

Introduction of radiology in undergraduate evaluation system

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Abstract

The undergraduate training of radiology is different in terms of the curricular content, instructional formats and available human resources. In the present study, organization of undergraduate radiology teaching has been described & important characteristics of undergraduate radiology curricula have been identified. Perception of students about the undergraduate radiology curriculum at university & about radiology as a profession & career choice were explored. Specific questionnaires were developed. Sample size of 50 was taken, of which 35 were post graduate students of various departments and 15 were interns. 97% students were agreeing to add radiology in undergraduate curriculum and 2% were in dilemma to whether add or not and 1% was totally disagreeing to add radiology as undergraduate curriculum. The descriptive results of the questionnaire show large differences in the organization of undergraduate radiology curricula. The results show that students both during pre-clinical and clinical years appreciate particular curriculum components & highly appreciate radiology study to interpret imaging studies. The study experiences affect positively student perceptions about radiology as a profession. Thus, radiology as a subject for undergraduates is a need of time & diagnostic quality by adding radiology as a subject for undergraduate curriculum can be improved.

Keywords: Radiology, Undergraduate, Training, Curriculum, Profession

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This will help to stay the main research objectives and to develop an advance organizer about the different studies, conducted in the context of this dissertation to address the research problem.

Aims and Objectives

1. To describe how undergraduate radiology teaching is organized and to identify important characteristics of undergraduate radiology curricula.
2. To investigate how do students perceive the innovative undergraduate radiology curriculum at University and what explains differences in student perception.
3. To explore the perceived value of clinical studies in the radiology curriculum as well as the impact of radiology studies on the students' beliefs about the radiology profession and radiology as a career.
4. To explore whether case based learning within a computer supported collaborative learning (CSCL) setting results in student satisfaction and helps to develop an improved radiologic problem solving abilities of medical students.

Introduction

The topic of this dissertation is the evaluation of an innovative radiology teaching system within the context of the medical college curriculum. In addition, a perspective is adopted to position the local innovation within a broader frame of references. Depending on a particular medical college, educational programs and in particular, the undergraduate training of radiology, are different in terms of the curricular content, instructional formats (teaching approach, course design, evaluation approaches) and available human resources. Considering the influence of good teaching on learning performance, students satisfaction and future career choice^{1,2}, a better understanding of the content and nature of traditional and innovative instructional formats used in radiology is expected to be helpful to direct the current and future design of adequate learning and teaching involvements and appropriate, state of the art curricula. The introductory chapter presents an overview of earlier research in the field of radiology curriculum as it is related to medical curriculum. This overview will provide a rich background to ground the central research problem of this dissertation. The chapter therefore starts with an overview of literature about the current status of radiology education. Next, a descriptive perspective will be adopted to analyze critical features of radiology curriculum at university.

Materials and Methods

In view of this dissertation, specific questionnaires were developed. To map radiology undergraduate curricula in a context, the questionnaire on undergraduate radiology teaching was developed. In view of evaluating the undergraduate innovative radiology curriculum, a questionnaire "Evaluation Radiology Teaching Concept Skill" (ERTeCS) was designed. A qualitative and quantitative analysis of online collaborative learning, discussion was performed to investigate radiology case based learning in a CSCL

setting. The study was done on sample size of 50, out of which 35 were post graduate students of various departments and 15 were interns. All students were asked about our projects and given questionnaires.

Observations and Results

Out of all students, 97% students were agreeing to add radiology in undergraduate curriculum and 2% were in dilemma to whether add or not and 1% were totally disagreeing to add radiology as undergraduate curriculum. The descriptive results of the questionnaire show large differences in the organization of undergraduate radiology curricula. The results from the evaluation of the undergraduate innovative radiology curriculum show that students both during pre-clinical and clinical years appreciate particular curriculum components such as E- learning, E- testing, the use of E-cases. During clinical years, when students are oriented to the application of knowledge and skills, a high appreciation is expressed for practice linked curriculum components. The results show that students highly appreciate the radiology study to learn, to order and to interpret imaging studies. The study provides students a unique possibility to attend various radiological examinations and to get access to a variety of radiology software systems. They develop a better understanding of radiology and improve their image interpretation skills. The study experiences affect student perceptions positively about radiology as a profession. The results about the case based learning via computer supported collaborative learning groups show that this approach is effective in terms of process and learning performance. Critical is the role of scripting. The CSCL approach proves to be useful for students of different grade levels in view of developing their radiology diagnostic skills and problem solving abilities.

Discussion

Several authors explain why radiology should play a vital role in the medical college curriculum and advocate the need to improve undergraduate education in field of radiology. Educational research stresses to move away from a focus on single and/or isolated radiology learning experiences towards a stronger emphasis on radiology in the undergraduate radiology curriculum and/or towards a fully integrated approach of radiology education.

The current literature emphasizes the adoption of evidence- based approaches in the field of radiology education. Research additionally emphasizes the psycho-social aspects of learning and teaching in medical education^{3,4}. The particular interest is the role of Gestalt principles related visual perceptions in radiology practices and education. Research acknowledged that Gestalt theory conceptions such as the figure-ground relationship and variety of "grouping principles" (the laws of closure, proximity, similarity,

common region, continuity and symmetry) are under appreciated but invaluable in radiology training⁵. Applying these conceptions can help students to better understand and interpret radiology images. Research also centers on broad conceptions of learning as advocated in the medical education literature: "the ultimate goal of education is not to teach well, but for learners to learn well".

This stresses the importance of learning subdomains such as the cognitive (what we think and believe), the affective (what we feel and experience) and the psychomotor (what we do) subdomain in medical education. The affective learning domain is not to be underestimated in relation to clinical competence and clinical performance. Affective attitudes as reflected in emotional responses and personal experiences are sensitive to personal failings and the context. As a result, instructional research increasingly focuses on the design and innovative features of learning environments as reflected in action learning and group work, the interactivity of the learning environment, the expansive use of multimedia and adoption of E-learning. The latter results in the implementation of "blended" learning approach in which face to face instruction is mixed with E-learning, resulting in higher efficiency, better learner achievement and higher learner satisfaction. In this context, a large body of research evidence emphasizes that these innovations are only beneficial when they are perceived as such by the students^{6,7}.

A specific part of research literature discusses the adaption of problem based learning (PBL) in medical education. PBL especially builds a number of theoretical learning perspectives, mainly rooted in (social) cognitive psychology. The literature also inspires future educational practices advantages and disadvantages of problem based learning in field of radiology education. The available evidence, especially centers on the potential of computer based case based learning in radiologic learning^{7,8}.

Case based learning, set up via computer supported collaborative learning (CSCL) settings is a well established approach in the medical literature. But it is a less studied domain in radiology education. CSCL approaches are assumed to be effective in terms of attaining learning goals and to enhance student satisfaction. Though a large number of studies report positive empirical evidence about CSCL, recent studies also point at critical issues to be considered in setting of advanced CSCL applications⁸. First, authors address the non-conclusive results of a number of studies. Researchers also point to low or uneven levels of participation, low average levels of cognitive processing, the detrimental impact of weak levels of prior knowledge and struggles with the structure in discussions. These issues underscore the statement that online collaboration does not automatically lead to improved learning performance. This has resulted in a

new generation of CSCL research and practices that stress the need to add structure to the collaborative task. Authors- in this context- have advanced the concept of scripting to refer to a variety of ways to structure the collaborative tasks. These trends in recent research about medical education, in general and the radiology curriculum in particular have inspired the innovation of the radiology learning and teaching approach as discussed below^{9,10}.

Conclusion

Our study was done on a sample size of 50, out of which 35 were post graduate students of various departments and 15 were interns. All students were asked about our projects and given questionnaires.

Out of all students, 97% students were agreeing to add radiology in undergraduate curriculum and 2% were in dilemma to whether add or not and 1% was totally disagreeing to add radiology as undergraduate curriculum.

Implications

A relevant implication is regarding quantitative characteristics of didactical approaches, such as the total number of radiology teaching hours, or the number of teaching hours for a particular radiology topic. The benchmarking exercise can help to reorient the content and structure of a number of curricula in which there is an under-emphasis on the development of radiology competences. Guidance should be offered to students to help them find suitable teaching websites. Alternatively, dedicated e-learning modules have to be developed at the university hospitals where students receive training which have to be tailored to the specific training needs of medical students, aimed at the correct level, and they should ideally be as interactive as possible to maintain students' interest and improve learning outcomes. Possibilities include covering basic facts with dedicated e-learning modules followed up with subsequent interactive case-based teaching sessions, ideally with a radiologist, where knowledge can be consolidated and any queries can be discussed.

Limitations

The limitations of this study include its relatively small sample size and participants limited to one teaching hospital. It is not clear whether the results of this study reflect the opinion of the entire radiology community in India, so nationwide surveys are needed to explore this particular issue further. A second limitation is linked to the newly developed Evaluation Radiology Teaching Concept Scale (ERTeCS). Future research should underpin the extent to which all the innovative curriculum components are covered by the instrument. In addition, further validation research is needed considering the nature of some of the goodness-of-fit indices. A third issue is related to the cross-sectional nature of the studies building on student

perceptions. Though the cross-sectional nature of the research design helped to study perceptions of students of different training years, this approach has some limitations since it only partly helps to map the longitudinal nature of the perceptions related to curriculum components. A true longitudinal design implies the follow-up of the same cohorts of students during a sufficiently long period of time.

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