



Original Research Article

## Does The Traditional Teaching Component Of The Hybrid Curriculum Improve The PBL Component, In The Teaching Of Anatomy?

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### ABSTRACT

Problem-based learning (PBL) is a relatively new teaching method, which was introduced in many medical schools as an alternative to the traditional method of teaching. At the beginning, the PBL method quickly gained popularity because of its many positive sides and particularly the one that allows early integration of basic medical and clinical sciences. A number of studies, however, reported that, in the PBL curriculum, the anatomical sciences (gross anatomy, histology and embryology) were insufficiently covered and the subjects were poorly understood by the students. Because of these deficits of the PBL teaching, a number of researchers suggested the anatomical sciences to be taught either by the traditional method or by the hybrid method, which is a combination between the traditional and the PBL method. The aim of this study was to establish whether the traditional teaching component, of the hybrid curriculum, contributes to the elimination of deficiencies of the PBL component. To achieve the objective, a data collection and analysis method was used. The results indicated that the traditional teaching component, of the hybrid curriculum, contributed significantly to the elimination of the deficiencies of the PBL component, in the teaching of anatomical sciences. This was achieved by the introduction of didactic lecture course and relevant practicals, which supplemented the PBL component. In conclusion, the hybrid method of teaching combines the positive aspects of the traditional and PBL teaching methods. The two components of the hybrid curriculum supplement each other. We recommend the hybrid curriculum to be turned into a preferred teaching method, in medical schools.

**Key words:** traditional teaching, hybrid curriculum, anatomy teaching, PBL teaching.

### INTRODUCTION

Anatomy or anatomical sciences is a basic medical discipline, which consists of three closely related subjects, namely, gross anatomy, histology and embryology. At present, in many medical schools worldwide, anatomy is still considered to be a fundamental subject in medical education. It is generally accepted that a good

knowledge of anatomy helps medical students to better understand the other basic medical sciences as well as the clinical subjects.

Over the centuries, anatomy has been taught by a traditional (conventional) method, which includes didactic lectures, cadaver dissection practicals and tutorials. The traditional method of teaching is still a

preferred method, in many medical schools. This is because it allows a sequential and logical presentation of the teaching material and gives a good level of knowledge in basic medical sciences. [1-5] Despite its positive characteristics, the traditional teaching method has recently been characterized, by some authors, as non-relevant, passive and boring, which requires memorization of facts. [2, 6]

The more recently developed problem-based learning (PBL) method was designed as an alternative to the traditional teaching method. The new method quickly gained popularity, in medical education, because of its many advantages over the traditional teaching. [7, 8] One of these advantages is the possibility for integration of basic medical and clinical subjects, from the early years of medical education. Some of the other advantages are that it encourages self-directed learning, reduces the factual knowledge, allows students to learn by applying reasoning rather than memorization of facts and helps students to become life-long learners with analytical skills. [1, 2, 9-12]

At present, there are contradictory reports about the advantages and disadvantages of the two rival teaching methods. Some papers reported that, in the traditional curriculum, the medical students acquire a greater level of anatomical knowledge than the students taught in the PBL curriculum. [3, 4, 13] In other reports is stated that the PBL taught students apply their anatomical knowledge more successfully than those taught in the traditional curriculum, while a third group of researchers found no significant differences in the level of knowledge between the students using a traditional curriculum and those taught in a PBL curriculum.

A review of the research papers published in the past fifteen years indicated that, in the PBL curriculum, the basic

medical sciences and particularly the anatomical sciences suffer significantly, because they are under-represented and unevenly distributed. Because of these deficiencies of the PBL teaching, the authors suggested the anatomical sciences, or at least certain components of them, to be taught by the traditional method. [5,11,14-16] Over the past two decades, a number of medical education researchers recommended integration between the PBL and the traditional method in a hybrid method of teaching. The authors suggesting this integration believe that the new teaching method will provide the most effective training for undergraduate medical students. [2, 5, 8, 10, 11, 14-16]

At the new Faculty of Medicine, University of Botswana, a PBL curriculum was adopted. The curriculum was gradually supplemented by a systematic lecture course and relevant practicals, which are components of the traditional teaching method. This way, a hybrid curriculum was created and adopted, which consisted of a PBL component and a traditional component. In the near past, a study on the representation of the anatomical sciences, in the PBL component of the curriculum, showed that they were inadequately covered and unevenly distributed.

The aim of the present study was to establish whether the traditional teaching component, of the hybrid curriculum, contributes to the elimination of the deficiencies in the teaching of anatomical sciences. Secondly, we wanted to see whether the hybrid curriculum gives a good level of anatomical knowledge to the undergraduate medical students.

## **MATERIALS AND METHODS**

To achieve the aim, a non-experimental, data collection and analysis method was used. The data were gathered through “documentary analysis”, which

included a survey of the block timetables and examination papers. The timetable, for each block of the first and second year of the curriculum, was studied and the collected data were recorded, tabulated and analyzed. Special emphasis was put on the number and distribution of the teaching hours in gross anatomy, histology and embryology.

The academic performance, of 52 first year students, was assessed by studying the test question paper. The paper was set on the second block of the first year, titled “Cardio-vascular and respiratory system”. The question paper was of MCQ, Matching questions and Short questions format. The total number of questions, in the paper, as well as the number of the questions asked in gross anatomy, histology and embryology was counted, recorded, tabulated and analyzed. It should be pointed out that the sub-questions of a major (stem) question were counted as separate questions. The marks obtained for the three sub-divisions of anatomy were recorded, processed and analyzed.

Our curriculum was divided into a pre-clinical part (phase I) and a clinical part (phase II). The phase I curriculum consisted of the first two years of medical program, while the phase II, comprised the remaining three years. In the first year of phase I were included 7 teaching blocks, while in the second year were covered 8 teaching blocks. During the phase I curriculum anatomy, physiology, biochemistry, pathology, immunology, pharmacology, microbiology,

family medicine, public health, radiology, clinical skills some neurosciences and psychology were studied.

## RESULTS

The traditional teaching component of the phase I hybrid curriculum consisted of 750 teaching hours (TH), which were distributed among the 13 subjects included in the phase I integrated program. The anatomical sciences received 154 hours (20.5%) of the total teaching time. Of them, the gross anatomy received 91 hours (41 for lectures and 50 for practicals), the histology– 46 hours (21 for lectures and 25 for practicals) and the embryology-17 hours, used for lectures only. More details are provided in table 1.

During the first year of the phase I, the traditional teaching component of the curriculum consisted of 389 TH, of which 108 were allocated to the anatomical sciences. Further details on the distribution of the anatomical sciences teaching hours (ASTH) are given in table 2.

During the second year of the phase I, the traditional teaching component consisted of 361 TH, of which 46 were allocated to the anatomical sciences. More details on the distribution of the ASTH, during this year, are given in table 3.

**TABLE 1: Number and distribution of the anatomical sciences teaching hours (ASTH) during the phase one curriculum (year one and two).**

	Gross Anatomy		Histology		Embryology	Total ASTH	Total TH
	Lectures	Practicals	Lectures	Practicals	Lectures		
Year 1	26	34	17	18	13	154 (20.5%)	750 (100%)
Year 2	15	16	4	7	4		
TOTAL-1	41	50	21	25	17		
TOTAL-2	91 (59%)		46 (30%)		17 (11%)		

**TABLE 2: Number and distribution of ASTH during the first year of phase I.**

Block number	Gross Anatomy		Histology		Embryology	Total ASTH	Total TH
	Lectures	Practicals	Lectures	Practicals	Lectures		
1	0	0	1	0	0	108 (27.8%)	389 (100%)
2	7	8	2	3	3		
3	4	7	4	5	4		
4	4	6	4	4	4		
5	0	0	2	2	0		
6	10	11	4	4	2		
7	1	2	0	0	0		
TOTAL-1	26	34	17	18	13		
TOTAL-2	60 (55%)		35 (32%)		13 (12%)		

**TABLE 3: Number and distribution of ASTH during the second year of phase I.**

Block number	Gross Anatomy		Histology		Embryology	Total ASTH	Total TH
	Lectures	Practicals	Lectures	Practicals	Lectures		
1	0	0	1	1	0	46 (12.7%)	361 (100%)
2	0	0	0	0	0		
3	1	0	0	0	0		
4	1	1	1	1	1		
5	0	0	0	0	0		
6	8	7	0	2	2		
7	4	7	1	2	0		
8	1	1	1	1	1		
TOTAL- 1	15	16	4	7	4		
TOTAL- 2	31 (67.4%)		11 (24%)		4 (8.6%)		

The test paper, on which the students were assessed, consisted of a total of 96 questions, of which 26 were in the anatomical sciences. Of them, 14 were in the gross anatomy, 9 in the histology and 3 in the embryology. These data are summarized in table 4, while the results from the assessment of the student's performance are given in table 5.

**TABLE 4: Number and distribution of the anatomy test questions (out of a total of 96).**

Total	Gross anatomy	Histology	Embryology
26/96 (27%)	14/96 (15%)	9/96 (9%)	3/96 (3%)

**TABLE 5: Results from the test assessment.**

	G. Anatomy	Histology	Embryology	Total
Passed	37/52 (71%)	51/52 (98%)	31/52 (60%)	52/52 (100%)
Failed	15/52 (29%)	1/52 (2%)	21/52 (40%)	
Total Mark %	61%	78%	57%	

## DISCUSSION

Medical education has changed significantly with the introduction of the PBL teaching method; during the second half of the 20<sup>th</sup> century. We agree with the statement of the other researchers that the

popularity of this method is due to the fact that it allows integration between the basic medical and clinical sciences, from the first years of medical education. We also accept the other advantages of the PBL method, which are the ability to encourage self-directed learning, reduce the factual knowledge, allow students to learn by applying reasoning rather than memorization of facts and to help students to become life-long learners with analytical skills.

The results from our recent study confirmed the findings of the other authors that, in the PBL setting, the basic medical sciences and particularly the anatomical sciences are inadequately covered and their teaching and learning suffers significantly. [5, 11, 14, 16] These findings prompted us to support the recommendations of the earlier authors that the anatomical sciences should be taught either by the traditional method or by a hybrid method, which is a combination between the traditional and the PBL teaching method. [2, 5, 8,10 ,11 , 14-16]

The present study indicated that the traditional teaching component, of the

hybrid curriculum, contributed to the elimination of the deficiencies of the PBL method, in the teaching of the anatomical sciences. These deficits were reduced significantly, because the traditional component brought about a sizable extension of the teaching time, which was used for a systematic lecture course paralleled with relevant practicals. What is more, the traditional component allowed synchronization of the PBL clinical cases with the lectures and practicals. This approach helped the students not only to understand better the health problem of the virtual patient but also to identify the anatomical bases of certain signs and symptoms. In addition, the extension of the teaching time allowed certain fundamental topics in gross anatomy, histology and embryology, omitted in the PBL clinical cases, to be covered by the didactic lectures and practicals.

Analysis of the distribution of the added teaching time indicated that the anatomical sciences received 154 hours (20.5%) of the total time of 750 hours. This number of teaching hours was more than the time allocated for any of the other 13 subjects included in the integrated phase I curriculum. Further analysis showed that the gross anatomy gained 91 hours (41 for lectures and 50 for practicals), the histology 46 hours (21 for lectures and 25 for practicals) and the embryology 17 hours. We consider this time allocation as satisfactory, since it reflects realistically the volume of the subject as well as the degree to which the anatomical sciences were under-represented, in the PBL setting, reported by previous authors. [\[5,14,15,17\]](#)

The yearly distribution of the added teaching time showed that 108 hours (27%) was utilized during the first year of the curriculum. The larger number of the teaching hours, used during this year, could be justified with the higher intensity of the

anatomical sciences teaching, due to the nature of the block topics. During this year, however, there were differences in the time allocation for the various teaching blocks. For example, only few hours were spent on block 1 (Foundation of medicine), block 5 (Blood and immune systems) and block 7 (Psychological health). While the low number of teaching hours, spent on for blocks 5 and 7, could be explained with the specific nature of the block topics, the same cannot be said for block 1. In our opinion, this is the block where, the omitted in the hybrid curriculum important chapters, such as introduction to gross anatomy, cytology, histology and embryology, could have been accommodated.

Further analysis of the results indicated that, during the second year, the anatomical sciences received only 46 hours (12.7%). A closer observation of the time distribution showed that 6 out of 8 blocks, received either zero or few teaching hours. We assumed that this is due to the nature of the block topics and the spiral manner of teaching, which the PBL method allows. In essence, the spiral way of teaching is considered as one of the advantages of the PBL method, which allows a revision of certain teaching blocks. However, the very important blocks 3 (Pregnancy, birth and child health), 4 (Kidney and urinary tract), 5 (Cardio-respiratory systems) and 8 (Gastro-intestinal diseases) received either zero or few anatomy revision hours.

Analysis of the test question paper, set on the Cardio-Vascular and Respiratory systems, showed that the gross anatomy and histology were well represented, whereas testing the student's knowledge on embryology was considerably underestimated. The few number of the embryology questions asked could be regarded as an insufficiency of the paper. This is because the students were not tested on the clinically important developmental

abnormalities of the cardio-vascular system. The analysis of the results, from the assessment of the student's knowledge, appeared more than satisfactory. This statement is supported by the good total mark scored in the three sub-divisions of the anatomy. The results from the test assessment indicated that the hybrid teaching method provides a good level of anatomical sciences knowledge, for the undergraduate medical students, which supports the conclusions reported in previous studies. [5, 11, 15-17]

## CONCLUSION

The hybrid method of teaching combines the positive aspects of the traditional and PBL teaching methods. The two components of the hybrid curriculum supplement each other. We recommend the hybrid curriculum to be turned into a preferred teaching method, in medical schools.

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