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First-year Medical students' perception of the conventional teaching methods and Problem-based learning curriculum at Walter Sisulu University in Mthatha South Africa.

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Keywords:
Problem-based learning, MBChB, Semester, Cell block, GIT block, Computer skills, Human behavioural sciences

ABSTRACT

Background: Conventional teaching methods may not be an ideal solution to comprehensive and integrated learning. Medical schools throughout the world have adopted a PBL learning approach in their curriculum. There is general consensus that PBL engages more student involvement and challenges self-directed learning. Variations in success at different schools are probably impacted by multiple variables, such as culture, prior learning experience, and educational expectations. This study is mainly aimed at identifying students' perception of the conventional and PBL curricula. **Methods**: 98 medical students (2014) participated in the survey and were asked to fill a questionnaire that had questions on various aspects of the teaching, content and students' perception of overall content load and assessment aspects. A similar study was done successively from 2010-2012. **Results:** The module on computer skills (80%) and Human behavioural sciences (75%) were identified as the least enjoyable subjects to learn. Semester I (lecture based) was identified as easier (62%) than the semester II (PBL based) which is significantly different from the previous 2 years. The Cell Block seems to be difficult (56%) than the GIT block which is another deviation from previous years. **Discussion:** Content overload is the major reason identified as the factor responsible for finding a block difficult (85%). **Conclusion:** While senior faculty usually receives high ratings by students, limited resources usually dictate the allocation of multiple PBL tutors, ranging widely in expertise. Bearing this in mind, block Directors should allocate appropriate time resources to promote skills that help facilitate problem-based discussions to provide tutors and students with an educational experience that is both effective and gratifying.

INTRODUCTION

The learning that results from the process of working toward the understanding or resolution of the problem (Barrows & Tamblyn,1980). Problem-based learning, otherwise known as "PBL," has been incorporated into the curriculum at many medical schools around the world [Albanese & Mitchell, 1993]. PBL was developed at Mc Master University, 1968 followed by Maastricht Netherlands) and Newcastle (Australia) in 1978. In the next two decades, PBL was implemented in Harvard (USA), Sherbrooke (Canada), Manchester, Liverpool, (UK) and University of Transkei (South Africa). The main purpose of this method is to help students acquire new information by providing them with a context to apply their knowledge to clinical problems. It is generally observed that there are three roles for PBL. The first is the acquisition of factual knowledge, the second is the mastery of general principles or concepts that can be transferred to solve similar problems, and third, the acquisition of prior examples that can be used in future problem-solving situations of a similar nature. (Blumberg,1988).

PBL is based on several theories in cognitive theory. Two prominent ones are that students work on problems perceived as meaningful or relevant and that people try to fill in the gaps when presented with a situation they do not readily understand. Teachers present students with a problem set, then student work-

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groups analyze the problem, research, discuss, analyze, and produce tentative explanations, solutions, or recommendations. It is essential to PBL that students do not possess sufficient prior knowledge to address the problem. In the initial discussion, students develop a set of questions that need to be addressed. These questions then become the objectives for students' learning. A further aim of PBL is to provide students with resources in self-directed learning skills that will persist throughout their careers (Morrison, 2004). When compared with the conventional curriculum, the PBL method generally increases use of limited resources at medical schools, while debate continues as to its advantage in enhancing learning and test performance. (Azer, 2005).

Based on our experience at WSU, we noticed that the attrition rate was quite high before PBL was introduced in our medical school and even after introducing PBL the failure rate was high in the first semester of the I yr program and this is the main motivation for the present study.More recent reviews of the literature such as those by Azer, at the Faculty of Medicine at Melbourne; by Gude et al., 2005, at the University of Oslow; and Iputo and Kwizera., 2005, in South Africa, credit the introduction of PBL at their Facilities for improving student attitudes and performance, using differing outcome measures. However, Traditional lectures, both in Psychopathology as well as Neuroscience as a whole, were still endorsed as highly favourable by a majority of students (Trappler, 2006).

In 2003, it was proposed that lectures and seminars could be integrated into PBL. Over the next few years, many models in PBL were implemented. The diversity of PBL models were categorised as, full, near-full, partial or hybrid (Kwan & Tam, 2009). It was also suggested that the hybrid can be classified into 4 types, namely type I which is the conventional curriculum (2-3 PBL problems per year), type II & III which are essentially lecture based curricula, but type II incorporates PBL tutorials for supplementary knowledge, while type III uses PBL problems for a lecture. Type IV is the typical PBL based curricula which is followed in McMaster. It is to be noted that using hybrid PBL, the possibility of ending up with dysfunctional PBL (Lim, 2012).

Dysfunctional PBL curricula may be the result of too many resource sessions which discourages independent study, lack of medical education expertise or ineffective curriculum reviews and inadequate staff developmental programs (Lim, 2012). If case-scenarios are not open-ended or inadequate preparation time or lack of supportive leadership may also lead to dysfunctional PBL curricula. Hence, it was concluded that poor teaching is bad, but poor PBL is worse (Kwan & Tam, 2009).

PBL has a distinct advantage over traditional curricula since it caters for horizontal multi-disciplinary integration, emphasised a discovery mode of self-directed learning (SDL) and acquisition of knowledge in relation to the problem rather that discipline based (Bokey et al., 2014). However, some serious concerns were raised against PBL mainly the clinicians found disconnected and disenfranchised, expert clinical bed side teaching suffered and student content with practice progression was diluted (Bokey et al., 2014).

Walter Sisulu University implemented the PBL in 1989, prior to that they had the traditional curricula. In a study comparing traditional versus PBL at WSU, it was reported that drop-out rate in the traditional curricula was 23% as compared to 10.3 % in PBL. It was also noted that in the traditional curricula, only 55% of the students were able to complete the MBChB in six year, while 67% of the students in PBL curricula were able to complete the same course in six years (Iputo & Kwizera, 2005). It was also reported that the failure rate was unusually higher in I year as compared to other years and this attributed to the lecture based I semester in I year while in the II semester it was PBL based (Umapathy et al., 2011).

In WSU, which has a type III hybrid model, especially in the I year, since the I year students were exposed to two different kinds of learning, namely lecture based learning during the 1st semester and Problem Based Learning (PBL) in the 2nd semester of their 1st year. Lecture based learning comprises of lectures being given to students, lecture notes given as hard copies or electronically to students by lecturers; and PBL is an active type of learning where the students are more involved in the learning process. The focus is mostly on student's ability to learn concepts and develop ability to improve their reasoning process and identify their learning issues which is then discussed in a small group tutorial. This tutorial group is usually comprised of 8 or 9 students and each group is facilitated by a tutor who is supposed to be a subject specialist but need not necessarily be a clinician.

The study compares two modalities of curricula namely lecture based I semester and PBL based second semester. In the first semester each subject was permitted to use its own discretion according to each department's resources. In the second semester, there was a common goal or learning outcome and was divided into two blocks. The first block emphasised cell structure, its organisation and its functions. This block also concentrated on cell metabolism and basic principles in genetics and immunology was emphasised. The second block focused on nutrition, gastro-intestinal physiology and intermediary metabolism. In this block, anatomy dissections and histology practical were used as additional tools to enhance the learning.

In Physiology, computerised practicals were introduced and students had a fuller participation in this interactive session and learnt some basic principles in physiology much better than actual practical sessions. This observation was made based on the students'interest and participation in these sessions.

In the second semester, there were two blocks, the cell block had 7 cases and the GIT block had 9 cases. These paper cases were designed by a group of experts comprising of clinicians, scientists and senior professors in basic medical sciences and in clinical disciplines. Usually the cases are chosen from a Case bank comprising more than 20 cases for each block and which have been used for the last several years and properly edited and altered according to the suggestions and inputs from various sources.

Following the case discussion at the end of each week, the subject specialists usually identifies problem areas in that particular case and a resource lecture is given to the whole class where relevant learning issues are analysed and integrated with the case. The students input in organising the lecture session is also taken into account when they make representations at the weekly tutorial meeting. Some of the concepts are emphasised by using practical sessions and if a particular concept is found to be extremely difficult for the students to appreciate, then seminars are organised which is made up of 3-4 tutorial groups but mentored by subject specialists. Main focus of these seminars is to give additional support to all students and individual attention is given to poorly performing students. In total, each case would have 6 hours of small group tutorial, 3 hours of practical in physiology and biochemistry where relevant and 3 hours of dissection and 3 hours of histology concerning the case.

The selection of tutors for each group is based on the following criteria. They need to have some years of graduate teaching experience, and has expertise in conducting small group tutorials. Most of our tutors had to go through a mentoring session where the expert tutors would mentor the newly appointed staff for a period of 1-2 years before they are recognised as experienced tutors and would be allowed to tutor a group on their own. One meaningful observation is that it is not necessary to be a clinician in order to acquire competence in tutoring or handling cases of this nature. Non-expert mentors were either junior faculty members or clinicians lacking consistent experience in teaching (Davis, 1992).

METHODS

A simple, questionnaire was issued to 99, year-II medical students, to evaluate and assess them on their experience i.e. difficulties and smooth sailings during their first year of study.

The questionnaire comprised of various sections that were mainly designed to identify the problem areas in the two semesters of the I yr program. The delivery mode of each subject was also included in the questionnaire, since most of the subjects had 4 components of delivery mode, namely lectures, practical, tutorials, and seminars. However, in this study, we could not present data on this aspect since some subjects did not have all the components and therefore the results were difficult to interpret.

The results were presented as percentage comparisons between the groups. However, where necessary, a chi-square test was done. Some aspects of the analysis are presented as Tables and some as line diagrams. A sample questionnaire is shown below, which does not contain all the questions; only a selected few are given.

Sample questionnaire:

1. Which semester was easy/ which block was easy
2. Which subjects in I semester was easy/ difficult
3. Reasons for finding it easy/ difficult
4. Delivery mode in I semester: Which was more useful? Lectures/practical/seminars/tutorials.
5. Delivery mode in II semester: Which was more useful?
6. Reasons for finding it easy/difficult: number of Cases, content, practical, anatomy, Histology, lectures?
7. Two-line comment
8. Entry level: (Matric or graduate)

RESULTS

The following Figures analyse individual questions answered by the students and their percentage distribution. Figure 1 indicates that semester 1 seemed to be the easiest semester (62% as opposed to semester 2).

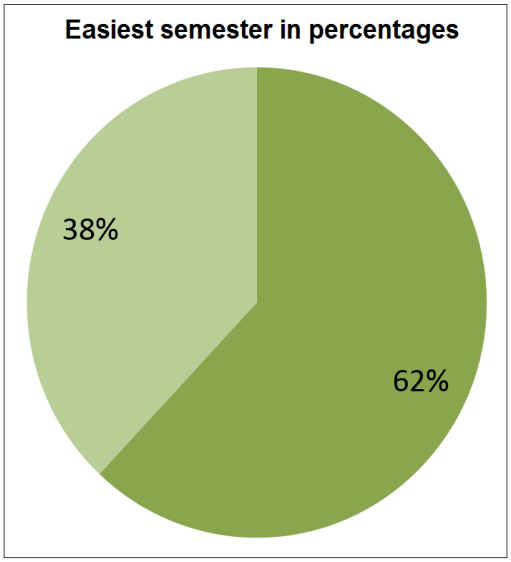

Fig. 1. Compares student response regarding the two semesters.38 %: Semester I; 62 %: Semester II.

Table 1: Percentages of students who indicated hard to learn subjects

	Medical chemistry	Medical biology	Medical physics	Computer skills	Human behavioural science
Percentage	3%	5%	13%	23%	55%

Table 2: Subjects identified as more and least useful

	Least useful	More useful
Medical chemistry	6	17
Medical biology	5	37
Medical physics	11	9
Computer skills	58	1
Human behavioural science	19	35

Figure 2 analyses the most enjoyable subjects in first semester. Medical biology followed by medical chemistry and medical physics are the favoured subjects. Computer skills and Human behavioural sciences were least enjoyable.

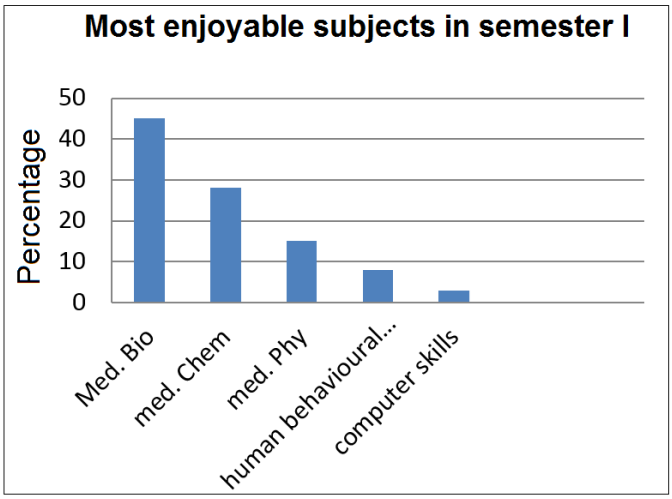

Fig. 2. Most enjoyable subjects in semester 1.

Figure. 3. Shows subjects in first semester that were hard to learn represented in a line graph. Human behavioural sciences and computer skills were identified as most difficult to learn.

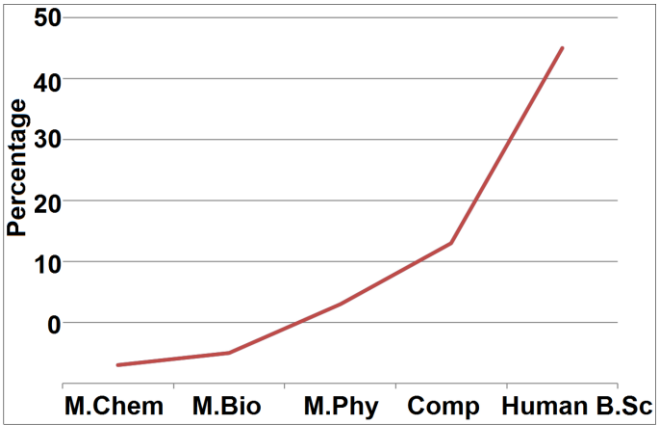

Fig. 3. Subjects hard to learn in semester 1.

The following Table shows data where more than half the class clearly disliked the human behavioural sciences (55%) course followed by computer skills (23%)

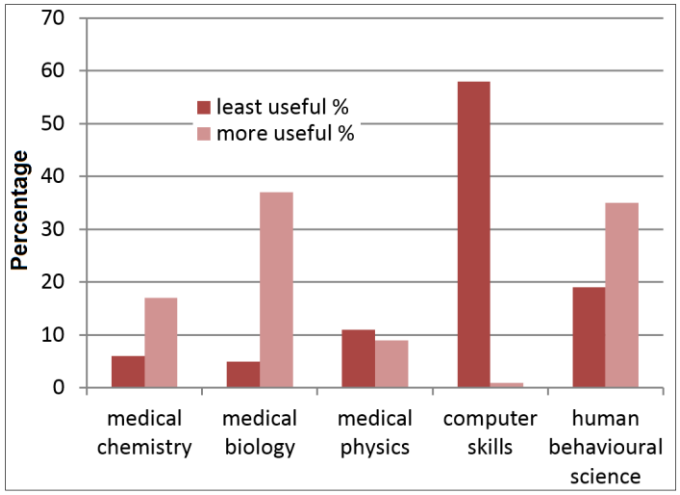

Fig. 4. Least useful and most useful subjects in I semester.

Table 2 and Figure 4 identifies medical biology and human behavioural sciences as the most useful subjects compared to others.

Table 3 compares the results of 2011 versus 2012 regarding the student responses in identifying subjects that were enjoyable/useful in learning. An obvious and a significant finding is the shift in medical biology as more interesting in 2012 compared to medical chemistry in 2011. However, human behavioural sciences and computer skills were identified as the most difficult subjects to learn, both in 2011 and 2012. A chi-square test indicated that they were significant compared to other subjects in the I yr MBChB (HBS ($p<0.05$) and Computer skills ($p<0.01$)).

Table 3: Comparison between 2011 and 2012 results identifying more enjoyable subjects in the first semester.

Subjects	2012	2011
Medical chemistry	25	40
Medical Physics	17	18
Human behavioural sciences	8	6 *
Medical Biology	48	34
Computer skills	2	2**

*Chi square $p<0.05$ ** chi square $p<0.01$.

Figure 5 indicates human behavioural science as the most difficult to learn whereas computer skills is the least difficult to learn.

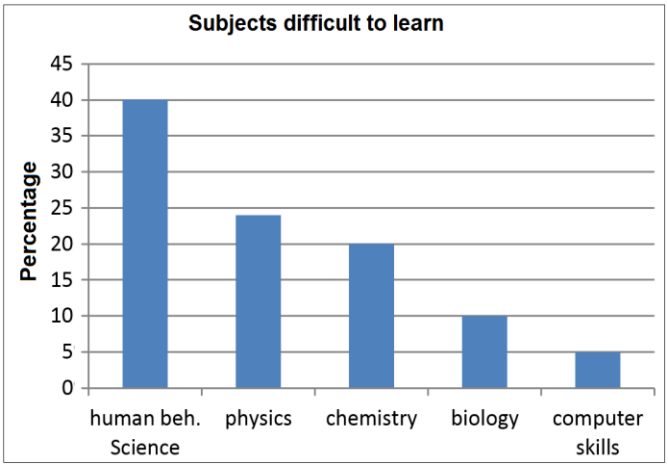

Fig. 5: Difficult to learn subjects in I semester.

Although computer skills were least enjoyable to learn, it was not difficult to learn. Human behavioural science was identified as the most difficult and also least enjoyable to learn. However, students were asked to identify the reason for finding a particular subject hard to learn. This data was incomplete since many of them could not identify any one particular reason for considering Human behavioural sciences hard to learn. The reasons that were cited in the questionnaire was more specific about mode of delivery. Since all other subjects had lecture, practical, seminar and tutorials, human behavioural sciences had only lecture as the mode of delivery and this may be the reason for high failure rate, Since we did not have content overload as one of the reasons for finding a subject hard to learn, the results could not be presented.

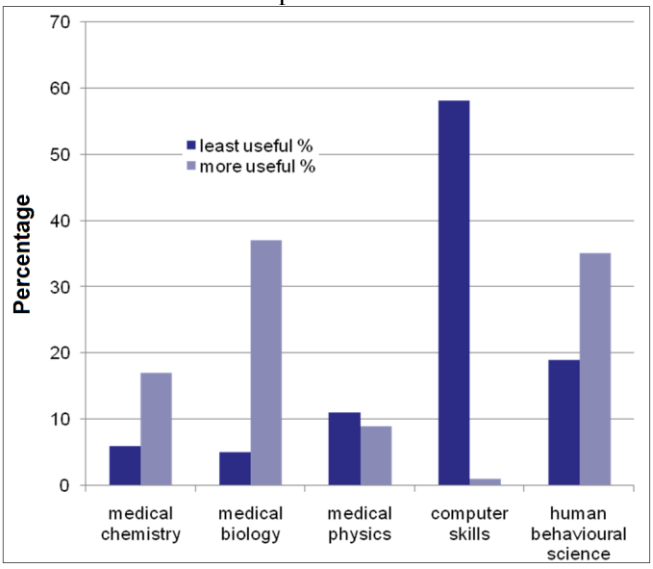

Fig. 6. Subjects identified as most and least useful in semester I

Table 3: Reason for finding a particular block easy

	Percentage
Minimal content	29%
Minimal number of cases	26%
Practicals too few	12%
Anatomy not much to remember	29%
Histology not much to learn	3%
No response	10%
Total	99

Figure 6 identifies most and least useful subjects in I semester. Computer skills was identified as least useful which is an anomaly since the students need this skill in accessing information when they are in clinical years. Probably the students did not realise the importance of this in the second year. On the other hand medical biology was identified as most useful subject compared to other science subjects and this is not surprising since the students in second year were benefitting from their prior knowledge in Medical biology when they are doing basic medical sciences.

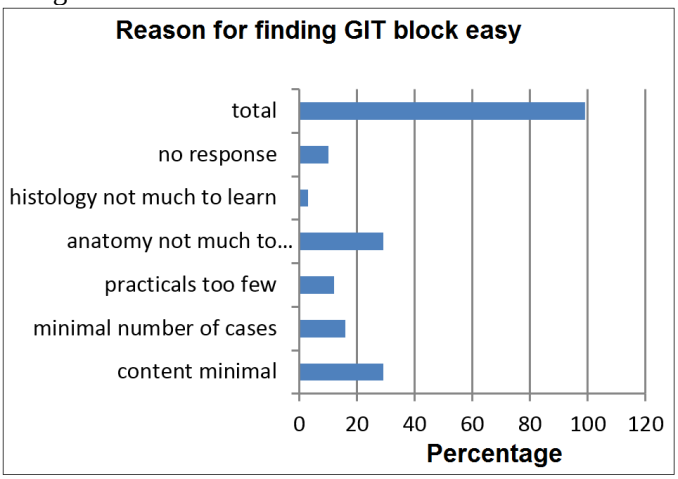

Fig.7. Reason for finding a particular block easy in the second semester.

Table 3 and Figure 7 indicates that minimal content is one of the major reasons for finding a particular block easy. Not much to learn in Anatomy was identified as another reason for finding this block easy compared to cell block.

Table 4: Reasons for finding a Block difficult

	Percenatge
Content overload	44%
Cases too many	10%
Practicals too many	4%
Anatomy too much	24%
Histology too much	17%
Total	99

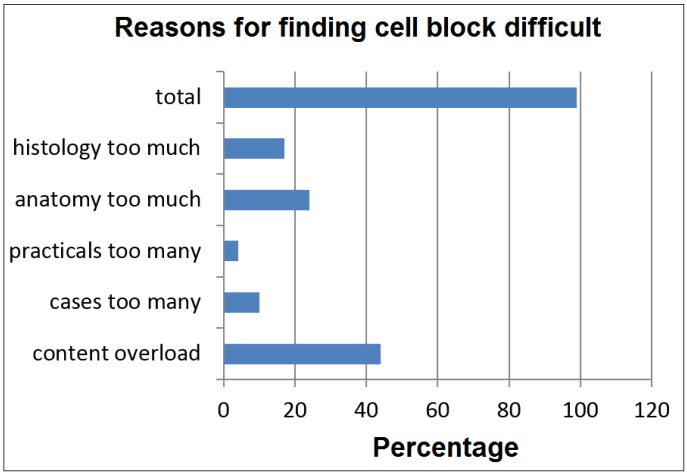

Fig. 8. Reasons for finding Cell Block difficult.

Table 4 and Figure 8 identify the content overload as the main reason for finding a particular block difficult and in addition anatomy too much to learn in cell block was also indicated as one of the reasons. Figure 9 is totally contradicting the findings in Table 8 since anatomy is the most interesting subject to learn and yet they found too much of anatomy to learn as the major reason for finding cell block as difficult. There was no gross anatomy in the cell block and so this aspect of the result is baffling.

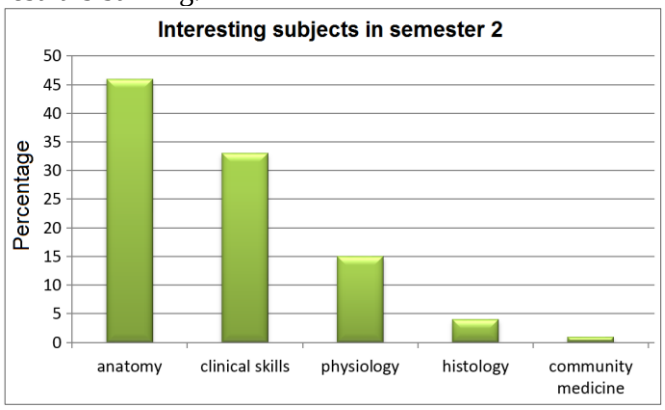

Fig. 9. Anatomy was the most enjoyable subject in semester 2.

Table 5. Delivery mode for various subjects in second semester

	More useful	Least useful
Anatomy	50%	10%
Physiology	30%	3%
Histology	10%	17%
Computer skills	2%	42%
Community medicine	7%	27%
Total	99	99

Table 5 and Figure 10 indicate that anatomy was the most useful subject followed by Physiology, while computer skills was identified as least useful subject.

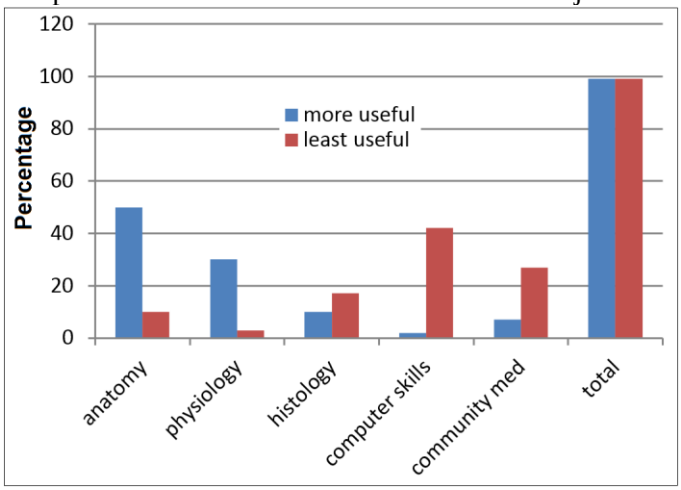

Fig. 10. Least useful and more useful subjects in second semester.

Table 6: Which semester was difficult?

	Percentage
PBL (Semester 2)	20%
Lecture based (Semester 1)	80%

Table 6 Identifies semester I as the most difficult compared to II semester. Table 7 shows entry level of students in the medical program, majority of them are from Matriculation which may explain some of the results shown.

Table 7: Entry Level at I MBChB.

	Percentage
Matric	73%
Graduate	27%

DISCUSSION

PBL curricula demonstrate equivalent or sufficient professional competencies compared with graduates of more traditional curricula (Neville, 2009). PBL is, however, more expensive than conventional curricula, especially in larger medical schools (Donner & Bickley, 1990). In the early literature reviews, PBL graduates tended to rate their basic science background weaker than their conventional curriculum counterparts. These results suggest that PBL may not develop in students an effective cognitive foundation (Albanese, 2000). Mc Master students identified a lack of definition of core material as a weakness in student-directed PBL (Woodward & Ferrier, 1993). Neame & Powers (1993), stated that "It is impractical to suggest that an unstructured, undergraduate medical course be designed in which the onus is entirely upon the student to define and undertake his own program of studies."

What these authors recommended was a gradual progression towards independent learning, via a graded reduction of imposed structure.

The advantage of small student PBL groups proposed by Howard Barrows, 1985, appears to work by creating tightly knit student groups who steer, direct, and delegate learning tasks that evolve over many sessions. In contrast, in some models, expert mentors who actively focused the learning tasks and used their group process skills to function both as group facilitators and leaders offset the advantage of small groups (Trappler, 2006).

We from this study can safely vouch that PBL is best suited for those with motivation to learn, irrespective of their earlier school background as majority of our students come from a background not conducive to learning in terms of facilities and social benefits. While our findings are not in total agreement with the suggestions expressed by Albanese & Mitchell (1993) in implementing comprehensive curricula with rapid conversions to PBL, the data also adds some constructive findings to the evolving literature on this important subject. Before launching into a PBL dominated curriculum, faculty should appropriate skill training to prospective PBL mentors to allow them to function comfortably using this teaching format.

An optimal framework may be one, that amalgamates the benefits of both conventional and PBL components as suggested by Trappler (2006). However, with the early dominance of conventional teaching and the introduction of PBL, in increasing complexity, commensurate with student development and faculty resources may indeed be an ideal policy in implementing PBL. In this regard we tend to agree with the above author. Trappler (2006) has also emphasised that in order to create a problem-based learning paradigm, a committee of experts need to be set up for each module. Each committee may be charged with the mission of: 1) generating a case report, 2) using the case as a springboard for fruitful exploration and discussion, 3) providing questions and references for the students that would encourage self-directed reading, 4) creating a user-friendly manual for the mentors, and 5) generating a set of examination questions that would be based upon students' attendance and participation in the case-based learning module. Surprisingly, all the above paradigms were used by us at WSU even before this report by Trappler (2006) was published.

It should be noted that the PBL model employed at SUNY differed from the "pure" PBL model proposed by Howard S. Barrows (1985), where small student groups: 1. Review the learning needs after reviewing the case., 2. Decide on the best learning resources, such as textbooks, monographs, and journal articles, and then, 3. Return from their self-study as "assumed experts, armed with the knowledge necessary to resolve the simulated patient problem." 4. *The student group* then decides on the clinical hypothesis and problem-solving strategies. Our pattern seem to fit into the earlier model proposed by Barrows (1985).

However, our main focus of this project is to identify the subject areas that need to be revised and we are making implicit suggestions that there is need to relook at some of the course contents and their learning objectives. It is proposed that in the I semester, content overload may be the main culprit in making the students detest some of the subjects in the I semester. It is also emphasised that the delivery pattern of some of the subjects like, human behavioural sciences and computer skills need to be relooked.

CONCLUSION

Conventional teaching methods may not be an ideal solution to comprehensive and integrated learning. A comparison was made between the first and second semester curricula and the PBL approach seem to be more student centered although more tedious in terms of logistics and preparations. It is also ideal to have more senior faculty functioning as expert mentors.

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