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Review Article

Comparing problem-based learning curriculum and the traditional curriculum based on the outcome

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ABSTRACT

It has been argued and shown by various outcome studies that traditional knowledge based assessments of curriculum outcomes have minimal, or no difference in learners graduating from either problem-based learning curriculum (PBLC) or the traditional curriculums. A literature search on problem-based learning has shown several comparison studies between graduates from the PBLC with those from the traditional method of teaching, these include: the academic process; program evaluation; academic achievement; graduates' performance, specialty choices and practice characteristics; and faculty members' satisfaction. This review article will compare PBLC graduates with the traditional or conventional style of learning, and based on the above; conclude weather PBLC needs to be implemented in medical schools?

Keywords: Medical education, outcome-based medical curriculum, problem-based learning, traditional curriculum

INTRODUCTION

The main purpose of introducing problem-based learning curriculum (PBLC) was to: Stimulate the learners; assist them in seeing the relevance of learning to their future roles as doctors; maintain higher level of motivation toward learning; and to show the students the importance of responsible, professional attitudes.[1]

It has been argued and shown by various outcome studies that traditional knowledge based assessments of curriculum outcomes have minimal or no difference in learners graduating from either PBLC or the traditional curriculums.[2,3] Despite the debate, medical educationalists' for the most part have been receptive to the PBL approach. It does seem like a more challenging, motivating, and enjoyable way to learn and the students would agree.[4]

A literature search on problem-based learning has shown several comparison studies between graduates from the PBLC with those from the traditional method of teaching, these include: the academic process; program evaluation; academic achievement; graduates' performance, specialty choices and practice characteristics; and faculty members' satisfaction.[5,6] In addition to the above some studies have also compared the cost of teaching with the traditional teaching.[7]

This review article will compare PBLC graduates with the traditional or conventional style of learning, and based on the above; conclude weather PBLC needs to be implemented in medical schools?

The Academic Process and Program Evaluation

Studies have shown that PBLC students place more emphasis on understanding rather than reproduction, i.e. rote learning and memory; the opposite has been shown in students from the traditional curriculum.[5,6]

In order to seek knowledge PBLC students have been shown to give more importance to journals and on-line databases as their main source of information; they make good use of the library; make better use of self-selected reading materials, as opposed to those selected by the teaching staff; and feel more competent in their knowledge seeking ability.[7]

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In support of the above, a study conducted by Moore *et al*.[8] showed that PBLC students who were recruited in the year 1989 and 1990, at Harvard Medical School, United States, memorized less, reflected more on their learning and similarly favored more active learning when compared to the students from the traditional curriculum.[8]

In addition, PBLC students reported less "cramming" before the exam; had better knowledge retention in the months post exam; and, as the exam result was eight-her a pass or fail as opposed to a grade, they felt less stressed.[8]

When re-compared after 2 years with their matched control group. PBLC students reported significantly higher autonomy, more innovation, and involvement, under similar work pressures.

They also felt more competent in handling uncertainty and described their early clinical years as being "engaging, difficult, and useful." When compared to the traditional curriculum students, they described their earlier clinical years as "non-relevant, passive, and boring."[8,9]

PBLC students tend to use "deep approach" of learning when compared to the students of the traditional curriculum.[10]

A "deep approach" is encouraged by an interest in the subject matter or by its vocational relevance. On the other hand students who take a "surface approach" to gain knowledge are mainly motivated by a concern to complete the course or by a fear of failure. They plan to fulfill the assessment needs by the reproduction of factual materials.[10]

A study from McGill University, Canada, has shown that students from PBLC and the traditional curriculum display distinctly different modes of reasoning.[11]

When students were asked to explain the diagnosis of a clinical case, PBLC students demonstrated a "backward directed" hypo-thetico-deductive mode of reasoning, whereas students from the traditional curriculum demonstrated more "forward-directed" method of reasoning.[11]

PBLC students, when compared to the traditional curriculum students, gave more extensive elaborated answers with relevant citations and biomedical information. However they also tended to generate more errors.[11] PBLC students including those who had just started their course were able to give more consistent answers by using both clinical and basic medical science inferences.[11]

Whereas the traditional group of students used basic medical science inferences to link haphazardly with a few cues from the clinical context.[11]

PBLC student's midway between their courses generated a number of inferences based on their basic medical science knowledge, rather than on clinical examination, whereas the balance was reversed for the students in the traditional group of students.[11]

Students' Attitudes

Studies on learner's attitudes have shown that PBLC students have a more positive attitude towards their curriculum as opposed to students from the traditional curriculum.[12,13]

Kaufman *et al*.[12] found that PBLC students had a more positive attitude towards their tutors and their ability to stimulate learner's curiosity, hence suggested a high level of motivation amongst PBLC students and tutors.

The PBLC permits its learners to identify and seek their own learning needs as a result students to much extent guide the tutorial process, and this might be the reason as to why PBLC students are more likely to find their learning environment more democratic compared to the students receiving traditional style of teaching.[12]

PBLC students have more intrinsic interest in learning by solving clinical cases, new concepts are learnt and although the new method of learning could initially decrease the amount that students learn, subsequent retention is increased.[13,14]

This new method of learning also has a psychological effect on its learners and its teaching faculty; students had reported that they found the learning environment "more stimulating and more humane" than did graduates from the traditional curriculum.[13,14]

With undergraduate medical education currently carrying a health warning because of the stress and anxiety caused to students and young graduates, any educational process that promotes enjoyment of learning without loss of basic knowledge and skills must be a good thing.[15,16] A study at Harvard University, US, found interpersonal skills, psychosocial knowledge and attitudes in students of PBLC towards patients to be better.[8,9]

Traditional curriculum students on the other hand reported better interaction with their peers, whereas PBLC students tended to form several small groups within the class.[9] It was hypothesized that the intensity of the small-group process could be the reason for this, as PBLC students tend to become more acquainted at a deeper level quickly than in the traditional, lecture-based curriculum.[8,9]

However, Dolmas[17] in his study regarding student's attitudes towards social issues in medicine have found no convincing difference between graduates from both the curricula.

ACADEMIC ACHIEVEMENTS

Performance in Basic Medical Science Examinations

It has been argued that students from the PBLC do not perform well in the written part of basic medical science examinations.

At the Macy Conference in 1989. Participants on the "Evaluation of Innovative Curricula" concluded that they would expect the National Board of Medical Examination Part 1 (NBME-1), which is the written part of the US medical licensing exam, scores to be lower for students who would graduate from the innovative curriculum than for students from the traditional curricula.[18]

Mennin *et al.* have also reported similar findings.[19] They concluded that; a more teacher centered approach better prepares students for the NBME-1. In support of the above, a meta-analysis conducted by Vernon and Blake reported similar findings.[20]

However, Farquhar *et al.*[21] had noted no significant differences between the total test scores, whereas on the other hand students of the PBLC at the Mercer University School of Medicine, US, did better in the NBME-1.[22]

In conclusion the general perception about the PBLC students is that they do not perform as well as the traditional students in basic science written examinations.[18,19,20,23]

Clinical Competence

Three general types of data i.e. ratings and tests of clinical performance; tests of clinical knowledge; and the "humanism" variables relevant to clinical functioning were used in order to evaluate the PBLC students at Harvard Medical School.[8]

Many of which showed minor but a non-significant trend in favor of PBLC students in clinical science performance.[8,10,20,22]

Graduates' Performance

Comparison studies on "preparedness for post graduate training" between PBLC graduates and their peers from the traditional curriculum, has not shown any evidence that would suggest that PBLC graduates felt themselves to be disadvantaged.[24,25]

About 89% PBLC graduates at the McMaster University considered themselves to be either equal or well prepared than their peers, not only at independent learning but problem solving, self-evaluation, data- gathering, behavioral sciences, and lastly dealing with both social and emotional problems of the patients.[24]

About 62.5% of the clinical supervisors had reported that PBLC graduates had performed significantly better than 1st year postgraduate trainees.[24]

Students of the PBLC have tended to rate themselves lower in terms of their basic medical science preparation.[24]

In comparison, traditional curriculum students tend to rate their training more positively in the areas of clinical medicine and biomedical science.[25]

It has been reported that graduates from the PBLC group receive better ratings than their peers from the traditional schools when it comes to health care costs, communication with patients, and patient education.[26]

However, it is interesting to note that nurses working on the ward give a higher evaluation in knowledge to residents from the traditional curriculum.[26]

A study from Australia[27] has shown that PBLC graduates were rated significantly more than their peers, when it came to interpersonal relationships, reliability, and self-directed learning.[27]

Specialty Choices and Practice Characteristics

It is generally observed that PBLC tend to produce graduates, who in most cases choose careers in family medicine,[8] and some of the medical schools such as that at McMaster University produce graduates who tend to pursue their careers in family medicine with special interest in academics.[28]

PBLC graduates are less likely to locate to a rural area or be in solo practice than are their traditional counter parts.[29]

Faculty Members' Satisfaction

Studies have suggested that tutors find the PBLC provides a satisfying way to teach.[24,25]

In a survey of Dutch medical schools, the PBLC faculty rated their curriculum higher when it came to teaching clinical reasoning, humanistic qualities, and preventive care as compared to the traditional faculty.[25]

However, in the same survey, the traditional faculty rated their schools higher in the teaching of clinical medicine and biomedical sciences.[25]

Thirteen out of the total 14 non-volunteer tutors from the traditional faculty at a PBLC course rated their experience to be more positive than they had expected.[30]

The most common cited benefit was student contact, by virtue of the small group format.[30]

Costs of the PBLC

It has been calculated that when it comes to faculty time devotion i.e. preparing for exams, meetings, and performing ancillary activities. It is almost the same in both types of curriculum.[31] And, It has been roughly calculated that PBLC costs less per student for groups <40, but may be impractical for a group >100 students.[30]

It has been suggested that increasing the size of the group can reduce cost; decreasing the number of times the group meets per week, or using non-faculty teachers for some meetings.[30] However, quality might be compromised in doing so.

CONCLUSION

Despite the debate, medical educationalists' for the most part have been receptive to the PBL approach, it does seems like a more challenging, motivating, and enjoyable way to learn, and the students would agree.

When compared to the traditional approach, PBLC students give more importance to the meaning than on memorizing, use journals and on-line resources as sources of knowledge, self-directed, more confident in knowledge-seeking skills, use a deep learning approach of learning, and use a "backward-directed" hypo-thetico-deductive mode of reasoning. They are better at interpersonal skills, psychosocial knowledge, and attitudes toward patients.

However, they do not perform well in basic science written exams when compared to their traditional counterparts, but they perform as well if not better when it comes to clinical examinations. Centers that have adopted a PBLC approach have found improved student motivation and enjoyment, but there is no convincing evidence of improved learning as such.

In conclusion, combined use of both the traditional and PBLC approach might provide the most effective training for undergraduate medical students, however for the first 2 years of basic science undergraduate learning I would strongly suggest the traditional method.

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PEER REVIEW

Double Blinded externally peer reviewed.

CONFLICTS OF INTEREST

None.

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