriculum integration across different subject areas and create constructivist learning environment, which are student centred and inquiry based we (teacher education institutions) need to make changes in our curriculum planning, instruction and the evaluation procedures in our teacher education programmes. Through extensive survey of literature and from the experience of teaching in different teacher training institutions the authors have came to the conclusion that going through the process of problem based learning would provide the students of teacher education programme with the first hand experience of

curriculum integration as well as solving a real-life problem in a collaborative learning environment. Students will then be able to make sense of the aims of curriculum integration.

Fig.1: Integrated Curriculum and Teaching-Learning Continuum

Integration through correlation between subjects 1	→	Integration through common themes and ideas 2	→	Integration through the practical resolution of issues and problems 3	↔	Integration through student-centered inquiry 4

General aims of curriculum integration are:

- To develop children's independence and interdependence as efficient and motivated learners.
- Enable children to perceive the curriculum as relevant to their learning needs.
- Acknowledge that attitudes and values play a pivotal role in exploring concepts and principles in all curriculum areas.
- To enhance teaching and learning more effectively than through a separate subject approach.

In order to address the aims of curriculum integration, authors of this study have introduced the Problem Based Learning approach in an integrated curriculum paper for the primary education teacher-training course. The PBL activities so designed allowed students to move back and forth between the stages 3 and 4 of the continuum as shown in fig.1.

The problem-based scenarios and the assessment were designed based on the model shown in fig. 2 (modified from Aikenhead, 1991). The illustration (fig. 2) shows

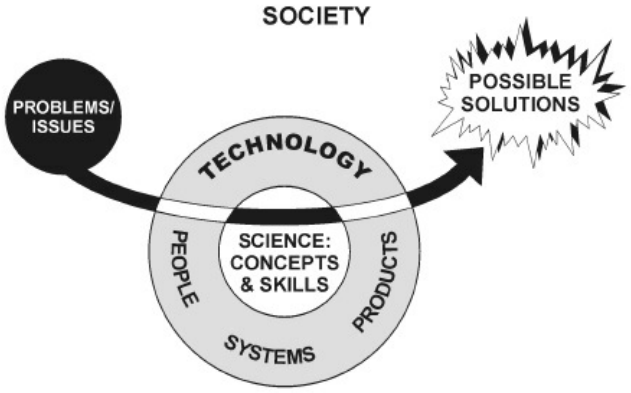

Fig. 2: Integration of Science Technology and Society through PBL

that the problem / issue enters the *world of technology* first because problems / issues are first and foremost linked to people and we live mainly in a technological world rather than a scientific world. What authors are attempting to suggest is that events (issues / problems) in society pass first into the domain of technology and then on into the domain of traditional science where *science content is learnt in a context that is meaningful* and finally out into the domain of technology where the original (possibly

superficial) understanding becomes more complex with additional learning. The process ends in society because you are able to provide a decision / solution through an informed in-depth understanding of the science content and an understanding of the relevant technology (MacIntyre et al, 2004).

Also the ill structured problem scenarios provided the scope for a range of meaningful learning (fig. 3 attributes of meaningful learning adapted from Jonassen, 2001) activities, which students can perform to work towards defining problem statement,

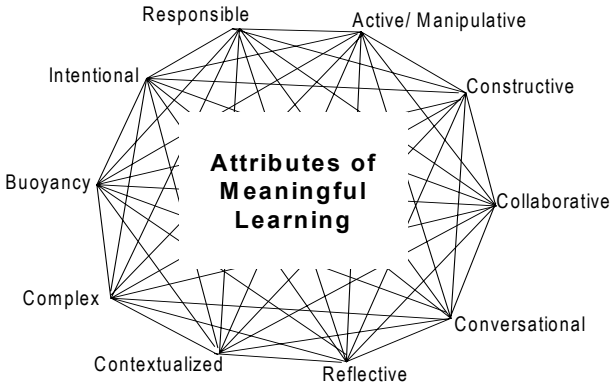

Fig. 3: Ten Attributes of Meaningful Learning

identifying the activities, conducting the investigations and trying to solve the problem.

The PBL process followed by the students for duration of five weeks is as follows:
Students are presented with a set of PBL scenarios from which individual student would choose a scenario and provide reasons for his/her choice.

An example of justification provided by a student towards the choice of the scenario:

Developing an understanding of what it means to be left handed in typical classroom will enable us/me to become aware of what it is that I need to consider for the LH children in my class. It will therefore promote a more inclusive environment and a more equitable layout and structure within the classroom. This scenario will enhance my teaching knowledge and practice for my first year as a beginning teacher. - Until now I had not even considered that I would have to think differently for the left-handed children in the classroom.

Ideally, following the choice of the scenarios the students are then placed into small groups of three students each. They are then instructed through the steps as follows:

- Read and analyse the problem scenario
- List what is known
- Develop a problem statement
- List what is needed
- List possible actions
- Analyse information
- Present findings and give self-reflection

Detail instructions, strategies, tools, exemplars and exercises are provided throughout the process to facilitate students learning. Students are guided through the process and help is provided "on demand".

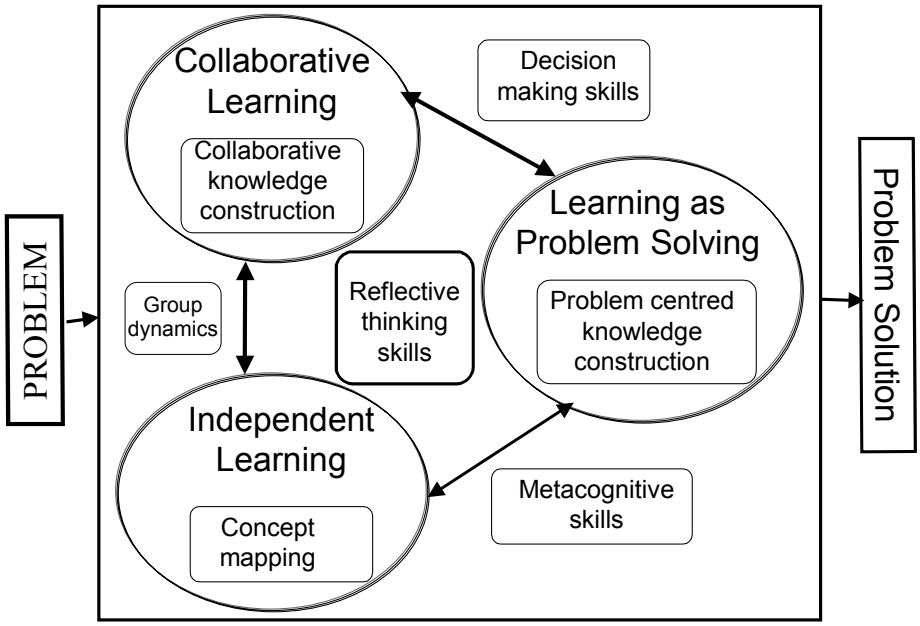

Fig. 4: Model for Problem Based Learning

The authors have designed the integrated curriculum framework based on the conceptual model for problem based learning as proposed by Madhumita & Akahori, 1997(fig.4). Students develop various important skills as shown in fig. 4 as they work through the problem in collaborative groups.

Discussion and Ongoing Research

The tensions that influenced the development of the integrated curriculum at the tertiary level (teacher education programme) are represented in fig. 5. The integrated curriculum paper is a fusion of two papers Science Curriculum II and Technology Curriculum II, which were used to have 12 weeks for each paper. Now this has been reduced to one integrated curriculum paper of 12 weeks duration only. Pre-requisites for this paper are Science Curriculum I and Technology Curriculum I. These curriculum I papers were designed in a very traditional way in a teacher taught mode with minimum ownership given to the students for their learning.

The integrated curriculum paper is a final (third) year paper so the students do not have any previous experience with PBL approach. Similarly faculty did not have any previous experience of facilitating learning in a PBL environment. Another factor, which influenced the design of the curriculum, is the government policy decisions and the worldwide trend of introduction of ICT in schools and institute of higher education.

This paper was introduced at the same time for the internal (on campus/onsite) and extramural (distance/online) students. So the faculty involved did not have the opportunity to find out what works for the internal students and what works for the extramural students.

Finally the most challenging part was to integrate two closely related subjects such as science and technology by keeping characteristics of each discipline clear and distinct.

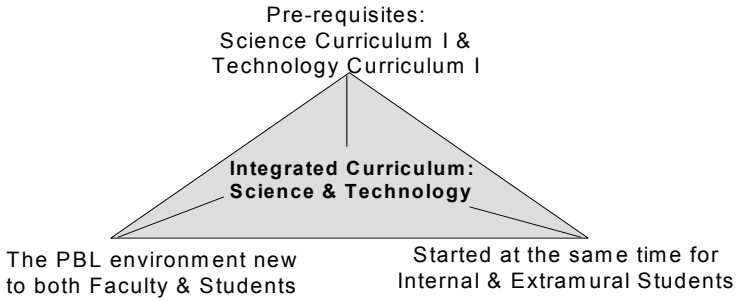

Fig. 5: The tensions in the process of curriculum development

Course evaluation revealed that there are some issues and concerns, which needs to be addressed. This is a new approach to curriculum integration where both faculty and students are not yet aware of all the pros and cons of the methodology being followed. The process is time consuming for both students and facilitators. Collaboration among group members was difficult at times especially for the extramural students who have never worked on group assignment. Students also realized that independent and autonomous learning was difficult as they need to decide what to do, how to do and prepare the timeline, prioritize the tasks, share their findings with the group members, etc without someone telling them what to do.

Students mentioned a number of advantages of the PBL exercise in their self-reflection and course evaluation survey. Students have realized that

- they have learnt a lot more about the subject areas through the PBL process.
- knowledge and skills they have acquired by going through the PBL process would be applicable and transferable in other facets of life.
- they became confident in using ICT in their teaching-learning.
- they have got a clear understanding of the concept of curriculum integration through this approach.

This is a complex process of action and reflection through which the model is still being developed. The authors are engaged in revising the Curriculum I papers in science and technology to make students entry in the process of curriculum integration in a smoother way where students will be able to establish links and build upon their existing knowledge base.

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