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ABSTRACT

Since 1991, the problem-based learning (PBL) approach has been incorporated into the distance education program culminating in a Bachelor of Building degree from the Faculty of Architecture at the University of Newcastle, Australia. The Newcastle conceptual PBL model for on-campus courses was adapted to the special needs of distance learners. The briefings and lectures that are typically part of the interactive learning process that takes place in on-campus PBL-based courses have been replaced by scenarios and learning units. Learning units, which are designed solely to impart knowledge, are perceived by students as an "informative voice." They are separated by "asides," which offer directions and considerations but do not provide data or technical information. The alternation of learning units and "asides" provides a conversational medium through which the student interacts indirectly. Student feedback regarding the technique of simulated conversational exchange has been extremely positive. Because the technique gives the perception of a plot unfolding, it gives students the sense of direction, purpose, and integration that can so often be lacking in topic-centered distance education courses and thus helps improve distance learners' motivation to complete the course. (MN)

The Application of Problem based learning to distance education.

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Abstract

The earliest models of teaching including the Socratic method rely on the analysis of hypothetical situations involving solving problems or formulating strategies to discuss given situations. In recent times, the principles of this approach to teaching have been manifested in Problem Based Learning (PBL). It is the direct relationship between the motivation to solve a problem and the subsequent learning that differentiates PBL from the more conventional didactic paradigms for education.

PBL has proved especially appropriate to vocational professional courses. It offers a solution to the potential dichotomy which can exist between the academic and vocational aspects of professional programmes. The underlying rationale of the PBL approach is that students quickly develop a holistic view of the process and are continually made aware of the relevance of the individual subject disciplines which are being studied, to the problem at hand. This approach is particularly suitable for a distance mode of education where student motivation is a crucial aspect.

The paper describes the development of a PBL approach to distance education as used in the Bachelor of Building degree offered by the Faculty of Architecture at the University of Newcastle, Australia.

Key Words.

Problem-based learning. Distance education. Integrated learning.

Introduction.

The Faculty of Architecture at the University of Newcastle implemented a new 'building degree' course in 1991. When curriculum planning began the faculty was presented with an opportunity to challenge the validity and appropriateness of existing educational models and to develop *de novo* its own model of a vocationally orientated program in a tertiary institution This paper discusses the development of the problem-based learning model used in the Distance Education Building Degree program.

Problem-based learning describes an approach in the implementation of problem-centred curricula where the students' learning results "from the process of working toward the understanding or resolution of a problem. The problem serves as a focus or stimulus for the application of problem-solving or reasoning skills, as well as for the search for, or the study of information or knowledge needed to understand the mechanisms responsible for the problem and how it might be resolved." (Barrows, Tamblyn 1980)

The appropriateness and effectiveness of problem-based learning for professional education has been well argued by its proponents (Boud, Feletti 1991) on the basis that not only does it takes account of how students learn, but also because the expanding knowledge base of most professions means that a topic centred approach is likely to produce an overload of material which is likely to become rapidly outdated (Maitland 1985). Whilst the use of PBL is gaining acceptance in on-campus courses, particularly in the field of medicine, the use of PBL in a distance education mode is virtually unknown. The challenge for the curriculum developers involved in the Newcastle course was to translate the benefits of PBL into a form suitable for distance education, and in doing so turn the perceived disadvantages of distance education into benefits. The strategy adopted was firstly to develop an educational model for on-

campus delivery then use this model as a basis for the distance education course development.

Concept for an on-campus PBL model

The Newcastle conceptual PBL model for an on-campus course is identified in Figure 1.

The characteristics or stages identified in the model in Figure 1 are typical of an informed action or problem solving approach. The first half of the problem solving algorithm may be seen as the information processing side of the equation, the other side, is the acquisition of information. In order to solve a problem students must apply their acquired knowledge. The problem thus becomes the motivation to learn. Within the structure of a learning environment the problem solving process is altered slightly to allow the student to learn while analysing and solving the problem.

Structure of the on-campus PBL model

In our PBL model for the on-campus course, learning commences as the problem is encountered in the first stage — the problem is invariably presented in a realistic manner. In analysing the problem students identify areas of skills and knowledge which need to be acquired to solve the problem situation. Through the analysis of the problem student abilities to reason and apply knowledge are challenged and evaluated appropriately to their learning needs. Finally students apply acquired skills and knowledge to the problem so as to evaluate the effectiveness of their learning.

Our approach has been to divided the course into phases, each one corresponding to a problem situation or a specific scenario condition. Each phase contains one or more learning problems based around a theme which provides a focus to consider a number of related issues. Phase objectives are determined which are appropriate to the theme and to the stage of the course. These phase objectives describe competencies which students are expected to achieve through the phase.

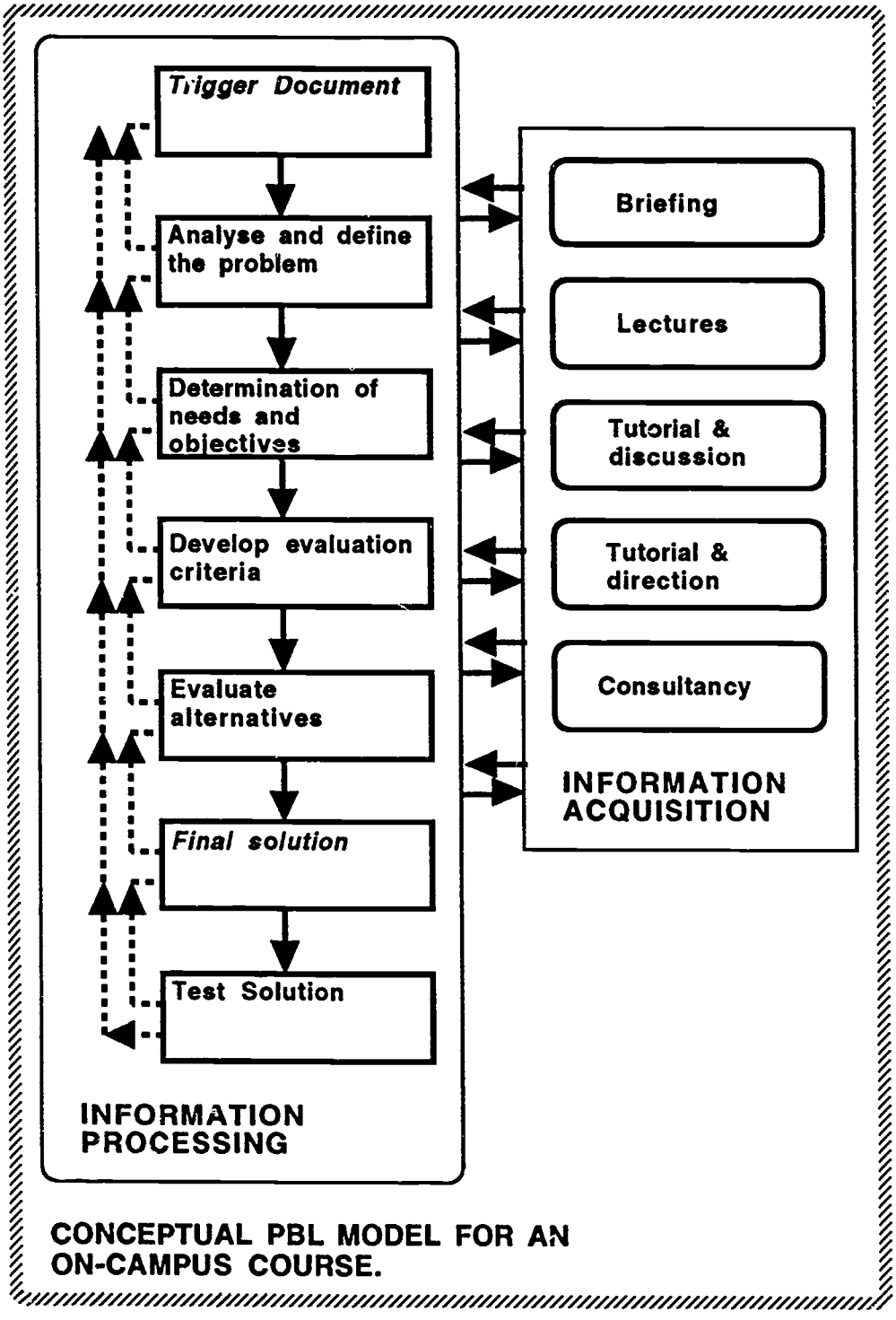

Fig 1. A conceptual PBL model for an on-campus course.(After Ross 1991)

Each phase of the course begins with the phase scenario (the phase scenario contains the problem trigger), together with a statement of submission requirements and a statement of the broad learning objectives for the phase. Where appropriate additional

case information such as site plans, working drawings, financial and project data and various type of documents will be given to students for use in specific situations. Required submissions take the form of work products which students may expect to encounter in job situations such as various types of reports, project plans, financial analyses and feasibility studies.

After considering the problem situation with which the student has been presented a body of knowledge is delivered to the student. The exact nature of the information relates to the perceived needs of the students. The impetus to learn is the students analysis of the problem which drives them to seek some form of knowledge. Once the knowledge has been found then the student must decide what to do with it, how it is applied and what factors effect the final solution to the problem. This stage of individual appraisement, the on-campus reasoning and application, which is more important than the data they use to feed these judgmental lines of thought. The final solution offered by the student is in the form of a submission. The solution offered by the student determines whether the student has completed the phase, and is able to progress to the following phase.

Structure of the distance education PBL model

In the PBL process there is a focus on interactive learning. The key motivation to learn is the need to solve a problem, and therefore the information which will best facilitate the learning is that which the student has identified a need for, and is able to interact with. Some of the most important sessions in an on-campus PBL course are situations in which students may interact with the sources for information, these are usually the tutorial type sessions. The majority of distance education studies courses operate though one way communications, the reading of text and the sending of this material. These simulate the lecture and submission format well but are less effective at simulating tutorial type learning and interaction. The solution to the two way communication problem has in the past been to utilise a media more conducive to

interactive communication, for example teleconferencing or more recently computer mediated communication (CMC).

The solution offered at Newcastle University to the endemic problem of interaction in an distance education mode is not so much a direct solution, in say for example the use of teleconferencing, but rather a strategy revolving around a shift in textuality. In the problem solving algorithm there are two sides to the process, the challenge is to model both sides of the algorithm in an distance education course and as part of the overall strategy to implement PBL in a distance course a number of new modes of communication had to be developed to replace the lecture and tutorial stages of the problem solving process whilst at the same time making use of the new technologies such as teletutorials (See figure 2)

Comparison of on-campus and distance education modes

The new methods of communication on the distance education mode parallel the on-campus stages, though more through their context than their ability to simulate fully two directional communication. The Scenario, in the distance course, replaces the briefing, in the on-campus course, although there are only small differences between the two forms. The learning unit replaces the lecture, it seeks only to impart knowledge, it operates in a formal manner, and is perceived by the students as an "informative voice".

A further refinement for the distance education mode has been the creation of an interrogative, informal voice. These are called "Asides", they proffer directions and considerations, but do not provide data or technical information The submission and feedback modes are almost identical to the on-campus variants. The "Aside" usually separates learning units, providing a commentary on the preceding learning unit and an informal introduction to the next, outlining the relevance of the section and raising points to consider during reading.

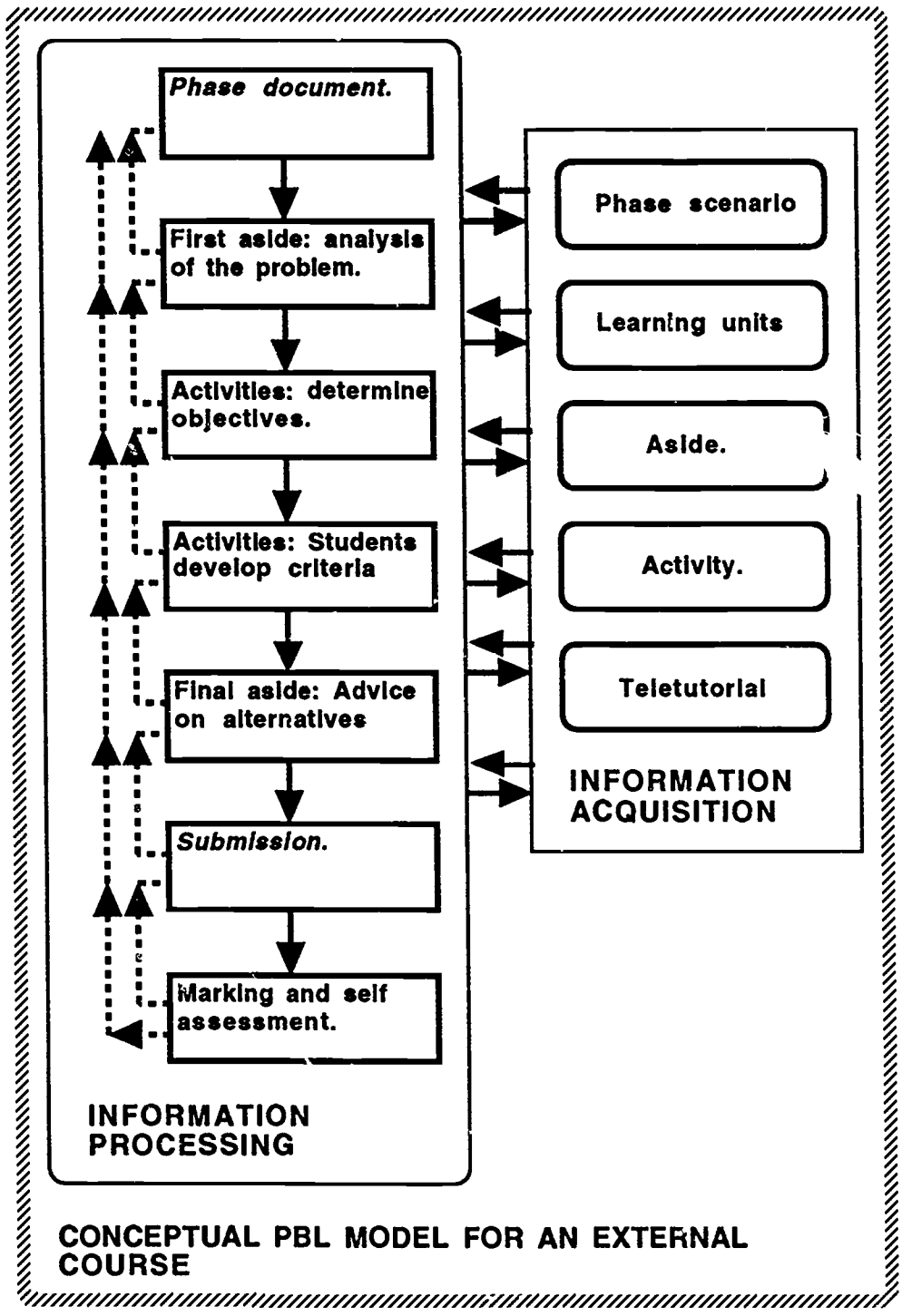

Fig. 2. A conceptual model for PBL for an External course.

The shifting textual personas provide a conversational media through which the student interacts indirectly. By observing the conversational exchanges and then following the changing voices of active and passive teaching the all-essential PBL,

scenario and tutorial modes of voicing may simulate the on-campus contact learning situation. Traditional technological means for improving learning through stimulating the senses in the form of other materials and media's assist in the problem setting and information acquisition stages.

Feed back to-date.

Although the distance education program is still in an embryonic stage, student feedback has been extremely positive. The combined scenarios and problems have not only given motivation to the students but have also provided a narrative linking structure. Today's modern mind, well trained on television, movies and books, appears to adapt quickly to an educational framework which follows an episodic structure revealing more of its plot in successive phases. This perception of a plot unfolding gives a sense of direction, purpose and integration which can so often be lacking in topic centred distance education courses particularly in the early formative years of the course. Feedback also indicates that being able to solve a problem which is new to a person symbolically parallels a major personal achievement in a direct manner. This is as opposed to the satisfaction derived from passing exams, in this form the satisfaction is indirect, the goal to succeed driving the student rather than the motivation to learn by doing.

Conclusion.

The strategies offered in the text are part of the course structure and learning model developed at Newcastle University. The vocational nature of the course has required that the twin strategies of problem based learning and distance education be combined to facilitate the improved training of Professional managers for the building industry. The approach taken by the University of Newcastle in developing its undergraduate building degree by distance education reflects a strong commitment to the development of the student as a capable professional and a life-long learner.

The integrated problem-based learning approach prepares students to be independent learners and encourages the development of generalist problem solving skills.

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