

Interactive methodologies to facilitate the integration of the Human Semiology Curricular Unit

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Abstract

Introduction: Curriculum integration is critical to medical education. However, it represents a constant challenge for the teachers involved, since there is no consensus on the concept, on the need to include integrated activities, and even on their operationalization. **Objectives:** To promote the integration of the human semiology (medical clinic, pediatrics, diagnostic imaging, psychology and health informatics) curriculum unit (CU) through the implementation of interactive methodologies, and to evaluate the students' perception of the module of human semiology after the implementation of these methodologies. **Methods:** Action research was used, involving 76 teachers and 125 students in the third year of medical school. In order to implement the CU, monthly meetings were held between the coordinators for the implementation and follow-up of the interactive methodologies, which consisted of integration of theory and practice, implementation of a joint discussion of clinical cases, holistic view of the patients and their problems, collaboration and communication between teachers, joint classes, evaluation which was integrated with the learning process, and teaching in small groups. In addition, training workshops on the use of the Moodle platform were held for teachers and a page with the activities of the CU was made. Students' perceptions about the CU were evaluated through a voluntary and anonymous questionnaire and open questions (qualitative). All students answered the questionnaire. The five-point Likert scale was used with a midpoint indicating intermediate or nullity, a disagreement domain (values 1 and 2) and an agreement domain (4 and 5). In order to analyze these third year medical school students' performance, their results were compared with those obtained in the tests taken on the previous year. The Statistical Package for the Social Sciences (version 17.0, SPSS®, Chicago, IL, USA) was used in the statistical analysis. **Results:** The joint analysis of the categories of the questionnaire showed that there was a positive impact after the integration between the disciplines and the introduction of interactive methodologies in the course. There was significant improvement in performance, both theoretical and practical, as measured by the grades obtained by the students, when compared to the students from the previous year ($p < 0.001$). On the other hand, in the open questions, students still mentioned heterogeneity among teachers and in the evaluation, the need for a continuous effort to improve and maintain the integration, as well as to adjust the workload, considered insufficient. **Conclusion:** Evaluation analysis showed the need to implement teacher development, joint planning and the continuity of

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the articulation process. The use of interactive methodologies contributed to the integration of the Semiology Curricular Unit.

Keywords: Semiology, Medical Education, Student, Methodology.

Introduction

The implementation of the Nuclear Curriculum at the Paulista School of Medicine established as one of the general principles the integration of disciplines, orienting the construction of the curriculum based on contents and not on administrative disciplines, seeking to reduce the fragmentation that existed in the past (PUCCINI et al., 2008).

One of the curricular units of the Nuclear Curriculum is the unit on human semiology, which takes place in the third year of the medical course. It consists of five disciplines: adult semiology, child and adolescent semiology, human relations semiology, health informatics; these activities involve seventy-six teachers and administrative technicians with teaching activities, coming from different fields of work. The general objective of this curricular unit is to enable the students to carry out anamnesis and physical examination in adults and children, considering the emotional, familiar and social context, as well as to get to know laboratory and image-based diagnostic aid methods.

Although the curricular matrix is modular, teaching is based on the disciplines, where each one has their own teaching program and evaluation.

Although the integration between disciplines is seen as an important educational strategy, it represents a constant challenge. There is no consensus among teachers on the concept, the need for integrated activities and its operationalization (HARDEN et al., 1984; HARDEN, 2000). Integral education has several advantages and can be the essential factor in the development of an effective educational program. An integrated medical curriculum assists students, now qualified with anamnesis and appropriate physical examination, to take a holistic approach while treating patients or planning preventive measures (MALIK; MALIK, 2011). Thus, the need for integration has been advocated by several studies in medical education (HARDEN, 1998; WILLIAM, 1997).

Traditionally, according to the Flexnerian model, disciplines were taught separately with an emphasis on the basic sciences in the early years and on clinical experiences in later years. However, students were expected to be able to combine the knowledge and skills of the disciplines and apply the knowledge gained in their clinical practice. In the latter part of the twentieth century reforms in medical education advocated the combination of disciplines and the organization of integrated learning experience for students. Integration was promoted through the teaching and learning approach rather than assuming that students could somehow integrate their disciplinary knowledge by themselves. While integration was considered a landmark innovation in medical education today it is more widely accepted as a feature for all programs. However, the degree of integration varies. Harden (2000) conceptualized a “ladder” of integration with 11 steps or stages varying the treatment of the disciplines in isolation from one another to interdisciplinary and transdisciplinary projects.

The objectives of this study were to promote the discussion, planning and use of interactive methodologies as an integration tool in the human semiology curricular

unit and to evaluate the students' perception of the curricular unit after the implementation of the methodologies.

Methods

This study was approved by the Research Ethics Committee of the Federal University of São Paulo – Escola Paulista de Medicina, under CEP 0319/10. An action research design involving 76 teachers from the human semiology curricular unit and 125 students enrolled in the third year of the medical course was used. Action research was chosen because it is used in real situations where it is possible to explore the nature of practice and improve it (WATER, 2006).

The use of the action research methodology allows for articulation and reflection-action in the context of the teacher's educational practice, taking into consideration that teaching-learning can only be understood if teachers are aware of the situation in which they are acting (MIRANDA, RESENDE, 2006, CARR, KEMMIS, 1988).

After reflecting on teaching practice, the initial strategy to facilitate integration was to promote the articulation between the coordinators of the five disciplines of this curricular unit, defining and implementing the human semiology teaching plan, including integrated teaching-learning activities and evaluation. Synchronization of the themes from the theoretical program was planned in the various disciplines and the discussion of clinical cases with the presence of teachers from all areas was implemented, as well as joint classes in small groups.

In order for students and teachers to have a global and integrated view of the curricular unit, a page was created on the Moodle platform, with all the activities from the semiology curricular unit, after teachers attended a training workshop to learn how to use this tool. The follow-up of the curricular unit development process was carried out through monthly meetings with the coordinators of the disciplines.

The evaluation of students' perception of the curricular unit was carried out through a voluntary and anonymous questionnaire using the Likert scale (strongly agree, agree, sometimes, disagree, strongly disagree) applied at the end of this course. The questions on the questionnaire explored topics such as: interaction between theory and practice, objectives of the curricular unit regarding: physician-patient relationship, obtaining anamnesis and physical examination data, and clinical reasoning for elaborating a diagnostic hypothesis; and teachers' contribution as a model and improvement of medical practice. The students' perception was also evaluated through the qualitative data obtained in the questionnaire with open questions, which were constituted with comments and suggestions on the strengths and challenges for the improvement of the human semiology CU.

In order to verify if the integration of the curricular unit resulted in students learning more, students' performance was analysed by comparing the results of the tests taken on the previous year and those from the current year. Statistical analysis: The Statistical Package for the Social Sciences (version 17.0, SPSS®, Chicago, IL, USA) was used to create the database and perform the statistical analysis.

Statistical analysis of the questionnaire: the five-point Likert scale was used with a midpoint indicating intermediate or nullity, disagreement domain (values 1 and 2) and agreement domain (4 and 5). Frequency analysis was carried out and was expressed as a percentage. For the statistical calculation of the categories the

following codification was used to calculate the mean: -1: strongly disagree, -0.5: disagree, 0: sometimes, 0.5: agree and 1: strongly agree. The mean was calculated using the weighted relative frequencies that are based on the category of maximum presentation of the event. For the joint analysis of the categories, a contingency table was used, using the chi-squared test. A significant value of $p < 0.05$ was considered.

Results

All 125 students answered the closed questions of the questionnaire and 76% of the students made comments and/or suggestions on the open questions.

The results of the questionnaire showed that 74% of the students agreed that the theoretical classes facilitated the practical activities, and 73% stated that the practical classes allowed them to use the knowledge acquired in the theoretical classes, as can be observed in figure 1.

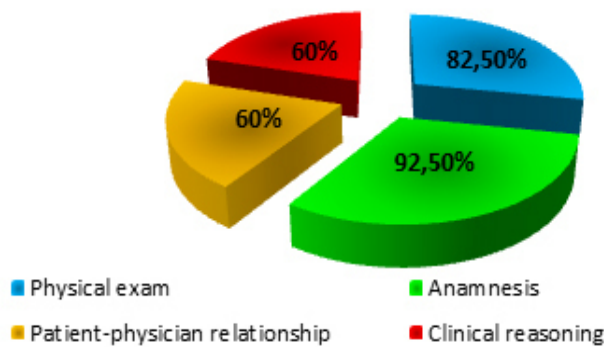


Figure 1 - Percentage of agreement in relation to the objectives reached in the human semiology curricular unit.

The contribution of the teachers in the moments of discussion, to increase students' knowledge about the medical practice, had 86% of agreement; as a model for medical practice there was 80% of agreement.

The chi-squared test demonstrated that there was a positive impact of the semiology course on students' cognitive abilities and practices, as shown in figure 2.

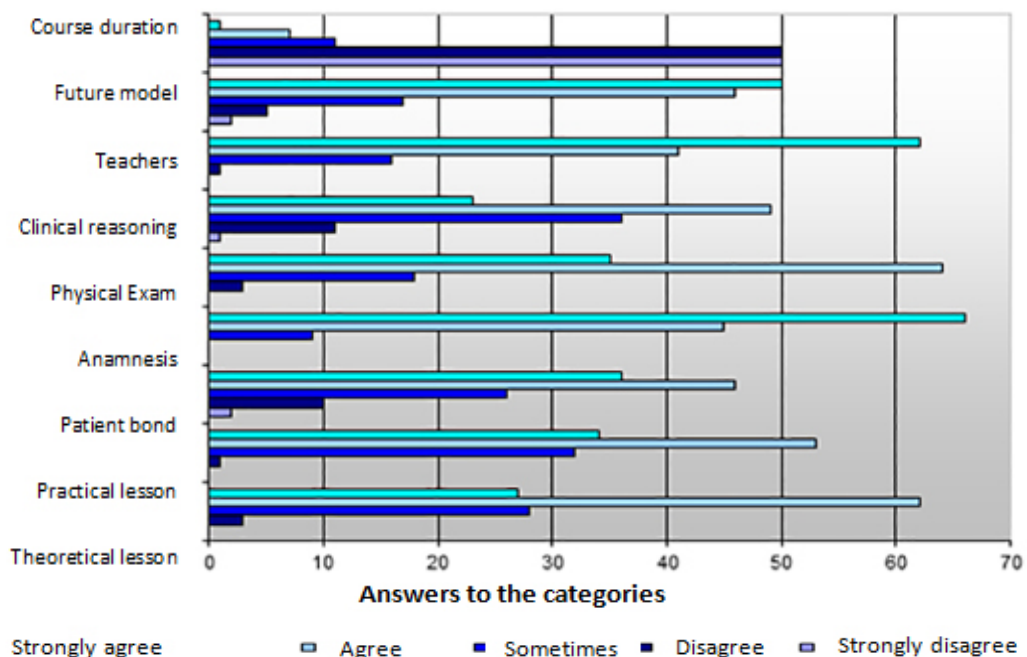


Figure 2 - Frequency of the questionnaire responses, expressed in relative frequencies.

Question 1: Did the theoretical classes provide information that facilitated your activities in the practical classes?

Question 2: Did the practical classes allow you to use the knowledge acquired in theoretical classes?

Question 3: The objectives proposed by the course of Semiology were fulfilled in terms of:

Question 3. 1. Establishing a bond with the patient?

Question 3. 2. Getting anamnesis information?

Question 3. 3. Getting Physical Examination Data?

Question 3. 4. Establishing a clinical reasoning to develop diagnostic hypotheses?

Question 4: Did the teachers' contribution in the moments of discussion increase your knowledge about medical practice?

Question 5: Did the teachers' contribution in the moments of discussion broaden your references as a model for future medical practice?

Question 6: Was the duration of the semiology course sufficient for learning?

The open questions allowed the identification, in the student's perception, through the repetition of information, of the reasons for the difficulty in integration, that is, the heterogeneity between teachers and of the evaluation, the lack of feedback, the insufficient workload of the curricular unit and the insufficient number of supervised practical classes for adequate learning. All of the answers from the 95 students who answered the open questions were used for evaluation.

The table below highlights some of the comments from different participants regarding the difficulty of integration in the curricular unit:

Teacher and evaluation heterogeneity:
«... there is great heterogeneity, both didactic and in terms of experience and knowledge, among our teachers of adult semiology. I think this could be used for students in a better way.»
Lack of feedback:
«... teachers often do not give feedback on the anamnesis or take too long to do so.»
Curricular unit course time:
«... semiology is an extremely important course (Adult and Pediatric), but there is not enough time for it to be taught efficiently.» «... the short duration of the module is certainly the biggest criticism I, and perhaps the entire class, can make. Learning clinical reasoning and all the techniques in 4 months may even be possible, but a longer time would undoubtedly make it possible to retain more knowledge, as well as to gain a little more experience. «

The information obtained by the comments at the end of the questionnaire showed that the students considered semiology to be the most important curricular unit of human of the course so far; they waited for it with great expectation because it is an introduction to medical practice, and that the teacher dedicated to teaching should be more valued, according to reports from different students:

“... the course was one of the best curricular units so far”

“... I believe it is, so far, the most important course of graduation (1, 2, 3 years), but with very little time!”

“... I know it’s complicated, but it is of utmost importance that the University as a whole should give more importance to the career of undergraduate teachers. Teachers who serve as examples as good professionals and ethical people should not be overlooked compared to other teachers who only do research. Research is important, but undergraduate training is the basis for continuity in the academic production process. I know this discussion is at a much higher level, which I do not have access to, but I think it is my duty to express my opinion in this regard. I really liked this module, especially the proximity to teaching, easiness and didactics that my preceptor taught us. “

Test results

Statistical analysis of test performance revealed that students, after the introduction of interactive methodologies, did a better job than in previous years. In the year of implementation, the average grade was 8.6 (lowest grade: 7.6 and highest grade: 9.4) with the approval of all students without an exam, while in the previous year the average grade was 8.1 (lowest grade: 5.6 and highest grade: 9.4) with a failure and final exam for three students. These results presented significant variance ($p < 0.001$), by the ANOVA test.

Discussion

Currently, in Brazil, as in the whole world, medical education has been the subject of discussions. The National Curriculum Guidelines (DCN) (2014), based on the technological advances of medicine and on the commitment to general education, giving the future doctor the opportunity to have a basis on which to develop and learn continuously. Two recommendations of the highest relevance were established: the mediating role that the teacher should play in the student’s learning process, and the active stance of the student in the process of knowledge construction (MEC/CNE/CES, 2014).

According to Prideaux and Ash (2013) integration should be promoted in the approach to teaching and learning, rather than assuming that students can find a way to integrate the knowledge from the different subjects by themselves. In our field, it is assumed that integrated knowledge will result in a more relevant and meaningful student-centered curriculum, but this assumption is often not tested.

In this study, the analysis of the questionnaire answered by the students showed a great adhesion in filling the answers (100%) of the closed questions, as well as the open questions (76%). The closed questions, with a Likert scale, showed that the semiology curricular unit had a positive impact on students’ cognitive abilities and practices. However, it is worth noting that the difficulties presented by the students appeared only in the questions where comments and suggestions for the unit were requested. The students’ reports about the excessive theoretical load and fragmentation of the module classes show a situation which is similar to the one found in many courses at other Brazilian medical schools (ALMEIDA, 2008).

The results of the questionnaire were taken to discussion with the teachers, with the following responses, which were summarized and forwarded to the students as feedback:

As far as the lack of integration goes, a “timeline” was created for class planning, in which subjects are taught synchronously, for example: the semiology of adults will develop respiratory semiology at the same time as the semiology of children aiming to show their similarities and differences, while the same theme will be addressed by the diagnostic imaging department and also by the health informatics department, which will have expressive participation with the electronic medical record and in the computerized search, besides the availability of clinical cases and classes recorded in the Moodle platform. In addition, all anamneses, theoretical tests and projects requested will use this platform, and the teachers who need it will be able to do attend training workshops at any time. As was previously mentioned, a single page was created for the semiotics curricular unit, allowing teachers and students to have a general view. Previously, each discipline had its own page on the platform, and it was often underused.

The integration of a curriculum or curricular unit is a complex process. It is understood and experienced in different ways by students and teachers, and may refer to the method of teaching, content and the incorporation of knowledge by students. It can occur in different rhythms and some subjects are integrated more easily than others (MULLER, 2008; Hollander et al., 2002).

The degree of integration varies. Harden (2000) conceptualized a “ladder” of integration with 11 steps or stages, ranging from disciplines which are isolated from each other, to designs of interdisciplinary and transdisciplinary in stage 11. According to the integration analysis carried out by teachers, they were in stage 3 as far as harmonizing disciplines, where the teachers responsible for different courses discussed and elaborated a joint program through formal planning discussions in monthly meetings. In this process teachers adapted the curricular objectives to make explicit connections within the subject addressed. For Fogarty (1991), the deliberate effort to relate objectives within the discipline, rather than assuming that students will automatically understand connections, is the key point of an integrated model.

The heterogeneity of teachers in teaching is the Achilles tendon of undergraduate studies, especially in a course taught to more than 100 students by 76 teachers from different areas. Harden and Laidlaw (2012) consider that the educational process has three key elements: the curriculum, the student and the teacher. Although the teacher is the key element in creating the conditions under which learning occurs, little attention has been paid to him/her. Teachers can learn from their own experience, but that alone is insufficient. The use of guidelines for good teaching practice, teacher development opportunities and student feedback are important elements in order for teachers to acquire and improve the skills required for teaching.

The faculty of the human semiology curricular unit is made up of doctors and career professors. Most teachers like to teach undergraduate medical students, but only a small minority have training for teaching in medical education, which is also described in the literature (BADALDEN, DAVIDOFF, 2007). The proposal of the teachers’ group was to carry out teacher development workshops with emphasis on the design of an integrated curriculum and the collective construction of the students’ competences and performances, expected at the end of the curricular unit and in the evaluation of the students. Meetings were held with groups of teachers from the practical classes and a manual was prepared with the day-to-day of class

proposals, as well as detailed guidance and checklist for use on the day of the test, in an attempt to standardize assessments and improve teaching.

The lack of feedback from the teachers in the practical classes, mentioned by the students, was solved after teachers' reflection on the results of the questionnaires answered by them. The purpose of the feedback is formative, with the intention of leading to reflections that help the students to make adjustments to their performance and demonstrate improvement in their learning. The feedback should be given frequently, and as soon as possible, after performance, as this allows students to make the necessary changes and corrections (Perera et al., 2008).

All teachers agree with the students' assessment of the small course load. Unfortunately, it is something that can not be changed in the short term. Until this is resolved, it seems important to use the available time as best as possible. In this sense, the objective is to prioritize the practical classes of the course, which has already been happening. The practice scenarios were modified, the classes were reduced with patients under hospital admission, and the groups of students were taken to the outpatient clinics.

In order to obtain integrated learning, it is argued that it must be ensured that the learning context itself is integrated. As medical practice has become increasingly specialized, particularly in large hospitals, the integration of learning has been increasingly difficult to obtain. This is one of the reasons why students' clinical experiences occur in outpatient primary care services, for example. It is argued that these contexts provide students with experience centered on the patient, not on the illness. According to Janssen-Noordman et al. (2006) when students learn complex tasks in an integrated way, it is easier for them to transfer what they have learned to everyday reality in the workplace.

In addition, the number of students for each teacher is also important. In the department of pediatrics the teacher / student ratio is 1: 6, whereas in the medical clinic this ratio is 1:15. The idea is there should be a better distribution of students, with smaller groups in the adult semiology, thus providing better teaching-learning. As the undergraduate course teacher is not valued, many teachers end up dedicating themselves more to scientific research at the expense of teaching.

In the discussion of the university's learning processes, Tinto (1998) considers the student's approach to practice as a privilege of medical training, when different learning is built and shared. According to this same author, the university student lives unique experiences of socialization and identity structuring, having his professional training interconnected with interactions with colleagues, teachers, as well as experiences in the care practices to patients, health teams and the community itself.

In this context, in the hospital environment, as well as in the outpatient setting, it is important to recall Osler's statement: "In what can be called a natural method of teaching, the student begins with the patient, continues with the patient and finishes his studies with the patient, using books and lessons as tools, as a means to achieve a goal. When the student begins he/she is, in fact, already as a doctor... Teach him/her how to observe, give him/her plenty of facts to observe, and the lessons will emerge from his/her own facts "(PUCCINI et al., 2008, p.103).

The present study describes the experience of the institution with the joint planning and the use of interactive methodologies to provide integration of the medical

semiology curricular unit in the medical undergraduate course. One of the essential factors for the movement towards integration was to give less emphasis to the role of each discipline, increasing the importance of the semiology curricular unit as a whole, which showed the need for a change in the structural organization, as well as greater teacher participation in discussions and planning. The active participation of the coordinators of the different disciplines was essential for the successful completion of this initial phase of integration, and the next step will be the most effective implementation of this methodology for all 76 teachers in this CU.

Mennin and Krackov (1998) emphasize the role of leadership and governance for the success of curriculum innovation. The curricular change can happen from top to bottom when decided by the formal leadership of the medical school or vice versa through the organization of the teachers of the curricular unit, as was the case in this study.

The integration of a curricular unit, particularly with a large number of teachers, requires a greater degree of structure than a curricular unit or curriculum based on subjects. In the integrated curricular unit, concepts and ideas from various disciplines must be combined in a logical way. Our study showed that there was an organization and articulation of teachers in order to achieve greater integration.

Later, we should also evaluate the impact of this teaching methodology and evaluation practices on the quality of education through the test of progress and proof of attitudes skills (STEINERT et al., 2006), as well as an evaluation of how teachers experienced the curricular integration.

Conclusion

The role of teacher development in curriculum study as well as in the implementation of interactive methodologies and evaluation is of fundamental importance for curricular integration and for student learning. In addition, to achieve success in this process of change, both formal and informal leadership and essential, and so is governance, i.e. the concrete possibility of implementing change.

The analysis of the results of the questionnaires answered by students resulted in a critical reflection by teachers and clearly showed the need for joint planning of curriculum and activities and of continuing the articulation process.

Continuous evaluation of the curriculum is essential and the impact on teaching-assessment methods and the training of more competent professionals should always be considered, with an emphasis on approach to practice, use of interactive methodologies and timely feedback. We believe that this model adds value to the process of curricular change.

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