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Original Article

Dentistry Section

Perception and Attitude of Students and Teaching Faculty on Continuous Cumulative Evaluation System in Dental Education

RASHMI VENKATESH[1], SEEMA BARGALE[2], MONALI SHAH[3]

ABSTRACT

Introduction: Continuous Cumulative Evaluation System (CCES) is an innovative formative evaluation system practiced in Sumandeep Vidyapeeth which is located in Gujarat, India. The CCES is carried out during the conduct of course and every undergraduate student is evaluated for his/her performance in theory lectures and/or in clinical and/or practical classes daily. The cumulative marks secured by the student for entire academic year is calculated and part of it goes as internal assessment marks which will be added to their summative evaluation.

Aim: To evaluate the perception and attitude of dental students and teaching faculty regarding CCES.

Materials and Methods: In this cross-sectional study, self-prepared validated questionnaires were distributed amongst dental students and teaching faculty of K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Vadodara, Gujarat, India. Total 42 faculty questionnaire and 300 student questionnaires were distributed. Questionnaire for teaching faculty consisted of eight questions while questionnaire for students consisted of six questions. Collected data from filled questionnaires were subjected to descriptive statistics and the significance of differences among responses depending on seniority of faculty in faculty group and by year of study in student group was determined by Chi-square test.

Results: The response rate of the study questionnaire was 35 (83.33%) and 276 (92%) for faculty and students respectively. Both students (100%) and the faculty (91.42%) were open to implementation of newer evidence-based evaluation methodologies in curriculum. The junior faculty felt 14 (82.35%) difficulty in adapting to CCES system. Both faculty 24 (68.57%) and students 257 (93.11%) agreed that CCES in every lecture has increased the students attentiveness in theory class.

Conclusion: The CCES as an innovative evaluation system is well accepted by teaching faculty and students of K M Shah Dental College and Hospital, Sumandeep Vidyapeeth.

Keywords: Assessment, Formative, Perception, Summative

INTRODUCTION

Educational assessment is intended to identify student's knowledge, skill and aptitude, such an assessment is also a stepping stone for their promotion to further classes, certification and/or selection to any new course [1]. Traditionally in medical, dental or any other health care professional courses the summative evaluation was given importance which typically give concrete scores and other objective measures [2]. This type of evaluation is usually conducted at the end of the course or module. What was lacking in this type of traditional evaluation system was students getting day to day feedback on their performance which reinforces the learning behaviour and improve their skills. This can be delivered only by implementing formative type of evaluation [3].

Miller GE, in 1990 proposed a new model for assessment of clinical competency amongst health care students which is widely known as Miller's pyramid. In this pyramid of evaluation processes the broad base (knows and knows how) involve class-room based assessment which evaluates cognitive components of competence. The behavioural components of clinical competence is evaluated by following the higher two levels (shows how and does) of Miller's evaluation method [4]. In Sumandeep Vidyapeeth cognitive components of undergraduate students are evaluated on day to day basis in every theory lectures and the practical/clinical postings through a formative evaluation system known as Continuous Cumulative Evaluation System (CCES).

The CCES was designed to assess the factual knowledge and context-based knowledge through Multiple Choice Questions (MCQ) and oral evaluation. At the end of every theory lectures, students attempt a set of five MCQ's framed from the subject matter taught in that particular lecture on specially developed CCES application in their cell phone/tablet. The software automatically displays the secured marks which was accessible by the faculty. By this both student and faculty would be aware about level of understanding of the subject through their performance.

The CCES was even implemented in practical/clinical postings. Regularity of students, punctuality and attitude of students towards their peers, faculty and patients, the students clinical work was evaluated on daily basis during their practical/clinical postings. Parameters like equipment handling, their behaviour during patient management, following infection control protocol were also evaluated and based on this the CCES scoring was done in clinical/practical sessions.

The 40% cumulative score secured by a student in particular subject was later added to his/her internal assessment marks both in theory and practical/clinical classes as separate entities. In Medical college affiliated to Sumandeep Vidyapeeth, study was conducted to evaluate the impact of feedback on CCES for learning in human physiology subject. Here the authors provided the students with corrective feedback for the MCQs after every lecture to increase their learning process. Later they assessed the learning outcome, evaluated the perception of students on feedback methodology [5]. For the success of any evaluation system, it should be accepted by all the stakeholders. Hence, this study was planned to evaluate the perception and attitude of dental students and teaching faculty of K M Shah Dental College and Hospital towards CCES.

MATERIALS AND METHODS

This cross-sectional study was conducted at K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Vadodra, Gujarat,

India, after obtaining permission from Institutional Ethics Committee (SVIEC/ON/DENT/SRP/1521). The study was conducted between September to November 2016 during the academic year 2016-2017. The study conducted was in agreement with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000 [6].

Inclusion and Exclusion criteria: Students of all the years who were present on that day of questionnaire distribution were included in the present study and individuals who were absent on the day of questionnaire distribution along with individuals who refused to given written consent were excluded from the study.

Questionnaire

Two sets of questionnaire for evaluation of perception and attitude of dental students and teaching faculty regarding CCES was prepared and were validated (face and content validation). The questionnaires were self-prepared;

- Questionnaire for teaching faculty consisted of eight questions [Table/Fig-1].
- Questionnaire for students consisted of six questions [Table/Fig-2].

S. No.	Questions	Yes	No
1	Are you open to implementation of newer evidence-based evaluation methodologies		
2	Are you happy with incorporation of CCES in academic curriculum?		
3	Do you feel adapting to CCES implementation is time consuming?		
4	CCES in every lecture class is giving you extra burden of preparation?		
5	CCES in every lecture class is giving you extra burden of correction and documentation?		
6	Adaptation of CCES in every lecture has made students more attentive in class?		
7	Do you feel lecture classes are unsuitable environment for conducting CCES?		
8	Do you feel that CCES takes away the time for covering more details in lecture classes?		

[Table/Fig-1]: Questionnaire for teaching faculty on Continuous Cumulative Evaluation System (CCES) in dental education.

S. No.	Questions	Yes	No
1	Are you open to implementation of newer evidence based teaching methodologies?		
2	Has any similar evaluation system was adopted in your previous years of education (primary and higher school education)		
3	CCES in every lecture class is giving you extra burden?		
4	Adaptation of CCES in every lecture has made you to be more attentive in class?		
5	Do you feel lecture classes are unsuitable environment for conducting CCES?		
6	Do you feel that CCES takes away the time for covering more details in lecture classes?		

[Table/Fig-2]: Questionnaire for students on continuous cumulative evaluation system in dental education.

The researchers widely reviewed the initial draft of both faculty and students' questionnaires. The questions were assessed qualitatively (face and content validity) by two members of dental education unit of the institute. The suggested changes were made. For reliability, pilot study was done on 10 participants of each group (excluded in final sample size) and the questionnaire and Cronbach's alpha value was calculated. Cronbach's alpha value was 0.82 and 0.82 for questionnaire of teaching faculty and student respectively indicating that the survey instrument had high reliability and internal consistency [7]. Along with participant information sheet and informed consent form, the questionnaires were distributed amongst study participants. Total 42 faculty questionnaire and 300 student questionnaires were distributed.

STATISTICAL ANALYSIS

Filled questionnaires along with signed consent form were collected and data entry was done in Microsoft excel sheet and was subjected to statistics. Statistical analysis was performed by using the Statistical Package for Social Sciences (SPSS) version 19.0. Descriptive statistics was applied and data was presented as frequency (n) and percentage (%), and the significance of differences among responses depending on seniority of faculty in faculty group and by year of study in student group was determined by Chi-square test. The level of significance was set at p-value <0.05.

RESULTS

Perception and attitude of teaching faculty on continuous cumulative evaluation system in dental education: Total 42 teaching faculty questionnaires were distributed and the response rate found was 35 (83.33%). The mean age of the study participants was 31.14 years. Among the study participants, 21 (60%) were males and 14 (40%) were females. Amongst 35 respondents, 18 (51.4%) were senior faculty with more than five years of experience (professors and associate professors) and 17 (48.57%) were junior faculty with experience less than five years. The [Table/Fig-3] describes and compares the response of senior and junior faculties to the questions of the questionnaire. For the question on adapting to CCES implementation, there was statistical difference between the response of senior faculty and junior faculty (p-value=0.023). The junior faculty felt 14 (82.35%) difficulty in adapting to CCES system, as it was time consuming for MCQ preparation for theory/didactic lectures, observation of day to day performance of student in clinical and/or practical classes, record keeping of marks and sending it as part of student's internal assessment. There was no statistical differences between the responses of senior and junior faculty for rest of the questions. Faculty participants felt lecture classes are suitable environment for conducting CCES 30 (85.71%) and this student evaluation at the end of the class has made them more attentive in the theory lectures.

Faculty experience	Response	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Senior faculty	Yes	18	18	8	7	10	12	3	3
	No	0	0	10	11	8	6	15	15
Junior faculty	Yes	14	14	14	4	7	12	2	8
	No	3	3	3	13	10	5	15	9
p-value		0.104	0.104	0.023	0.271	0.305	0.546	0.528	0.057

[Table/Fig-3]: Faculty response to the questionnaire.

Perception and attitude of dental students on CCES in dental education: Total 300 student questionnaires were distributed and the response rate found was 276 (92%). Among the study participants, 225 (81.5%) were males and 51 (18.5%) were females. Amongst 276 respondents, 51 were interns, 88 were IV year BDS students, 66 were III year BDS students, 37 were II year BDS students and 34 were I year BDS students. The [Table/Fig-4] describes and compares the response of students to the questions of the questionnaire. There was no statistical significant differences observed between the responses of the students based on their year of study to any questions. All the participants 276 (100%) were open to implementation of newer evaluation methodologies. Majority of students did not feel this exercise in every lecture is causing them extra burden 260 (94.2%) and they accepted that CCES incorporation has made them more attentive in class 257 (93.11%).

Question number	Response	Interns	BDS student				p-value
			IV year	III year	II year	I year	
Q1	Yes	51	88	66	37	34	0.72
	No	0	0	0	0	0	
Q2	Yes	0	14	8	9	5	0.038
	No	51	74	58	28	29	
Q3	Yes	0	9	1	3	3	0.126
	No	51	79	65	34	31	
Q4	Yes	51	82	61	33	30	0.422
	No	0	6	5	4	4	
Q5	Yes	2	7	1	2	1	0.418
	No	49	81	65	35	33	
Q6	Yes	3	17	10	4	3	0.187
	No	48	71	56	33	31	

[Table/Fig-4]: Students response to the questionnaire.
p-value <0.05 was considered as statistically significant

DISCUSSION

The effective training of healthcare professional is always challenging. Introduction of various innovative teaching-learning methodologies and evaluation/assessment methods are helping in effective medical/dental training [8]. The statutory councils usually prescribes the method of summative evaluation in India. But the statutory council has given flexibility to all institutions to adapt any tools of formative assessment so the learning outcome of the student is improved [9]. Main focus of formative assessment is "assessment for learning" which differs from "assessment of learning" [10]. CCES is a innovative formative evaluation system in undergraduate programs implemented in the constituent colleges of Sumandeep Vidyapeeth. This system is effectively been carried out in medical, dental, nursing, pharmacy and physiotherapy colleges which come under Sumandeep Vidyapeeth. This study was carried out to evaluate the perception and attitude of the stakeholders of dental institute i.e, dental faculty and dental students. The present study has highlighted the perception and attitude of dental teaching faculty and students regarding CCES. Faculty play an important role in the backing of medical education including student assessment. Hence, open minded faculty for trying the new methodologies in all aspects of medical curricula is important [11]. In present study, the faculty were happy with incorporation of CCES in academic curriculum and also they were open for trying such other innovative formative assessment methods. Constructing time required for preparing MCQs is more as the question framing should test the clinical decision-making skills along with giving appropriate answer choices [12].

In present study, though the faculty did not find extra burden of preparing five MCQs for each theory class, but they felt adapting to entire CCES system is definitely time consuming. Formative assessment in health care education system is one of the motivating factors for students learning. Retention of knowledge after learning is critical and this can be improved by providing the students with various formative assessment opportunities during their training [13]. In present study, faculty felt the attentive ness of students has increased in theory lectures due to incorporation of CCES. In study conducted by Kerdijk W et al., authors have concluded that cumulative assessment inspires undergraduate medical students to allocate their learning activities according to their needs [14].

In a study on medical students, formative assessments like MCQs, short answer questions and other innovative assessment methods were used and they found that there was improvement in their academic performance [2]. In a retrospective longitudinal study conducted for predicting academic success among general practice registrars, authors concluded that internal MCQ formative exams can be used as academic markers for early identification of slow learners [15]. Formative Assessment Classroom Techniques (FACTs) was implemented in one of the medical institutes of India. After self-assessment, the authors concluded that FACT is useful and feasible mechanism for identifying learning issues, adapt for any instructional changes and facilitate timely feedback to improve learning among medical students [16].

A study conducted among medical students of Sumandeep Vidyapeeth regarding providing feedback after CCES in subject of medical physiology has shown positive outcome in student's learning process [5]. In present study, the faculties had expressed about extra burden in record keeping of CCES results. Presently the institution has incorporated CCES in its Enterprise Resource Planning (ERP) system which will calculate the scores of individuals, stores the data and calculates the internal assessment marks. This has reduced the burden of record keeping. In an study on a medical graduate's perspective about formative assessment, the author expressed formative assessments will eventually have a fruitful influence on students [17].

To address challenges in undergraduate pathophysiology education, case-based MCQs was introduced as the formative assessment for students majoring in clinical medicine and basic medical sciences in Peking University School. Later the students perception was assessed. The students thought formative assessment led to self-motivation and development of analytical and problem-solving skills [18]. A phenomenological study was conducted to evaluate the effectiveness of Kahoot, a app based formative assessment tool in medical education. The students were motivated for studying after using this formative assessment tool [19]. In present study also dental students well accepted CCES and they felt this formative assessment has helped them to be more attentive in the class.

Limitation(s)

As this was the questionnaire study, the present study did not evaluate the students learning ability based on their performance in CCES. Studies on students categorisation based on their learning abilities will help to find the way to improvise this formative evaluation system and this can help to bridge the gap in their learning process.

CONCLUSION(S)

Formative assessment in dental education must be seen as a continuous process which helps in developing self-directed learning among students. Both faculty and student participants admitted that theory classes are suitable environment for incorporation of CCES and also felt the incorporation of this formative evaluation has increased students attentiveness in classes. Overall CCES is found to be well accepted formative evaluation system in dental education.

REFERENCES

[1] Sood R, Singh T. Assessment in medical education: Evolving perspectives and contemporary trends. Natl Med J India. 2012;25(6):357-64.
[2] Arja SB, Acharya Y, Alezaireg S, Ilavarasan V, Ala S, Arja SB. Implementation of formative assessment and its effectiveness in undergraduate medical education: An experience at a Caribbean Medical School. Med Ed Publish. 2018;7(2):131.
[3] Epstein RM. Assessment in medical education. N Engl J Med. 2007;356(4):387-96.
[4] Miller GE. The assessment of clinical skills/competence/performance. Acad Med. 1990;65(9):S63-67.
[5] Dulloo P, Vedi N, Purohit G. Impact of feedback on continuous cumulative evaluation system for learning in physiology. J Clin Diagn Res. 2017;11(12):CC01-05.
[6] WMA declaration of Helsinki-ethical principles for medical research involving human subjects. Wma.net. [cited 2022 May 10]. https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/.
[7] Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53-55.
[8] Konopasek L, Norcini J, Krupat E. Focusing on the formative: Building an assessment system aimed at student growth and development. Acad Med. 2016;91(11):1492-97.
[9] University grants commission. Professional councils. Available from: Ugc.ac.in. [cited 2022 May 10].
[10] Schuwirth LWT, Van der Vleuten CPM. Programmatic assessment: From assessment of learning to assessment for learning. Med Teach. 2011;33(6):478-85.

[11] Vesel T. Curriculum development for medical education: A six-step approach, second edition. J Palliat Med. 2011;14(1):110110.
[12] Schuwirth LWT, van der Vleuten CPM. ABC of learning and teaching in medicine: Written assessment. BMJ. 2003;326(7390):643-45.
[13] Evans DJR, Zeun P, Stanier RA. Motivating student learning using a formative assessment journey. J Anat. 2014;224(3):296-303.
[14] Kerdijk W, Cohen-Schotanus J, Mulder BF, Muntinghe FLH, Tio RA. Cumulative versus end-of-course assessment: Effects on self-study time and test performance. Med Educ. 2015;49(7):709-16.
[15] Heggarty P, Teague PA, Alele F, Adu M, Malau-Aduli BS. Role of formative assessment in predicting academic success among GP registrars: A retrospective longitudinal study. BMJ Open. 2020;10(11):e040290.
[16] Srivastava TK, Mishra V, Waghmare LS. Formative assessment classroom techniques (FACTs) for better learning in pre-clinical medical education: A controlled trial. J Clin Diagn Res. 2018;12(9):JC01-08.
[17] Abu-Zaid A. Formative assessments in medical education: A medical graduate's perspective. Perspect Med Educ. 2013;2(5-6):358-59.
[18] Scally KJ, Wilson KE, Girdler NM. Formative assessment used to enhance knowledge, skills and student experience in undergraduate sedation teaching. Journal of Disability and Oral Health. 2017;18(4):117-23.
[19] Ismail MAA, Ahmad A, Mohammad JAM, Fakri NMRM, Nor MZM, Pa MNM. Using Kahoot! as a formative assessment tool in medical education: A phenomenological study. BMC Med Educ. 2019;19(1):230.

PARTICULARS OF CONTRIBUTORS:
1. Professor, Department of Oral Medicine and Radiology, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth Deemed to be University, Vadodara, Gujarat, India.
2. Professor, Department of Paediatric and Preventive Dentistry, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth Deemed to be University, Vadodara, Gujarat, India.
3. Professor, Department of Periodontology, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth Deemed to be University, Vadodara, Gujarat, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Rashmi Venkatesh,
Professor, Department of Oral Medicine and Radiology, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth Deemed to be University, Vadodara, Gujarat, India.
E-mail: drrashmivenkatesh@gmail.com

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