

Predictive utility of performance of students of dentistry in the first periodic assessment

SHIVASAKTHY MANIVASAKAN

ABSTRACT

Background. Predicting students who need extra support academically may help initiate early remedial measures. We assessed the predictive utility of the first periodic assessment as a tool to identify students who need additional curricular support in the first year of Bachelor of Dental Surgery (BDS) course.

Methods. We retrospectively compared the performance of two batches of BDS students in the first periodic assessment and final university examination. The students were divided into three groups on the basis of their ranks in the first periodic assessment as high, middle and low achievers. We assessed the tendency of the students to be in the same group in the university examination.

Results. Though the performance of all the three groups improved significantly from the first periodic assessment to the final university examination, 73% of low achievers and 80.6% of high achievers stayed in the same group in both examinations. All those who failed in the final university examination were from the low achiever group.

Conclusion. Performance of students in the first periodic assessment is a valid tool to identify students who need additional curricular support.

Natl Med J India 2018;31:32–4

INTRODUCTION

One of the challenges for educators and administrators of higher education is to manage students who have a poor academic performance. Failure to progress in a course has implications for all stakeholders.¹ Such students face stigma and are stressed due to academic failure, which may affect their health. They may have to spend more time and money in completing the course. Administrators and teaching faculty have to spend more time and effort in mentoring such students and taking remedial measures. Finally, society too is affected as some low achievers may not perform well as doctors. Though there is a significant association between parameters of admission and academic achievements of students,² teachers are often held responsible for the performance of their students. To take pre-emptive measures, teachers need to know predictors of academic performance of students who need additional curricular support. Formative assessment in the form of periodic tests provides an opportunity to give constructive feedback to students on their progress by judging their level of achievement. We explored whether performance in the first periodic assessment could predict the academic success or failure of a student in the final examination so that it could help in early identification of students who need additional curricular support. We did not modify the quality or the prevailing pattern of periodic assessments.

METHODS

Ethical clearance was obtained from the institutional ethical committee for using data of first year students of the Bachelor of Dental Surgery (BDS) courses of 2013–14 and 2014–15 at Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth, Puducherry. Anonymity was maintained and permission was obtained to access the theory marks of students. Data collection was done on spreadsheets. The students were ranked as high, middle and low achievers on the basis of their first periodic assessment theory marks. The theory performance of the same group of students in the final university examination was compared with their scores of initial periodic assessment. Students who discontinued after taking the first periodic assessment and those who were absent for one or more papers in the first periodic assessment were excluded. The difference in performance was assessed using the independent *t* test.

RESULTS

In the 2013–14 batch, of the 92 students, the top 30 were rated as high achievers, the next 30 as middle achievers and the last 32 as low achievers. The whole batch had a significant improvement in performance from the first periodic assessment to the university examination ($p < 0.0001$; Table I). Among the high achievers, 23 of 30 remained in the same group in the final university examination and 7 moved to the middle group. Among the middle achievers, 15 of 30 remained in the same group in the final university examination and 7 moved to the high achiever group while 8 moved to the low achiever group. Among the low achievers, 23 of 32 remained in the same group in the final university examination and 9 moved to the middle group (Fig. 1). All the students who failed in the final university examination had failed in the first periodic assessment.

In the 2014–15 batch, of the 94 students, the top 31 were rated as high achievers, the next 31 as middle and the last 32 as low achievers. This batch too showed an improvement in performance from the first periodic assessment to the final university examination ($p = 0.025$; Table II). Among the high achievers, 26 of 31 remained in the same group in the final university examination while 5 moved to the middle group. Of the middle achievers, 18 of 31 remained in the same group in the final university examination, 5 became high achievers but 8 moved to the low achiever group. Among the low achievers, 24 of 32 remained in the same group in the final university examination while 8 moved to the middle group (Fig. 2). In this batch too all the students who failed in the final university examination had failed in the first periodic assessment.

Overall, in both batches, 80.6% of the high achievers stayed as high achievers while 19.4% shifted to the middle group; from the middle group, 53.2% stayed in the same group, while 19.4% became high achievers and 27.4% became low achievers; and in the low achiever group, 73% stayed in the same group while 27% moved to the middle achiever group.

DISCUSSION

Most students initially rated as high or low achievers, performed

F3, Vaishali Enclave, Third Cross, Kamban Nagar, Reddiarpalayam, Puducherry 605010, India; shivasakthym@igids.ac.in

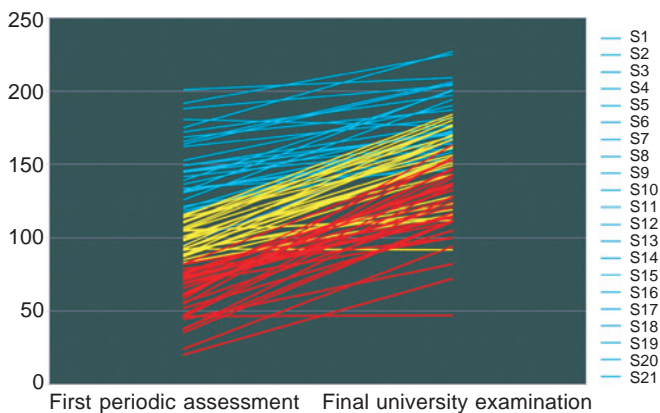


FIG 1. Performance of the batch of 2013–14 in the first periodic assessment and the final university examination

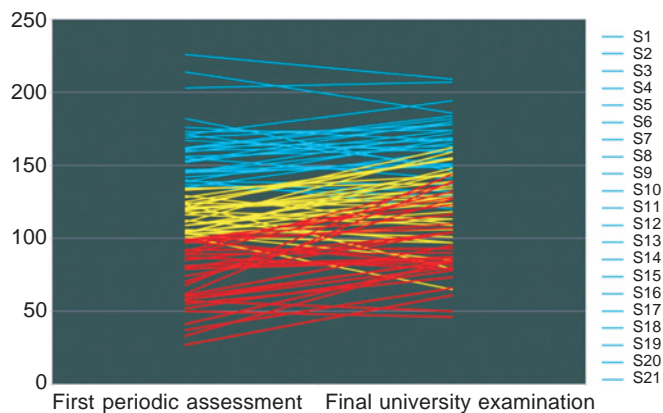


FIG 2. Performance of the batch of 2014–15 in the first periodic assessment and the final university examination

TABLE I. Comparison of scores among different levels of achievers of the batch of 2013–14 in the periodic assessment and university examination

Group	Mean (SD) internal assessment scores	Mean (SD) university examination scores
High achievers	148.7 (23.17)	186.2 (16.84)
Middle achievers	99.0 (9.56)	154.7 (7.81)
Low achievers	60.2 (16.78)	112.7 (19.40)

TABLE II. Comparison of scores among different levels of achievers of the batch of 2014–15 in the periodic assessment and university examination

Group	Mean (SD) internal assessment scores	Mean (SD) university examination scores
High achievers	160.81 (21.90)	168.90 (15.74)
Middle achievers	115.74 (10.32)	131.71 (10.04)
Low achievers	72.88 (21.52)	86.85 (16.62)

as expected in the final university examination. Around half the students in the middle group moved to either the high or low group. All the students who failed in the final university examination had failed in the first periodic assessment.

The performance in the first periodic assessment by first year students of both years therefore did predict their performance in the final university examination. This study supports the contention of Singh *et al.*³ that if properly implemented, periodic assessment can score over summative assessment in terms of validity, reliability, feasibility and educational impact.

Santra *et al.*⁴ studied the correlation of periodic assessment and final examination in second year MBBS students and found a direct correlation between both. Our study also revealed a definite relation between performances in both the examinations by the students. Our results are similar to those of Yaqoob *et al.* who in 2014⁵ found that class tests in medical college predicted academic performance in the professional examination.

Similarly, da silva *et al.*⁶ assessing factors influencing performance of students in a Brazilian dental school found that a significant number of low achieving students remained in the same performance cluster in different courses. In our study, 73% of the low achievers stayed in the same group in the final university examination.

Zhang and Henderson⁷ found that formative quiz predicted the summative performance and concluded that it served to identify students who needed additional remediation. Downey *et al.*⁸ also assessed the predictive value of admission parameters in the success of dental hygiene students and found a strong correlation between the two. A similar positive relation between periodic and final academic performance was seen in our study.

Rudolph *et al.*,⁹ and Yavuz and Tontus¹⁰ found that formative

periodic assessment with low stakes reveals the gap between the desired levels of performance and the actual level of performance of the learners and are the strongest predictors of academic success.

Garrud and Yates¹¹ utilized a toolkit published by Yates¹ to aid early identification of students who are likely to struggle, and concluded that problems encountered by students at the time of entry are comparable with the problems encountered in the entire programme and suggested that predicting ‘strugglers’ early can help set up warning flags for multiple factors.

Rauf *et al.*¹² mentioned that if the faculty believes in the process of formative assessments and motivates students to attend them, they will find a correlation between performance in formative and summative assessment. Anupama Kumar *et al.*^{13,14} studied the efficiency of a data mining model for predicting students’ academic success using performance in the internal examination. The number of students who were likely to fail were reported to the teachers for remedial action and they concluded that the prediction was valid and it helped to improve the academic success of the students. Thus education data mining techniques using the algorithms of predicting final outcome with performance in periodic examinations also supports it as a valid method for early identification of students who need additional support.

Conclusion

If initial assessment could be a useful predictor of the future performance of the student, then the feedback of such assessment would be useful.¹⁵ In our study, the performance of students in the first periodic assessment predicted their performance in the final university examination. This can be used as a predictive tool to identify students who need additional curricular support.

REFERENCES

- 1 Yates J. Development of a 'toolkit' to identify medical students at risk of failure to thrive on the course: An exploratory retrospective case study. *BMC Med Educ* 2011;**11**:95.
 - 2 Stacey DG, Whittaker JM. Predicting academic performance and clinical competency for international dental students: Seeking the most efficient and effective measures. *J Dent Educ* 2005;**69**:270–80.
 - 3 Singh T, Anshu, Modi JN. The Quarter model: A proposed approach for in-training assessment of undergraduate students in Indian medical schools. *Indian Pediatr* 2012;**49**:871–6.
 - 4 Santra R, Pramanik S, Mandal A, Sengupta P, Das N, Raychaudhuri P. A study on the performance of medical students in internal assessment and its correlates to final examinations of 2nd MBBS pharmacology curriculum in a medical college of eastern India. *J Clin Diagn Res* 2014;**8**:HC01–2.
 - 5 Yaqoob Y, Bhatti SA, Javed MS. Class test performance can be a predictor of scores in annual exam for a preclinical medical student. *J Univ Med Dent Coll* 2014; **5**:57–60.
 - 6 da silva ET, de Fátimanunes M, Queiroz MG, Leles CR. Factors influencing students' performance in a Brazilian dental school. *Braz Dent J* 2010;**21**:80–6.
 - 7 Zhang N, Henderson CNR. Can formative quizzes predict or improve summative exam performance? *J Chiropr Educ* 2015;**29**:16–21.
 - 8 Downey MC, Collins MA, Browning WD. Predictors of success in dental hygiene education: A six-year review. *J Dent Educ* 2002;**66**:1269–73.
 - 9 Rudolph JW, Simon R, Raemer DB, Eppich WJ. Debriefing as formative assessment: Closing performance gaps in medical education. *Acad Emerg Med* 2008;**15**: 1010–16.
 - 10 Yavuz R, Tontus HO. Examinations and curriculum in medical education and learning-assessment relations. *J Exp Clin Med* 2014;**31**:1–5.
 - 11 Garrud P, Yates J. Profiling strugglers in a graduate-entry medicine course at Nottingham: A retrospective case study. *BMC Med Educ* 2012;**12**:124.
 - 12 Rauf A, Shamim MS, Aly SM, Chundrigar T, Alam SN. Formative assessment in undergraduate medical education: Concept, implementation and hurdles. *J Pak Med Assoc* 2014;**64**:72–5.
 - 13 Anupama Kumar S, Vijayalakshmi MN. Efficiency of decision trees in predicting student's academic performance. *Comput Sci Inf Technol* 2011;**2**:335–43. DOI: 10.5121/csit.2011.1230.
 - 14 Anupama Kumar S, Vijayalakshmi MN. Prediction of the students recital using classification technique. *IFRSA Int J Comput* 2011;**1**:305–9.
 - 15 Tabish SA. Assessment methods in medical education. *Int J Health Sci* 2008; **2**:3–7.
-