

Dental Interns' Attitudes toward case-based learning (CBL). A Qualitative study.

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Abstract

Introduction *The regulatory bodies of dentistry have realized the importance to future dentists of acquiring the skills of teamwork, professionalism, critical thinking, lifelong learning, and problem solving. Those skills can be acquired in interactive student-centered learning approaches where students deal with real cases. Among those approaches is case-based learning (CBL), which was first introduced in colleges of business and law in the late decades of the 19th century?*

Methodology *The aim of this study was to investigate the perceptions of dental interns about using a CBL approach. Focus groups in which different themes were discussed were used as a qualitative research tool. Four focus groups were conducted for a total of 31 interns.*

Results *Our findings indicated general satisfaction among the dental interns with a student-centered small group teaching approach based on clinical scenarios. They indicated their preference for a CBL approach over the traditional lecture-based approach, mentioning greater independence, more joy, less stress, deeper thinking, better understanding, better teamwork, more student involvement, and an enhanced learning environment that was similar to the real context.*

Conclusion *It can be concluded that adopting this teaching method positively influenced the learning process of the dental interns. In addition, using a qualitative research tool was appropriate in investigating learners' perceptions.*

Keywords: Case-based learning, learners' attitudes

Introduction

The regulatory bodies of dentistry in the United States, Europe, and the United Kingdom have realized the importance to future dentists of acquiring the skills of teamwork, professionalism, critical thinking, lifelong learning and problem solving.^{1,2,3} In order to teach such skills while still in the classroom setting, a shift to interactive student-centered learning approaches where students wrestle with "real-world" scenarios is needed.⁴ Among those approaches is case-based learning (CBL), in which learners discover knowledge by themselves rather than passively receiving it. Case-based learning has been used in colleges of business and law since the late decades of the 19th century. Clinical cases or scenarios are required in CBL pedagogy to teach about realistic patient care situations; learners draw from their previously attained knowledge to solve problems.⁵ The case-based learning approach is underpinned by the concepts of social learning and contextual learning. Knowledge evolves through social negotiation; social factors also influence the individual's behavior, which both influences and is influenced by the environment and characteristics of the person. In other words, a person's behavior, environment, and personal qualities all reciprocally influence each other.⁶ According to the contextual learning concept, learning occurs when learners process new information in a way that makes sense to them in

their own inner worlds of memory, experience, and response. This concept of learning assumes that the mind naturally seeks meaning in context, that is, in relation to the person's current environment, and that it does so by searching for relationships that make sense and appear useful.⁷ Put simply, the basic premise of contextual learning is that when learners learn material in the context of how it will be used, learning and the ability to use the information are promoted.⁴

These concepts, social and contextual learning, are clearly seen in CBL approaches. The learners' exposure to alternative points of view is a real challenge to initial understanding. Students invoke their problem-solving methods and conceptual knowledge; they express their ideas and share responsibility in managing problem situations.⁸ The clinical scenario or problem presented is always portrayed in the real-life context of a patient coming to visit a dentist. Thereby, learners are the constructors of their own knowledge in a context similar to that in which they will apply that attained knowledge. This encourages them to think more critically and creatively in order to solve clinical problems.

Case-based learning is adopted as a teaching method with dental interns. The aim of this study was to evaluate the interns' attitudes toward this teaching method.

Methodology

Institutional Approval

The committee of the Research Center at the institution approved conducting this study based on a proposal sent by the first author, thereafter the experiment was conducted.

Method

The case-based learning approach was adopted in an endodontic diagnosis module introduced to dental interns in 2012. One case scenario was introduced and discussed in each module session for a total of five cases during the whole module; the cases were prepared and introduced by a member of the endodontic teaching staff. While the activity was being carried out, the interns were asked to divide into small groups of five to discuss the case. Then each group presented their findings on a flip chart. The objective of this module was to refresh the basic knowledge of the dental interns on the subject of endodontic diagnosis and help them utilize this knowledge to solve relevant clinical problems.

Focus groups were used as a research method in this study; four focus groups were conducted, for a total of 31 interns who participate in the CBL module. The focus groups were all facilitated by the first author, who is trained in running focus groups.

Focus groups represent a powerful tool for collecting qualitative information across many contexts. By definition, focus groups are structured or semi-structured meetings with small groups of individuals that allow the exchange of opinions, information, and feedback in relation to a single topic. Focus groups include, at a minimum, a meeting facilitator and informants.⁹ Focus groups have unique strengths: discussion among participants in the group stimulates the exchange of ideas, so participants can feed off and share each other's ideas and recall things that might not otherwise be recalled. Group participation and interaction might help participants define and frame their points of view by comparing them to others' perspectives. Additionally, people might not be aware of what they think unless they hear someone else discuss it.¹⁰

On the other hand, a limitation of focus groups is lack of confidentiality. People may be reluctant to speak freely about their private feelings or ideas in the presence of other participants. This might result in a sort of misrepresentation, unless they feel reassured that others in the same group are also similar to them on relevant dimensions.¹¹

Analysis

The Framework qualitative data analysis approach was adopted. It is an analytical approach that combines five distinct, though largely interconnected, stages.¹² The first stage is familiarization; the analyst carries out an overview of the body of the material and becomes familiar with its range and diversity. The second stage is identifying a thematic approach. Here the analyst makes notes and records the range of responses to questions, and then identifies the recurrent themes and issues that emerge as important to the respondents themselves. The third stage is indexing, when the thematic framework or "index" is applied to the data in its textual form. The fourth stage is charting. Data is extracted from its original context and reorganized according to the themes identified. The fifth and last stage is mapping and interpretation. Here the range and the nature of the experiences are mapped in the search for explanations and connections. Conversation in the focus groups was recorded using two recorders; this is recommended in case one of them fails.¹¹ The recordings were stored securely. The first author listened to the recordings and transcribed the comments verbatim.

Ethical Considerations

In any social research, three ethical areas are to be considered: informed consent, confidentiality, and anonymity.¹³

In this study, all participants signed and returned informed consent letters. Confidentiality means protecting the identity of the participants; this implies keeping data and names separated by using, for example, codes that are only accessible to the researchers, and reporting data in a way that does not reveal the identity of the participants.¹⁴ At the beginning of the focus groups, the interviewer reassured all of the participants that neither their names nor identities would be disclosed in any written document related to the study. Anonymity, in which researchers should not collect name data at all, goes further than confidentiality. This means that the researchers should not be able to identify which respondent the data came from.¹⁵ To achieve this, the interviewer gave the participants numbers, which were used instead of names during discussion in the focus groups. These numbers were assigned randomly and didn't represent the location of their seats.

Results

Upon analyzing data, the following themes were identified. The quotes of the participants are placed between brackets and in italics. Table 1 summarizes the identified themes.

1. Theme 1: Advantages of the Case-Based Learning Approach

There were a number of similar responses to the initial question posed to participants about the advantages of using such teaching methods. From their responses to this question and the examples they provided, the following dimensions were identified.

- Sharing thoughts among learners
- Enhanced attention and discussion
- Less stressful environment
- Teamwork.
- Peer-to-peer learning

These are some participants' quotes: *"Sharing the information with the other members in the group, we can take more information, I take information from different colleagues in the group and we never forget the information, this is the biggest advantage for me".*

"Everyone in the group can give answers, no one will be ashamed of a wrong answer"

"Informal, which is very good for us, you have a very good environment where you don't feel stressed, a stress-free environment I mean, so you get the information much easier instead of having it in a formal way. . . you feel like. . . eh. . . you're not under stress, not like there is somebody who is just looking for your mistakes to punish you."

Theme 2: Characteristics of an Effective Teacher

The participants in the focus groups identified the same teacher characteristics. They described a person who promotes critical thinking, induces confidence among learners, encourages debate, helps learners find the correct answer themselves, is an expert on the case, and is patient, friendly, motivated, and calm. Based on that, the characteristics of an effective teacher can be divided into two main categories: personal attributes and facilitation skills. The category of personal attributes includes being good listener, friendly, calm, patient, and enthusiastic about the case, *"He should be really calm, he should be patient," "He should be excited; he should have some kind of passion towards the case itself"*.

The second category is facilitation skills, which includes the following:

- Help the learners find the correct answers themselves, rather than giving the answers directly
- Encourage critical thinking
- Have good communicative skills
- Be familiar with the content of the case scenario.
- Be familiar with the teaching method.

"I need him to point me into the right direction, rather than giving me the answer directly without any effort," "He also should encourage critical thinking, so for example, make the groups reach the answer by themselves," "The teacher should have experience in the subject, also he should be familiar with teaching CBL".

Theme 3: Characteristics of an Effective Case Scenario

The first identified characteristic was the clarity of the case which, included the clarity of the clinical photos, radiographs and description of the case: *"Good documentation, pictures and X-rays, good description of the cases. Since the participants cannot see the case with their own eyes they should be able to visualize it to the greatest extent possible without actually being with the patient."* Additionally, it seems that the participating interns in this study preferred the cases to be tricky and interesting: *"The cases should be interesting . . . should be difficult . . . so it doesn't bore the participants, they should focus on matters or on cases that are not typical or not ordinary everyday cases"*. The third and last characteristic identified by the participants was being a "multidisciplinary" case scenario: *"In my opinion, I see that an interesting case should have more than one specialty. I mean a combination of endodontic, periodontic or restorative, something like that." "In response to my colleague's point that cases must have multiple disciplines, as general practitioner that would be crucial . . . yes, multiple disciplines is definitely recommended"*.

Theme 4: Comparison of the CBL Teaching Method with the Traditional Lecture Teaching Method.

The responses of the participants on this theme limited the comparison to three aspects: learning mechanism, efficiency and attention. The mechanism of learning in the traditional lecture method is completely dependent on the teacher's efforts in giving the information to the learners: *"The traditional way is like spoon feeding, it gives you the information directly, you don't need to search."* In contrast, in CBL learners discover the knowledge themselves *"In case-based learning we are the ones (the learners) who must find a solution for the case, not sit in the class and take in the information, we are the ones who must give the solution. It's not boring and you must think."* Concerning the efficiency aspect, the participants highly ranked CBL teaching compared to the traditional lecture method. One participant described the traditional lecture: *"It's easier to be forgotten, it will not improve your thinking . . . also, it won't improve your skills in problem solving and managing your time."* In contrast, knowledge retention was enhanced in the CBL teaching format: *"We will not forget the cases easily, we will link the cases to this exciting time, to those pictures, then once we see the real case in the clinic we will get the answers directly."* Finally, the learners' attention in the CBL sessions was higher than in traditional lecture-based methods. One of the dental interns presented funny example: *"We all have noticed that during the small group activity based on case scenarios, no one picks up his mobile and plays with it. On the contrary, in the conventional lectures, some students are usually distracted and playing with their mobiles."*

Although the participants preferred CBL learning, they still believed that this teaching method wouldn't be able to replace the need for lectures: *"Regarding the conventional learning technique, I don't think that CBL will be able to replace it, because most of the opinions that we express or the ideas that we give are based on the ideas that we got in the lecture."* *"I feel, no, it cannot replace. I mean especially in the early stages of our studies. I mean, how can students discuss possibilities and diagnosis if they haven't even studied it? They should have the basis to build on their diagnosis or treatment modalities."*

Theme 5: Learning of Problem-Solving Skills

All participants agreed that this teaching method helped them acquire problem solving skills, as learning occurs in a context similar to what would be faced in real practice: *"These are clinical cases and very much similar to what we would face in a clinical setting, so they are highly valuable and they are highly applicable as opposed to traditional lectures focusing more on theories that may have no relevance at all to the clinical setting."* Additionally, the participants learned how to solve similar clinical problems in the future by comparing them to the cases presented in CBL sessions: *"Having these cases and the discussion about them will make them stick in students' minds so later on when they face a similar case they'll recall that situation and make comparisons, so they will remember the discussion, the diagnosis and the treatment in regard to the situation"*.

Discussion

The participants in this study expressed general satisfaction concerning the use of case-based learning, which is consistent with the findings of several other studies.¹⁶⁻²² The students' satisfaction can be attributed to several factors. In such student-centered pedagogy, students actively participate in the learning process. The depth of learning attained is based on their participation, engagement and efforts, which supports learning as a dynamic, transformative and exciting process. The learning is like a passion they are responsible for rather than a chore. Additionally, learning is achieved in a stress-free environment while giving the students experience in managing real clinical problems similar to the real context,; which gives understanding at a holistic and applied level.

The participants identified the importance of peer learning as an advantage of CBL. Interestingly, in 2001 Botelho and Donnell²³ conducted a study and found that peer-to-peer explanations were understood just as well if not better than teacher-student explanations. This was attributed to the theory that, in comparison to experts, learners use language that novices can understand. This is more obvious when the medium of instruction is not the mother tongue of the learners. Expert tutors sometimes use technical, elaborate terminology that neophytes might not be able to understand.

The participants in this study and others^{16,20} preferred a teacher who was an expert on the case; however, this issue is a bit controversial. In the original McMaster PBL curriculum, the teachers were not required to have any particular knowledge about the case scenario or the problem being discussed by the students. Furthermore, it was believed that expert teachers wouldn't be able to resist the temptation to lecture to the students, which negatively affects the critical thinking process of the learners. Since the development of the third PBL curriculum, which is known as COMPASS (*concept-oriented, multidisciplinary, problem-based, practice for transfer, simulations in clerkship, streaming*), the trend has changed. Greater emphasis has been put on selecting facilitators with content knowledge of the curriculum and facilitation skills. This was a response to increasing evidence that effective learning and knowledge transfer need feedback from the teachers.²⁴

The results indicated that participants felt they had learned problem-solving and critical thinking skills that would aid their clinical practice in the future. These findings were in line with ADEA CCI^[1], who argued that comparing their findings with the teachers who work with them helps students develop the skills of problem solving and critical thinking. This learning mechanism is underpinned by the concept of case-based reasoning (CBR), in which the case scenario is stored as a holistic case with its solution rather than as scattered factual rules, which makes the retrieval of knowledge much easier.²⁵

As a qualitative study, the validity of this research can be established by a number of mechanisms, and the similarity of these results with other research offers some reassurance that the benefits are perceived by learners from multiple cultures and backgrounds^[26]. It is also very impressive how the participants' comments in this study reflected on the underpinning educational theories of learning and teaching. For example, they identified teamwork and peer learning as strengths of these teaching approaches; they preferred multidisciplinary cases, as they are more similar to the real practice of health care; and they preferred a facilitator with content expertise to provide them with feedback on clinical care.

Conclusion

This research reported on introducing an endodontic diagnosis module to dental interns in a case-based learning format. Such an active student-centered approach enhances problem-solving and critical thinking skills among learners, which is in accordance with the recommendations of the regulatory bodies of dentistry in the United States, Europe and the United Kingdom^[1-3]. This CBL module simulates actual clinical cases and instills a sense of decision making and teamwork. After this successful experience, the CBL methodology can be applied in other areas of clinical education, which enhances the learners' diagnostic and decision making skills.

Competing interests

The authors declare that they have no competing interests

Authors Contribution

AAA conducted the experiment and participated in writing the manuscript.

LAA participated in designing the study and editing the manuscript

Abbreviations

CBL – stands for Case Based Learning

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Table 1: summary of the identified themes

<p>Theme 1</p>	<ul style="list-style-type: none"> • Advantages of CBL • Sharing thoughts among learners • Enhanced attention and discussion • Less stressful environment • Teamwork • Peer-to-peer learning
<p>Theme 2</p>	<ul style="list-style-type: none"> • Characteristics of an Effective Teacher • Personal Attributes • Good listener • Friendly • Calm • Patient • Enthusiastic about the case • Facilitation Skills • Help the learners find the correct answers themselves • Encourage critical thinking • Have good communicative skills • Be familiar with the content of the case scenario • Be familiar with the teaching method
<p>Theme 3</p>	<ul style="list-style-type: none"> • Characteristics of an Effective Case Scenario • Clear radiographs and images • Interesting • Multidisciplinary
<p>Theme 4</p>	<ul style="list-style-type: none"> • Comparison of the CBL Teaching Method with the Traditional Lecture Teaching Method. • The comparison was limited to three aspects: • Learning mechanism • The mechanism of learning in the traditional lecture method is completely dependent on the teacher’s efforts in giving the information to the learners. This is in contrast to CBL, where learners discover the knowledge themselves. • Efficiency and retention • Efficiency of teaching and knowledge retention were enhanced in CBL compared to the traditional lectures. • Attention • The learners' attention in CBL sessions was higher than in the traditional lecture-based method.
<p>Theme 5</p>	<ul style="list-style-type: none"> • Learning of Problem-Solving Skills • All participants agreed that this teaching method helped them acquire the problem solving skills as learning occurs in a context similar to what would be faced in the real practice