



Impact of formative and summative assessments on 1st year physiology university exam in Medicine our experience

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Abstract

There are two types of assessments which are used in the medical education are formative and summative assessments. The purpose of the formative assessments is to provide the feedback and improve the learning behavior of the student. The summative assessments evaluate a student's learning progress at fixed interval of time. However, it is less known about the impact of the formative and summative assessments on overall student's performance in final examination in concern subject. This study is intended to study the impact of formative and summative assessments on final examinations in concern subject at the end of year. A longitudinal cohort study was conducted among the first year medical students attending physiology lecturers from September 2017 to August 2018 at Maheshwara Medical College and Hospital, Telangana. The study was supported by quantitative data to address the objectives of the study. Data collected and analyzed with graphpad Prism (version 7). A total of 150 students participated in the study. The pass percentage in formative assessment (45.1%) and summative assessment was 70%. There was a significant improvement in the final examination at the end of 1st year in concern subject was 90% and statistically significant

with chi-square test $p < 0.0001$ at 95% confidence Interval (CI) with 80% power of the study. There was a significant improvement in the student's performance after the implementation of formative and summative assessments in outcome of final examinations at the end of 1st year. Formative assessments consolidate the learning and reinforce the learning behavior in students and help the teacher to change the plan of teaching for better understanding the student. It is necessary that formative and summative assessments should be incorporated into the regular assessment system for the optimal educational output.

Keywords: Assessment, Medical Education Research, Self-assessment, Feedback, Teaching and Learning.

Introduction

Training the medical students is undertaking that requires specially supported learning tools and assessment methods. These assessments in the medical education are intended to measure students' skills, knowledge and attitude. This research article focused on the use formative and summative assessments for evaluating student progress in final university examination. There are two major types of assessments being used in colleges and schools summative and formative. These assessments

have similarities and dissimilarities depending on how they are administered and evaluated. Formative assessments are generally considered as a part of the instructional process and are intended to provide information, which helps instructor to adjust their instruction and help the students to learn while instructions are happening. Formative assessment is used as a tool and it should occur regularly at frequent intervals while one chapter instruction process is happening and the results are shared with students in a timely manner to enhance their learning and productivity skills. Any adjustments, need to be made in instruction are intended to ensure that all students meet pre-established learning goals within a specific timeframe [1]. Formative Assessments are part of the process of instruction. Formative assessment provides information regarding the need to adjust teaching and learning when it is happening. Timely adjustments or modifications in instructions and learning can be made by the teacher and students when it is happening. A formative assessment helps the teachers to find out the strengths and lacunae of the students so that they can help the student to move forward in learning. Summative assessments are intended to summarize what students have learned after the instruction has been completed at the end of a predetermined period. It can occur at the end of term or at the end of a unit or chapter. There are few similarities between formative and summative assessments both require involvement of the instructor to be effective. The formative assessment must align with the summative assessment to produce valid grades and scores. This can be accomplished by reviewing student work and looking at past test questions and answers to determine any areas of weakness and then successfully addressing them before the summative assessment [2]. There are few differences between formative and summative assessments. The goal of

summative assessment is to provide an overall measure of student performance at a stipulated time in other hand the primary goal of formative assessment is to provide feedback within the classroom with no real consequences attached [3]. Another difference between formative and summative assessments is that formative assessments are practice for students whereas summative assessments are graded. Formative assessments depend on student involvement and feedback is required for formative assessments whereas summative assessments do not [3]. The current study is undertaken to explore how formative and summative assessments influence student performance in final university examinations at the end of 1st year in physiology.

Methods

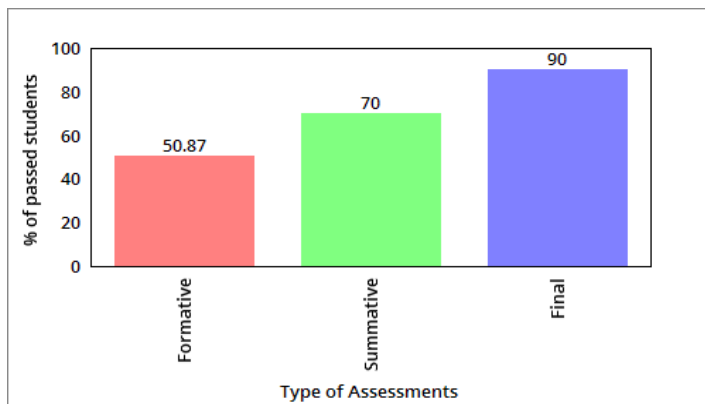
A longitudinal cohort study was conducted among the first year medical students at Maheshwara Medical College and Hospital, Isnapur, Telangana, India from September 2017 to August 2018 and the study was supported by quantitative data to address the objectives of the study. 150 students enrolled for study were attending physiology lectures as per the university guidelines for the course of 1st MBBS. Examination data from both formative and summative were analysed to determine their impact on first year final examination in physiology. We collected information by assessing student outcome by written exam for every 10 days in a month by means of formative assessment and summative assessment in stipulated time at every 3 months. A total no of 16 formative and 3 summative assessments were conducted and graded. Percentage of $\geq 50\%$ was considered as minimum percentage to clear the both formative and summative assessments. The data collected by conducting formative and summative assessments were correlated with final results obtained in university examination conducted at the end of 1st year by the Kaloji Narayana

Rao (KNR) Health University. Data analysis was done by percentage of pass in formative and summative assessments and in final examination. Chi-square (X^2) was used to find out probable outcome, by using statistical software (Graphpad Prism, version 7, USA). Confidence interval of 95% and $P < 0.05$ was considered to be statistically significant with a sample size of 150 students.

Results

Overall, 45.1% and 70% of students passed the formative and summative examination respectively. Formative examination did improve overall pass percentage in summative examination 70%. Formative examination had a positive predictive value for passing the summative examination (X^2 119.8 with 1 DF, $P < 0.0001$), and also with the final examination (X^2 153.1 with 1 DF, $P < 0.0001$). Summative examination had showed positive predictive value on the final examinations at end of 1st year (X^2 37.7 with 1 DF, $P < 0.0001$) at 95% confidence Interval (CI) with 80% power of the study. The final passed percentage was 90% statistically significant with formative and summative assessments. (Figure-1).

Figure 1: Percentage (%) of passed students in formative, summative assessments and in final examinations in physiology.



Data represented as pass % above bars. $P < 0.0001$ and statistically significant

Discussion

The benefit of impact of formative assessment has taken by learners and teachers. Numerous sources have taken these strategies to improve the student outcome during final examination. However Black and Wiliam authors used the general term assessment to refer to all those activities undertaken by the teachers and by their students in assessing themselves, which provided the information to be used as feedback to modify teaching and learning objectives. These types of formative assessments are the evidence actually used to adapt the teaching to meet student needs. Their guidelines emphasize the applications of formative assessments, thereby defining these assessments by their use to adapt instructions to particular learner needs based on assessment results [4]. Dunn and Mulvenon stated formative assessments are designed to monitor student's progress during the learning process [5]. Formative assessments seek to present students with explicit goals, and to equip them with the tools to bridge the gap between the two. Thus effective formative assessment must help students the following questions [6]. McMillan et.al stated Formative assessments are those where teacher use to obtain information about students understanding during instruction and provide feedback that helps him to learn [7]. The sole purpose of formative assessment is to improve student learning and motivation. Thus, the formative assessments must help the following three questions to be solved by the student and teacher. Where Am I Trying to Go? Students need clearly articulated, concise learning targets to be able to answer this first question. Learning is easier when learners understand what goal they are trying to achieve, the purpose of achieving the goal, and the specific attributes of success. Teachers should continually help students

clarify the intended learning as the lessons unfold—not just at the beginning of a unit of study. Where Am I Now? All of these strategies help students ascertain—and, even more important, learn how to ascertain—where they are and where they need to be, an awareness that is central to their ultimate success. How Do I Close the Gap? Assessment for learning helps students know what to do to move from their current position to the final learning goal. To meet learning goals, students must participate fully in creating the goals, analyzing assessment data, and developing a plan of action to achieve the next goal [8].

The role of formative and summative assessment in medical education is not limited to medical school, but continues in a physician's career as well [9]. A challenge in physician training is the lack of understanding regarding the effectiveness of formative and summative assessments in medical training over time. By the use of formative and summative assessments, which can promote the learning processes of the student, that reduces the likelihood of student's error in the future. Formative and summative assessments can enhance the learning process in timely manner. Previous research on medical education demonstrates that the combination of formative and summative assessments provides beneficial and long-lasting effects on learning in medical students [9,10]. Present finding further supports the use of formative and summative assessments within the context of medical education. Concrete knowledge of the association between formative and summative assessment in medical education reinforces the effectiveness of its use and add to the existing literature that supports our study and its efficacy. It is imperative to strengthen and elucidate the role of formative and summative assessments in medical education, particularly as it pertains to long-term competencies and expertise [11]. If these assessment tools are not followed thoroughly, they may not be effective

medical education, which will be known with further study. A good balance of formative and summative assessments is required in medical education and physicians training to achieve a reasonable and comprehensive assessment strategy [12,13,14]. While many of these studies exhibit methodological limitations, experts agree that the practice of assessment for learning shows promise in its ability to improve student performance.

Conclusion

Existing research yields promising conclusions regarding the impact of formative assessment on student academic achievement. Findings indicate that students who received formative assessment performed better in summative and final examinations. Findings indicate that learning intentions, specifically as a part of guided instruction methods, positively impacts students learning. Similarly, studies demonstrated that statement of learning objectives and assessment criteria improves student's self-assessment abilities; as a result improves learning outcomes.

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