International Journal of Dental Sciences and Research, 2021, Vol. 9, No. 2, 23-26
Available online at http://pubs.sciepub.com/ijdsr/9/x/x
Published by Science and Education Publishing
DOI:10.12691/ijdsr-9-2-1

Application of Competency Based Education in Dentistry (Review Article)

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Received May 15, 2021; Revised June 20, 2021; Accepted June 27, 2021

Abstract Nowadays Competency- based education (CBE) is considered one of the greatly accepted and widely spread educational strategies, it has great applicability in different fields, and one of those fields is dentistry, as its main aim is to introduce a qualified graduate who can work independently in the dental practice without supervision and who not only has a good knowledge, but also has good skills, attitudes, and values. One of the main advantages of Competency based education over the traditional education is the shifting of the educational process from the teacher based to a student based. It is proposed that there are 4 stages of competency which are novice, beginner, competent, and expert, which depend upon the degree of assistance the student receives in each stage. There are different assessment methods used in the competency based education using some evaluation criteria (Rubrics) for each stage, in order to shift from the traditional to the competency based education it is proposed that the curricula, and assessment methods should be reviewed. In this article I will discuss the applicability of competency-based education in dentistry regarding, its advantages over traditional education, stages, and the different assessment methods.

Keywords: *competency, dental education, traditional, strategies, assessment, rubrics, advantages, disadvantages, significance, stages*

Cite This Article: Noha Rashwan, and Mohamed R Mahmoud, "Application of Competency Based Education in Dentistry (Review Article)." *International Journal of Dental Sciences and Research*, vol. 9, no. 2 (2021): 23-26. doi: 10.12691/ijdsr-9-2-1.

1. Introduction

Dentistry is a field that demands a wide understanding of a broad range of basic and health-related sciences. In the last few decades, educational methodologies have evolved to include a student-centered approach as well as competency-based learning. Such philosophies have replaced the classical teacher-centered learning strategy. [1] Previous research have suggested that change in thinking about assessment in dental education is essential. Several differences exist between medical and dental teaching philosophies. Unlike medical education, dental education focuses on the development of competency as well as an equivalent of residency. Medicine entails residency, which demands years of clinical education following medical school [2].

What is competency? It is an integrated response to the full spectrum of conditions encountered in general dental practice, competency is the combination of expertise, skills, attitudes and values [3]. New graduates are competent when they function independently in a clinical setting [4]. Montero indicated that dental competence is a combination of expertise, skills and attitudes appropriate to the individual aspects of the dental profession, although this prerequisite is typically specified for a recent graduate dentist as the minimum reasonable standard of performance. General dentistry's clinical abilities entail mechanical hand procedures that depend on the development of psychomotor skills during clinical training practices [1].

During the 1950s in the United States, competency-based education (CBE) came into practice [5]. Such concept was introduced in dental education in 1993 with the publication of article entitled "Toward a Competency-Based Curriculum" and a session, at the annual meeting of the American Dental Education Association (ADEA; then, American Association of Dental Schools, AADS), focusing on the potential impact of competency on various aspects of dental education. In 1997, the dental education accreditation standards were modified to require a competency-based approach [6]. In 1995, CBE was introduced as a philosophy for dental education by the Commission on Dental Accreditation (CODA) [5].

Previous researchers have suggested the need of a competency-based curriculum in dental education. When preparing and designing curricula that are meant to meet the needs of dental practice, the conceptual discrepancies between a conventional discipline-based and a competency-based curriculum must be recognized. Dental competency can be classified into physical-technical

competence, intellectual competence, and interpersonal competence. It is important not to focus solely on the evaluation aspect of competency based education rather than addressing the curricular and instructional implications. The idea of competency relies on transferring the responsibility for learning from teachers to learners. The dental graduates are encouraged to reach a higher degree of competency through continuing education and postgraduate dental training [3]. In order to ensure that each dental graduate has the same basic knowledge of dentistry, pre-doctoral competencies must be standardized by each dental school. Such procedure would enable postdoctoral programs to evaluate dental students more equally. Post-doctoral competencies reflect the resident's ability to perform at an advanced level of general dentistry. [7]

Several researchers correlate problem-based learning (PBL) to competencies in the dental field, particularly when it comes to diagnosis and treatment planning. The idea behind PBL is to decrease the reliance on teachers, and to direct education toward active student-centered learning with particular focus teamwork and critical appraisal [4]. The impact of the growing diversity in the healthcare field in the United States has been significant. A new strategy of cultural competency has been developed to address disparities in health care and to help healthcare professionals in adapting to diverse populations. One of the emerging types of competency is cultural competency which is considered the corner stone of reducing racial and ethnic health disparities. Cultural competence can be defined as a "set of congruent, attitudes, behaviors, and policies that form an agency/system between health professionals and enables them to work efficiently in a cross-cultural situation." [8]

2. Significance of Using CBE in Dentistry

Yib proposed the advantages of Competency-based education which included [4]:

- Decreasing passive dependence on lectures
- Enhancing student performance by active participation as well as clinical problem-solving
- Encouraging critical assessment of competing evidence.
- Improving interdisciplinary understanding and database evidence searches.
- Establishing closer links between and educational institutions and private practice settings.

Deogade described the four distinguishing characteristics of CBE [3]

1. Analysis of the practitioner's job responsibilities defines trainee outcomes.
2. Curriculum should be based on the needs of dental students so that they are able to perform their responsibilities effectively rather than the traditional subject matter prerogative of disciplines.
3. The educational experience should allow dental students to proceed with the learning process at their own pace.
4. The system is designed to allow educators to rely on assessment techniques that measure unassisted student's performance in settings approximating real-world scenarios. Such system decreases the students' passive dependence on lectures and enhances their performance in an active learning environment.

3. Stages of CBE

Deogade suggested that the competency process is not achieved at one step, but rather earned in successive stages. The main objective of CBL is for the student to progressively independent gain a better understanding of the curriculum and for discipline-based learning to take over the learning process [3].

Researchers have classified competency into several stages:

1. Novice: This is regarded as the first learning step on the educational process. Confusion can be present at this stage. Such stage entailed a rote mimicking process of instructors and usually takes place in a simulation laboratory or diagnostic clinic.
2. Beginner: This is the next step of the learning process that is achieved with further instruction and practice. Students reach some level of control of the competency process and are able to demonstrate this control in ideal, simulated situations. Students usually master the basic knowledge and their performance is improved at this stage.
3. Competent: This is the third stage of the learning process in which students are able to understand the basis for their decisions, and possess appropriate professional values. At this stage, students are considered competent to meet the dental needs of most patients.

Chuenjitwongsa proposed that the competence of teachers is as equally important as the competence of students. Becoming a competent health practitioner is a staged process, starting from novice till to competent stage is reached and finally progressing to become an expert [9].

4. Comparison between Traditional Learning and CBE

Traditional dental education (TDI) regarded as an example of an apprenticeship model. Although such model has been used for several decades, many dental graduates may not have been exposed to those approaches of learning, judgments, skills, and critical decision making. Traditional dental curricula may not be able to supply accelerating learning outcomes to students so that they are not able to perform effectively in most circumstances [3]. Over the past several years, CBE has earned significant interest worldwide. It can be considered different from traditional learning methods as it transfers the assessment away from knowledge acquisition process towards knowledge implementation. Such approach relies on including more formative assessment through the observation of the residents' skills and correlating their performance to that of the gold standard. [10]

Previously, dental learning followed a pattern in which residents acquired what teachers wanted to teach them. The goal was to introduce a dentist with acceptable level of knowledge following graduation. Such strategy was

essentially disciplined-based. The new strategy is shifted toward competency-based education. This form of learning offers students a series of specified education experiences, so that they can be recognized as skilled clinicians following their graduation. The implementation of competency-based education necessitates updating of traditional curricula, but there is still some common ground between traditional and competency-based education.

A recent study evaluating two groups of dental residents showed that those that relied on CBE felt more competent in communication, and critical assessment, compared to those that utilized the traditional form of education. Competency involves creating behavioral patterns that are accessible to wider assessment protocols than are traditionally used in formal teaching. [4]

Deogade proposed that CBE school graduates felt more confident in their communication and critical assessment skills of current clinical condition and recognition of oral and dental related issues. CBE worked to assist in some fields such as diagnosis, treatment planning, judgment, and patient care as a close relation to dental competencies [3].

5. Assessment Methods of CBE

Competency-based education (CBE) has been established as a dental school educational model, so assessment strategies should be applied in a manner consistent with this educational philosophy. In order to do this, firstly, we have to understand the definition of competency-based education, then we will look for best practices to determine the ability of students to provide dental treatment in the public domains without guidance and under their own license. The highest priority in CBE, is to assess the students' practice readiness. which is based on two concepts: 1. Evaluating the overall competence of students rather than concentrating on particular skills. 2. The use of multiple sources of data based on the triangulation concept. [5]

George Miller indicated that no specific form of assessment would result in a reliable assessment of competence. He suggested a four levels assessment structure. The lowest level includes assessing what learners know ('knows'), then assessment of the applicability of the knowledge in relevant tasks or problems ('knows how'). This is followed by evaluation of task performance under standardization of settings ('shows how'). At the end, the highest level measures the student's performance in the unstandardized settings ('does'). The 2019 assessment workshop concentrated on improvement in the evaluation of learners at a non-standardized workplace-the highest level of the Miller assessment pyramid ('does'). [2]

Three components of dental competence, physical-technical competence, intellectual competence, and interpersonal competence, were identified [4], Formative and summative assessments of competency-based dental education programs have been reported to be successful in demonstrating an improvement in cognitive, psychomotive and affective learning domains. [5] Desi suggested that the specialty-specific knowledge, skills, and behaviors provide a descriptive rubric for assessment of trainee competence [10].

The students' assessment of their level of competence and academic achievement is a measure of the instruction received and may help to reevaluate how students are taught. Montero recognizing that every assessment guides resident's learning in competency-based education, we noticed that there is a shift from an emphasis on assessment of learning toward increasing use of assessment for learning [1].

Learning assessment takes the student into the appraisal process by actively asking them to be involved through reflections and self-assessment in processing feedback. Self-assessment helps the students in identifying their strengths and knowledge gaps. Utilizing critical thinking and problem-solving skills, students are directed toward building strategies that fill the gaps in their education. Such skill is essential in their career particularly because it is carried forward into their life. On the other hand, the assessment is no longer considered a domain that is under the faculty control; instead, it becomes a shared responsibility between students and their faculty. [2]

In dental education the focus on measuring overall competence has increased. The CODA standards implemented in 2013 state that dental education programs "should assess overall competence, not simply individual competencies, in order to measure the graduate's readiness to enter the practice of general dentistry". As such, the interest in identifying useful measurement tools to assess the overall competence of dental graduates has increased, leading to the need to establish psychometrically sound assessments based on a conceptual framework in CBDE settings [11]. The ADEA Competencies for the New General Dentist are the existing national competency standards. These competencies, which were accepted by the ADEA House of Delegates in 2008, are grouped into six domains:

1) Critical Thinking Skills
2) Professionalism
3) Communication Skills,
4) Health Promotion
5) Practice Management
6) Patient Care

A) Assessment, Diagnosis and Treatment Planning
B) Establishment and Maintenance of Oral Health [12].

6. Conclusion

Competency based education, considered a predictable method of learning in dentistry, and it is defined as a combination of expertise, skills and attitudes showing great advantages over the traditional learning. There are different techniques of competency based assessment. The ADEA accepted Competencies including 6 domains. Differences between a traditional discipline-based and a competency-based education must be considered while planning the dental curricula, as well as the assessment tools.

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