

Posters as an instructional strategy for interdisciplinary teaching: an approach for applying anatomy to practical situations in a pharmacy course

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Abstract

Many educational policies have been launched aiming at the adoption of interdisciplinary activities by higher education institutions. Despite those initiatives and in front of the exposed, the main difficulty for teachers to change their teaching style is still the lack of alternative strategies feasible to their specific courses and local conditions. A plausible strategy is to adopt tasks and class jobs with topics that forcefully covers multidisciplinary aspects and, therefore, may lead to an encompassing view of knowledge. This article describes an interdisciplinary approach to the integration of issues from previously separate disciplines into an Anatomy, First-Aid and Science Methodology courses in a poster session presented by the students and assessed by both students and professors. Those contents must deal with interesting issues in health sciences and compatible with the knowledge that students already have. Both students' and teachers assessed the posters by two different Likert-type questionnaires about content and form. The results show students' engagement on the activities and reveal enthusiasm on uncommon group activities out of the regular no participative classroom tasks.

Keywords: instructional strategies, posters, interdisciplinary teaching, self-evaluation.

1 Introduction

Good professional education meant the accumulation of knowledge along the undergraduate course until some decades ago. Those curricula traditionally would suffice for the long-life exercise of the profession. While held this educational paradigm higher education institutions were praised essentially for the quantity and quality of information provided: syllabus planning and course organization were overall determined by specific contents. This frequently called "content-oriented" model lasted as long as it was possible for institutions to assimilate the exponential growth of knowledge. The permanent accumulation of information brought about two main consequences to curriculum organization. Firstly, the impossible reconciliation of the increasing information volume with the stability of undergraduate courses class load. Secondly, the constant risk of imparting knowledge that will already be obsolete at the end of the course.

Following this observation international agencies have set guidelines for student capacities development of taking in and articulating new knowledge (UNESCO, 2002; UNESCO and International..., 2002) to meet the currently required abilities for higher education graduates i.e. turning information into knowledge in the absence of a tutor. It is expected that after developing the capacity to learn by themselves, students will be able to permanently expand their knowledge (DRIESEN, VERBEKE, SIMOENS et al., 2007). Interdisciplinary

approach is a recurrent recommendation to reach this objective in higher education courses (MICHAEL, 2005). Some successful experiences of this kind have been reported (CISNEROS, SALISBURY-GLENNON and ANDERSON-HARPER et al., 2002) and offer an overview of programs that promoted the shift from the traditional curriculum approach to those geared to lifelong learning.

Recently in Brazil, many educational policies have been launched aiming at the adoption of interdisciplinary activities by higher education institutions, mainly by the means of tests that contemplate the syllabus as whole as far as possible. It is not a trivial task, however; first because to produce tests that effectively integrate disciplines is very different from make a test with questions of many disciplines; second because it is not usual for professors to work together with different disciplines and recognize the importance or priorities of another field than your own, and; third because it is unavoidable to make choices in the content selection which necessarily lies in content elimination from a discipline to fit the already overloaded class time.

Despite those initiatives and in front of the exposed, the main difficulty for teachers to change their teaching style is still the lack of alternative strategies feasible to their specific courses and local conditions. In its absence, they stick to traditional classroom strategies, ignoring the students' needs for engagement and active participation as ways to reach

the aims of integration. But it is not the rule. One of the most successful interdisciplinary strategies is the well-known problem-based learning (PBL) curriculum (POWERS and JONES-WALKER, 2005).

But when such a deep curriculum change is not attainable, elective courses and innovative strategies may remediate the deficiencies of conventional education and be a starter to discuss and stimulate a broad curriculum integration consciousness in an institution. A plausible strategy is to adopt tasks and class jobs with topics that forcefully covers multidisciplinary aspects and, therefore, may lead to an encompassing view of knowledge (MONTAGNA, GUERREIRO and TORRES et al., 2010). This is not a trivial task for teachers to implement. It includes the shifting from a fragmentary and deep view of the knowledge to joining them horizontally in a global view (ABDULKADER, AZEVEDO-MARTINS, MIRANDA et al., 2005). This article describes an interdisciplinary approach to the integration of issues from previously separate disciplines into an Anatomy, First-Aid and Science Methodology courses in a poster session presented by the students and assessed by both students and professors.

2 Procedures

2.1 Activity Design

The objective is to build posters that present themes with interest to health science area, particularly, to the pharmacy student. Those contents must deal with interesting issues in health sciences (aiming at motivate students with new information) and compatible with the knowledge that students already have, or is not far from their possibilities to find and understand by themselves (aiming at the autonomy development for learning by themselves). The themes are discussed below and were chosen by the teachers; may vary accordingly to the institution, students' skills and background, institutional interest or even research interest.

The students should work in small groups, aiming at the profits of collaborative environment.

2.2 Contents

In content selection, it was first sought to include cases which lied in the possibility of discuss contents from Anatomy, First-Aid and Science Methodology. This was made by an overview of the theme with a general explanation of the case, then a deep discussion of the anatomy of the case, or even the anatomy of a central issue of the case. Then it was to be discussed the possible complications of the case which may lead to an emergency, and which would be the procedures for First-Aid. Finally, how the case is consistent with the scientific knowledge available and by which means that knowledge is attainable by the scientific method, mainly by the information structure and form.

The full understanding of each case will be attained by the integration of knowledge beyond Anatomy, First-Aid and Science Methodology. Although its contents are a part of the case, the activity lies on the deepening of the discussion towards a broader understanding of the events relates to the case in the scope of the disciplines, mainly Anatomy that acts as the central discipline in our choice.

The contents chosen for the posters are shown in the Table 1.

2.3 Methodological procedures

The students were divided in groups of five each ($n = 30$ groups). The cases were chosen by the professors and distributed to the students by sortition. The work's guidelines were informed to the students and they have four weeks to research about their subject and prepare the poster. Students could ask for help about their subject, mainly on the topics' research and eventually to understand details regarding disciplines they did not yet attended in their course. Although all themes have strong relationship with other disciplines and many of them have full molecular mechanism explanations, it was said to be ignored under the risk of being erroneous on the poster presentation.

The posters were exposed all together and were not divided in any form. Professors assessed all posters each by a questionnaire and directly arguing the group as a whole. Students should assess all the posters only by the questionnaire, which were also a group work. The aim of such activity is to stimulate students to carry a high-level cognitive task as evaluation and assessment (BLOOM, 1956) and compromise them in a self-evaluation process (TORRES, 1991) without offering them any advantage by the assessment values itself, but the act of assess the other group's work. The idea was to avoid overestimation of the final grade by the students.

2.4 Assessment

The posters were evaluated by the students through a 18-item Likert-type questionnaire (LIKERT, 1932, JAMIESON, 2004), varying grades from five (5) to one (1). Students' assessment aimed at the structural aspects of presentation and writing skills and all groups assessed all posters of its team. Being so, each group evaluated other twenty-nine posters ($n = 29$). In this manner, all values shown below are the mean of the occurrences obtained by each group for all posters, shown in percentage.

Teachers' evaluation were made trough a 12-item Likert-type questionnaire. This assessment was provided judging mainly the correctness of the concepts, the ability to answer the professors' questions about the matter subject of each discipline and by the ability to integrate the contents of the disciplines in a clear and conscious form. All the three teachers filled questionnaires for all groups and the value shown here are the mean values of the assessment. All values were approximated due the irrelevance of fraction numbers for this case.

3 Results and discussion

The students' evaluation is presented below. The percentage presented is based on the occurrence of the value attributed by the groups to each item of the questionnaire (Table 2).

Although the questionnaire items' refers to posters about different subjects, those items assess general aspects with meaning for all the posters. The comments about the questionnaire items are as follows:

Table 1. List of cases sorted to the students.

Case	Pathology	Anatomic aspects	Possible First-Aids
Group 1: Syndromes			
Alien Hand Syndrome	hand appears to take on a mind of its own	Split brain – corpus calosum	Panic attack
Ehlers-Danlos	Multiple collagen defects	Skeletal system and articulations	Luxations
Guillain-Barré	Peripheral demyelinating polyneuropathy	Peripheral nervous system	Falls/fractures
Jeavons	Epilepsy	Central nervous system/ mioclonic contractions	Epileptic attack
Marfan	Collagen defect	Cardiac malformation	Cardiac arrest/heart attack
Malignant neuroleptic	Reaction to antipsychotic drugs	Autonomic system	Cardiorespiratory arrest
Piriformis	Sciatic nerve compression	Lower limbs muscle and innervation	Pain/paralysis and immobilization
Orthostatic hypotension	Sudden postural hypotension	Cardiovascular	Faints and falls
Raynaud	Vasospastic disorder	Vascular and upper limbs vascularization/ brachial plexus	Trombosis and necrosis/ gangrene
Second impact	Head impact after a concussion	Central nervous system	Seizures
Serotonergic	Serotonergic drug overdose	Central and peripheral serotonergic innervation	Cardiorespiratory arrest
Toxic shock	Bacterial toxin	Multiple organ failure	Cardiorespiratory arrest
Necrotizing fasciitis	Bacterial infection	Multiple organ failure	Cardiorespiratory arrest
Crohn's disease	Inflammatory regional enteritis	Gastrointestinal tract	Abdominal pain/bloody diarrhea
Group 2: Venoms and toxins			
<i>Bothrops</i> sp.	Inflammation and haemorrhage	Vascular system	Haemorrhage
<i>Crotalus</i> sp.	Neuromuscular junction blockage	Peripheral nerves and motor system	Respiratory arrest
<i>Lonomia</i> sp.	Anticoagulation toxin	Vascular and clotting system	Haemorrhage and stroke
<i>Typhus</i> sp.	Spread neural depolarization	Peripheral nervous system	Cardiorespiratory arrest
<i>Phonutria</i> sp.	Spread neural hyperpolarization	Peripheral nervous system and Brain Blood Barrier	Pain and cardiorespiratory arrest
<i>Dendrobates</i> sp.	Acetylcholine inhibitor	Peripheral muscle innervation	Respiratory arrest and paralysis
Tetanus/botulism	Peripheral synapse blocking	Peripheral nervous system	Rigid/flaccid paralysis; cardiorespiratory arrest
Group 3: Drugs and chemicals			
Cocaine	MAO* inhibitor	Central control of systems	Cardiorespiratory arrest
Psilocybin	Complex MAO inhibitor	Central control of systems	Cardiorespiratory arrest and delusions
Heroin	Opioid system	Central control of systems	Cardiorespiratory arrest
Amphetamines	MAO inhibitor	Central control of systems	Cardiorespiratory arrest
Phenol	Liver intoxicant	Liver anatomy	Faints
Sulphydic acid	Mitochondrial respiratory chain blockage	Respiratory system	Respiratory arrest
Benzodiazepines	GABA** receptor inhibition	Central and peripheral control of systems	Respiratory arrest
Nitric acid	Strong corrosive	Tegumentary system	External chemical burn
Mustard gas	Strong corrosive	Respiratory system	Mucosae chemical burns/faints

*Monoamino Oxidases; **GABA-Aminobutyric Acid.

Table 2. The grades attributed by the groups to the posters.

Students' assessment table	Value (%)				
	5	4	3	2	1
1. Structure of the poster	78	12	7	2	1
2. Homogeneity of the formatting	89	9	2	-	-
3. Figures distribution	77	14	8	-	1
4. Amount of figures	64	22	11	1	2
5. Distribution of text	33	31	25	10	1
6. Amount of text	17	19	40	23	11
7. Use of graphics	21	23	32	20	4
8. Graphic and figure quality	45	34	17	3	1
9. Use of color balance and image	47	13	12	18	10
10. The font size made a comfortable reading	20	15	12	37	16
About the texts - general evaluation					
11. Clarity of information	21	22	19	20	18
12. The case is well explained	83	12	5	-	-
13. The level of explanation is compatible with the level of students	78	11	8	3	-
14. There are signs of copying or plagiarism	-	-	4	13	83
15. It was difficult to understand the information presented	76	15	8	-	1
16. Information is available in a logical flow	19	28	15	25	13
17. The text has the formal structure of scientific texts	68	21	11	-	-
18. The references section is formatted according to standards	92	8	-	-	-

1. Students clearly understand the mean of the "poster" media and that it has to carry a visual appeal.
2. Formatting and formal aspects of the scientific communication formalism are valuable to the students due to the very high grade attained in that item.
- 3,4. Students understand the necessity of good images and schemes in this kind of media.
- 5,6. Here raises a contradiction. Even knowing the importance of the image, they still dependent on the text form to explain a point. It is natural to happen, as their whole educational process was based on high information volume and it is seem as valuable procedure. A common allegation was that "the space were too short for so much information", which is a hint about their conceptions about the knowledge/information transmission.
- 7-9. It is curious how students have a misconception about the word "graphic" (which in Portuguese also means "plot") and they many times stated that "my work don't have any phenomena or data that is presentable by 'graphics' (meaning "plots")". It shows the confusion between the word and the mathematical tool.
10. Is a consequence of the items 5 and 6 that confirm those data since it is impossible to format a text to a poster in small font and keep it comfortable to read at distance.
- 11,12. Students do not understand what is a clear argument or writing. But they admit that the texts were well explained. It is also confirmed by the item 13.
14. Although it is very difficult to judge a plagiarism, teachers easily identify hints and traces of copy in

students texts, mainly by the style, language and vocabulary. So in the case of students, the data is spread and do not have a clear tendency. We attribute this effect to the fact that these students never had to make an analysis like that or even though about the issue.

- 15-17. Although the allegation that they were in front of an easily understandable content and that the text is "scientifically written", they cannot define if is there a logical flux in the text or if the text lacks some logic. It is weird, because scientific texts necessarily have to be logic.

18. This results reveal the students concerns about structure formalism.

After evaluate students' assessment, we now show and discuss the teachers' evaluation of the work. It is presented below on Table 3.

Results shown gives a perspective of the students' performance, and the comments as follows.

- 1,2. Students were able to make deep research in the anatomy topics and made correct relationships between the case theme and the anatomical implications.
- 3-5. Although the same did not occurred with First-Aid implications, it raises questions if students were able to make the relationship between the case and the possible occurrences; in a long shot, it is possible to claim that students even understood the work's guidelines. But it is an exaggeration since in the arguing process, much more of them were able to clearly answer the First-Aid Teacher questions. This is supported by items 10-12, where elements that were not present on the poster, but was taken from the students' speeches.

Table 3. The values here in presented are a simple mean of the teachers' assessment.

Teachers' assessment table	Value (%)				
	5	4	3	2	1
About the texts - specific evaluation					
1. The anatomical description is detailed	12	8	4	4	3
2. The figures used have improved understanding of the anatomy of the case / syndrome	19	10	-	-	2
3. The emergency event description is clear	2	5	2	11	10
4. The figures used have improved understanding of the emergency	2	-	-	12	16
5. The group did not present the case of emergency, and only procedures described	2	5	-	10	12
6. Connection between citations and references	22	8	-	-	-
Integration of disciplines					
7. The group was able to show the relationship between the events of the syndrome and its consequences in anatomical terms.	15	5	4	3	3
8. The group was able to show the relationship between the events of the syndrome and its consequences in case of emergency	2	3	5	6	14
Overall rating					
9. Layout / General Appearance	15	10	4	1	-
10. Quality of information	16	10	2	1	1
11. Quality of explanation	16	9	3	1	1
12. Overall rating	14	9	4	2	1

6. The results reveal students' concerns about structure formalism.
- 7,8. This results show the main difficulties of the students to preview the emergencies related to the cases presented. It is highly possible that the lack of knowledge on other important disciplines like pathology, physiology and pharmacology impaired their judgment on the causal forces that driven to clinical consequences of a clinical case. Even though, a significant part of the groups were able to discuss those possibilities that were not shown in the posters, once again supported by the teachers' assessment of item 10-12.

4 Conclusion

It is possible to see that the contents of Anatomy were deepened and the same did not occur to the First-Aid topics. Although it was shown in the guidelines that the possible emergencies also were on the focus of the work, many of the groups understood that the focus was on the first-aid procedure. Also, all the formality of the scientific work was contemplated and skills like writing and formatting were achieved. Despite the low profile achieved in the First-Aid part of the work, it was supplanted by the oral presentation. In this way, we assume that the content-oriented part of the work was achieved.

From other point of view, not quantifiable and impressionist (obviously open to criticism), we saw great engagement of the students either on the poster construction/presentation and on the other groups' assessment. It stimulated the students' interest on topics yet to see in their course as the first year in pharmacy course has very little on health science and is hard on chemistry fundamentals with near to none relation with health science.

Also worth note that all that activity has no more than 25% of bi-month grade and less than 1/16 of the annual grade for approval in the disciplines which proposed a joint grade for this work.

Finally, we must highlight that with the participation of other disciplines like cellular biology, biochemistry, physiology, and so on, this work tends to achieve a higher integrative scope and be a fairly simple way to scratch the surface of that extremely complex task called interdisciplinary teaching.

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