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EDUCATION

The Implementation of Case-Based Learning - Shaping the Pedagogy in Ambulance Education

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The Bachelor of Emergency Health - Paramedic (BEH-P) degree is a pre-employment, professionally orientated program conducted by Monash University Centre for Ambulance Paramedic Studies (MUCAPS) Melbourne, Australia.

The BEH-P is a professionally based program, completed over two years (accelerated entry) or three years (standard entry). [1] Students receive knowledge and skills relating to ambulance practice, clinical epidemiology, public health and professionalism issues and an emphasis towards a more general community-based health approach. [1]

The clinical units in the second and third years of the BEH-P are taught using the case-based learning (CBL) paradigm. This paper (the first in a series) will describe the background theory of CBL and discuss the implementation of a CBL paradigm in the BEH-P degree. A background of problem-based learning (PBL) will also be addressed, since it is considered the educational 'grandfather' of this type of instructional ideology, with CBL is one such pedagogical hybrid.

PROBLEM BASED LEARNING (PBL):

It is argued that PBL was first introduced at McMaster University in the 1960's and is regarded as the most important innovation in educational reform. [2] PBL has now been embraced and modified by educators not only in the teaching [3] and training of programs of Medicine and Health Science, [4, 5] but also in areas such as Architecture, Computing, Social Work, Aviation, Law and Engineering.[6]

Purposes of PBL include the development of high fidelity competency, identification of self-analysis, clear clinical decision-making and problem-solving in abnormal circumstances, and cultivating an ability and adaptation to work effectively as part of a team. [3]

PBL is a pedagogical (science of teaching) approach for posing contextualised questions that are based upon 'real-life' problems that may be clinical, non-clinical or holistic. The process involves replicating the problem-solving approaches likely to be encountered in authentic situations.[3, 6] The necessary resources and instructional guidance to develop problem-solving is provided to students who work in collaborative learning groups. PBL, CBL and other small-group teaching methods that incorporate andragogy (adult education) are exciting innovations in medical education. Vernon et al (1991) highlight that over 80% of medical schools now use PBL as their teaching mode to teach students about clinical cases. [7]

PBL has many definitions whereby various other educational paradigms are grounded from its foundations. The origins of these principles are based upon grand theories from such authors such as Dewey, Bruner Piaget, and Gagne.

PBL class settings can be constructed in multiple ways. Typical PBL tutorials have utilised the Maastricht 'seven jump' process, although this format can be shortened or modified accordingly to suit the specific needs of the students. [8]

PBL based upon the Maastricht 'Seven Jump' Process:

1. Form small groups;
2. A problem is presented;
3. Students develop learning issues relating to the problem;
4. Problem-solving with clinical reasoning skills are developed;
5. Learning needs and issues are identified;
6. Application of acquired knowledge to the problem; and
7. Summarising what has been learned with the group and as individuals.[3, 5, 6]

PBL based upon an alternative process:

1. Formation of small study group;
2. Exploration of problem – hypotheses are created;
2. Try to solve problem – clearer ideas will be shaped;
3. Identification of what student's do not know;
4. Learning needs are self-identified – resources are allocated;
5. Development of self-study and preparation;
6. New information is disseminated within group, ensuring all members understand learning;
7. Application of knowledge to potentially solve problem; and
8. Feedback provided and self-reflection.[9]

Figure 1. An example of a modified Maastricht 'Seven Jump' Process. [10]

So how does this alter the role of the teacher? Essentially the traditional teacher and student roles change.[11] The students now assume significantly more responsibility for their learning, allowing for more intrinsic motivation and feelings of accomplishment. The teacher now goes beyond the normal expected self-directedness of students, and in fact formally guides probes and supports the students' initiatives. [11] However, this must be achieved

without providing easy options or solutions to the students. It is the teacher's responsibility to allow an environment where the students can be accountable for their own learning. In other words, the instructor assumes the role of a fellow learner. [11]

CASE-BASED LEARNING (CBL):

So what is CBL, and how does it relate to PBL? Some regard the term PBL as negative and even misleading. Mullins (1995) highlights that there is no definitive definition of PBL [3] hence the growing numbers of synonyms such as Integrated Learning, Patient Centred Learning, Pathway Models, Project-Based Learning and Case-Based Learning. [7, 9] All have similar educational characteristics to PBL and can be considered as comparable variations.

Figure 2. Educational fusions of PBL [10]

CBL's main traits of PBL are that a case or problem is used to stimulate the acquirement of knowledge, skills and attitudes. [9] Cases place events in a context or situation that promotes authentic learning. Cases are generally written as problems that provide the student with a background of a patient or other clinical dilemma. Supporting evidence and information is provided such as: latest research articles, vital signs, clinical signs and symptoms and clinical laboratory results. The main goal of the facilitator is to assist the students through the facts and to engage in analysis and the development of possible solutions or strategies. The main characteristics of CBL include the consolidation and integration of learning activities both within each week and between weeks/semesters. [9]

CBL can occur in a number of different modes such as seminar cases, standardised patient cases, web cases, medical teaching rounds, minicases, bullet cases and directed case study. [12] Interestingly, little research has been undertaken on CBL in medical curriculum.[13] Barrows and Tamblyn (1980) highlight the importance of choosing cases that are closely aligned to medical situations and subsequently have significant medical consequences to reinforce the case-based style.[14]

CBL Process:

1. Small group is created;
2. The initial problem/narrative is established to develop further inquiry and discussion;
3. The problem is then analysed, with a study path being formulated;
4. Self-discovery of information, data, literature and clinical implications;
5. Supporting evidence, data, lab results and patient information is provided as required by teachers;
6. Hypothesize potential answers; and
7. Collect and disseminate new information. [12, 13]

Figure 3. The CBL process [10]

PBL vs CBL:

The adoption of PBL or CBL is not just simply developing 'problems' or 'cases' into conventional curriculum. It has direct implications not only on the teachers, instructional design and outcomes, but also to the perceived roles and responsibilities of students, their needs and requirements. [15]

Both PBL and CBL are designed to achieve similar goals. In CBL most of the main discussion points are aimed at promoting further questioning compared to the less narrative version, PBL. Notwithstanding common educational goals, each paradigm does possess its own unique distinctiveness. In PBL the problem compels the learning process and students determine what they need to know and how their learning will take them there. In CBL however, students are required to use previously covered material to solve and address the case. [16] 'Case-based learning (CBL) also is student-centred and interactive; however, students use previously acquired knowledge to solve problems that are designed to mimic

future professional practice.' [Bowen 17 p. 253] Mutually, PBL and CBL are intended to obtain key information and to use that knowledge effectively, whilst nurturing the growth of the student as self-directed learners throughout their careers, regardless of eventual specialty of the student. [13] Clinical-based studies have played a significant role in the continuing education of health education providers. [13] The implementation of CBL and PBL has widespread appeal and is attractive to education institutions in today's present financial and educational climate. [15] It is postulated that the role of higher education teachers is to develop not only a range of abilities but importantly, to develop the realities of graduate clinical practice.[15]

ADVANTAGES AND NEGATIVE ASSUMPTIONS OF PBL/CBL:

As with any educational ideology there will always be recognisable positives and negatives. Woods (1994) highlights two main disadvantages of PBL/CBL. First, because of previous educational approaches used in prior study habits, there maybe an obstinate impression of accepting change. [9] Secondly, there is a perception that more depth of study and understanding may have ensured from a subject- based study.[9] Other negative assumptions include:

Resource reliant;
Motivational issues for students;
Dissent with andragogy with its implicit work ethic;
Are the problems cognisant with the subject matter?
Reliant on smaller size groups;
Removal the element of choice process;
Over emphasis of process rather than outcome;
A shift in assessment paradigm;
Adoption of new skills by students and teachers; and
Timetable and coordination difficulties. [9, 18]

Arguably there are equally as many positives. The following are some examples provided by various authors:

The subject is student orientated;
Subject and topic relevance, eg. the problem offered is similar to that within 'real life';
Synthesis of broad range of subjects and topics;
Intrinsic and extrinsic motivation is developed, allowing individualised learning;
Encourages self evaluation and critical reflection;
Allows scientific inquiry and development of providing support for their conclusions;
Integration of knowledge and practice; and
Develop learning skills.[14, 19, 20]

Regardless of the whether the negatives potentially outweigh the positives or vice versa, the key lies in the way it is used e.g. pedagogically or andragogically. [21]

Expanding paramedic education into the future should involve a number of diverse educational methods. Presently, CBL is a potentially cohesive teaching and learning tool within MUCAPS. As the BEH-P program continues to grow and evolve, so will the need to reflect and research the effectiveness of such methods such as CBL and whether there is an educational context of transfer to subsequent professional practice.

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