Journal of Education and Learning (EduLearn)
Vol. 15, No. 4, November 2021, pp. 558~562
ISSN: 2089-9823 DOI: 10.11591/edulearn.v15i4.20283

Progress testing and its effect on medical student motivation

Bulan Kakanita Hermasari, Dimar Yudistyaningrum
Medical Education Unit, Faculty of Medicine, Universitas Sebelas Maret, Indonesia

Article Info

Article history:

Received Mar 22, 2021
Revised Oct 26, 2021
Accepted Nov 28, 2021

Keywords:

Assessment method
Medical student
Motivation
Progress test

ABSTRACT

Assessment has a pivotal role in medical education, as it can direct student learning. Motivation is an essential factor that determines learning assessment results. One of the aims of assessment is to determine the level of student knowledge, one of which can be measured by a progress test. This study aimed to determine the relationship between progress test and student motivation. This study used a cross-sectional observational analytic method. It was conducted in 2017 at Faculty of Medicine Universitas Sebelas Maret (FM UNS), Indonesia. The respondents consisted of 253 students from batch 2014, 2015, and 2016. The sample was selected by stratified random sampling. The instrument used to assess academic motivation was the academic motivation scale (AMS). The research data were analyzed using the Pearson correlation test. There is a significant positive correlation between progress test results and academic motivation (r=0.500; p=0.000). However, there is no significant difference in motivation level based on gender (p=0.889) and student cohort (p=0.533). In the progress test score, there are significant differences based on gender (p=0.014) and grade-point average (p=0.000). However, there is no significant difference in the progress test scores based on the student batch (p=0.212). The results support that progress test is useful assessment method to support medical student's motivation.

Corresponding Author:

Bulan Kakanita Hermasari
Medical Education Unit
Faculty of Medicine, Universitas Sebelas Maret
36A Ir. Sutami Road, Surakarta 57126, Central Java, Indonesia
Email: dr.bulan.kakanita@staff.uns.ac.id

1. INTRODUCTION

Assessment plays a vital role in medical education as it could determine the achievement of student competencies and drive students to what they must learn [1]. Hence, in medical education, it is generally acknowledged that assessment drives learning [1]. A well-designed assessment system must meet five utilities or standards: validity, reliability, feasibility, practicability, and educational impact [2]. The effect is usually correlated with formative assessment. Formative assessment can direct students on practical learning and divert them away from summative assessment, focusing on grades [2]–[4]. However, both assessment aims are functional when implemented in a correct setting and appropriate level of learning [1].

Essentially, learning is a process carried out by individuals to change overall behaviour due to their experiences and interactions with the environment. According to Rossum and Hamer [5], there are five basic learning concepts: learning to increase knowledge, learning to remember, learning to get facts, learning to get abstract understanding, and learning to understand reality. Learning is a long-term change in mental representations or associations as a result of experience [6]. Learning can also be defined as an experience when interacting with the learning environment to achieve learning objectives. Hence, learning can be

influenced by various things, such as the learning environment, the student learning approach, and motivation [7]–[10].

Motivation has emerged as a strong predictor of students' performance and well-being [11], [12]. It has a vital role in a student's learning process because it plays as an energy that can encourage students to learn. There are different theories of motivation; some focus on the quantity of motivation and others on quality. The amount of motivation could be high or low. Quality of motivation depends on whether the source of motivation is internal or external [7], [8], [13]–[15].

Furthermore, motivation can also expect self-efficacy. Self-efficacy relates to a student's perceived assurance in accomplishing specific targets. Self-efficacy helps students control what choices they make, how much mental effort they spend, and how long they persevere in a task. Therefore we can assume that motivation fundamentally matters in students' learning achievement [16].

Progress test (PT) is a longitudinal, comprehensive, repetitive assessment of students' functional knowledge. In medical programs, PTs are designed to assess applied medical knowledge at a new graduate-level [17], [18]. They are administered to all students across all years of a program. Due to their longitudinal nature, PTs are expected to determine knowledge progression as students enhance in their undergraduate studies [19], [20]. Because of these, PTs are expected to affect student motivation to learn.

However, a positive correlation between motivation and performance has not been substantiated in medical education, as different studies have contradictory findings [21], [22]. Moreover, practice indicates that not all assessment methods can increase motivation [1]. Disappointment with the grade, and most crucially, lack of understanding of its content, cause negative emotions and declining interest in learning. Only such an assessment provides reliable evidence about the actual level of training. It presents the opportunity to see the achievements, find errors and understand what needs to be done for further success [23]–[25]. This study aims to examine the relationship between PT and motivation. In addition, it is also to find out whether there are differences in PT values and motivation levels based on age, gender, and student achievement

2. RESEARCH METHOD

2.1. Study design

This study was an observational analytic study with a cross-sectional approach. The research was conducted at the medicine study program of the Faculty of Medicine, Universitas Sebelas Maret (FM UNS), Surakarta, in December 2017. The research subjects were selected using several criteria, then were randomized stratified. Student academic motivation was measured using the academic motivation scale (AMS) questionnaire. The data were analyzed using the Pearson correlation test. The ethical approval of this study was published by dr. Moewardi Hospital Surakarta Indonesia

2.2. Progress test in Faculty of Medicine Universitas Sebelas Maret

The progress tests at the faculty of medicine, FM UNS, has been implemented since 2013. The participants include all medicine study program students from all cohorts. FM UNS conducts the PT annually at the end of the odd semester. PT format is a multiple-choice question (MCQ) type test, consisting of 120 questions that reflect overall knowledge material taught to achieve national competence standards.

3. RESULTS AND DISCUSSION

3.1. Characteristic of research respondent

There were 253 questionnaires collected during the study. The age of the respondents was around 17-23 years old. Table 1 shows the respondents were more dominated by females than males. Most students were in the group of grade-point average (GPA) 3.0 -3.5.

3.2. Correlation between PT and motivation

This study resulted in a significant positive correlation between PT and motivation ($r=0.500$; $p=0.000$). This result supports the theory that exams can increase motivation to learn as a source of external motivation. The implementation of PT in FM UNS is a form of formative assessment. This type of assessment is useful for encouraging student motivation to learn. PTs also provide comprehensive feedback to students to identify gaps in their knowledge foundation, which promotes self-directed learning [17], [18]. PTs feedback can lead students to study more continuously and construct a better knowledge basis, preparing them for the national licensing examinations [17]–[19]. The meaningful student feedback provides detailed information about student learning achievements and student deficiencies in achieving learning goals [3], [26]. In the type of MCQ questions for medical students, this feedback can be information about the correctly

done questions based on the item blueprint [27]. The item blueprint must be detailed following national standards of doctor's competence, such as body systems, basic medical science, pathomechanism, laboratory examinations, clinical medicine, disease management, communication, and education. This constructive and detailed feedback will stimulate student reflection and increase self-efficacy, affecting learning motivation [26], [28].

Table 1. Characteristics of respondents

Variables	Number (n)	Percent (%)
Gender		
Male	96	37.94
Female	156	62.06
Total	253	
Grade-point average		
<3.0	16	6.32
3.0-3.5	215	84.99
>3.5	22	8.69
Total	253	

3.3. Academic motivation scales based on gender and student batches

Table 2 illustrates the data distribution of the motivation scale based on gender and student batches. The table shows that male respondents had a higher extrinsic motivation scale, while women had a higher intrinsic motivation scale. In addition, the student year of 2014 had a higher intrinsic motivation scale, while the 2015 and 2016 classes showed a higher extrinsic motivation degree. However, there were no significant differences between the gender, age, and student year based on intrinsic motivation, extrinsic motivation, and the AMS score.

The result showed that the level of academic motivation in female respondents was lower than that of men. The difference in this study results with previous research is probably because there are differences in the tendency of the level of motivation in women and men [16], [29]. Hakan and Munire [16] state that women have a better intrinsic motivation level, while a higher level of extrinsic motivation is found in men. Nevertheless, a current updated study on gender-based differences in academic motivation noted that gender differences in academic motivation might differ based on the publication type and sample characteristics

Furthermore, the study also showed that the 2015 class had a higher average level of motivation than those of the younger batch. This condition is in accordance with the andrology theory, which assumes that the higher the semester level of a student as an adult learner, the higher the intrinsic academic motivation. Age is a factor that affects the level of student academic motivation. At the age of 18-24 years old, there is a process of brain development and emotional maturation, which causes the increasing age in this interval, the academic motivation will also increase. In addition, until the age of 24, there is also a process of psychosocial development and skills in making decisions that can affect an individual's motivation [16].

Table 2. Data distribution of academic motivation scale

Variables	Mean of intrinsic motivation scale	p	Mean of extrinsic motivation scale	p	Academic motivation scale	p
Gender						
Male	63.31 ± 12.98	0.189	65.16 ± 11.35	0.628	128.46	0.889
Female	64.13 ± 10.97		63.13 ± 10.65		127.27	
Student batch						
2014	65.14 ± 12.08	0.442	62.82 ± 11.64	0.495	128.31	0.533
2015	64.49 ± 11.98		64.58 ± 10.74		129.08	
2016	62.27 ± 11.18		63.48 ± 10.35		125.76	

3.4. Progress test results based on gender, student achievement, and student batches

Table 3 illustrates PT scores distribution based on gender, GPA, and student batch. The mean PT value of male respondents was higher than that of female respondents, but it was not significant. Besides, there is a considerable increase in the value of the PT based on the GPA. The higher the student's GPA, the higher the PT. Based on the student generation, table 3 shows an insignificant increase in the mean PT score where the longer the student's study duration, the higher the PT score.

Table 3. Progress test scores

Variables	Maximum scores	Minimum scores	Mean scores	p
Gender				0.014
Male	72.5	20	42.84 ± 11.11	
Female	61.7	20.83	41.94 ± 8.95	
GPA				0.000
<3.0	54.17	30	36.77 ± 6.25	
3.0–3.5	61.67	20	41.87 ± 9.49	
≥3.5	72.5	28.33	49.98 ± 10.91	
Student batch				0.212
2014	72.5	21.67	47.45 ± 6.01	
2015	60.83	20.33	43.17 ± 9.08	
2016	48.33	20	35.68 ± 9.94	

This study showed that an increase in PT goes related to a rise in student GPA. This result indicates that PT has good external validity, so that it may also be used to predict student academic achievement. One of the utilities that must be evaluated from an assessment method is how the assessment results' appropriateness is compared with other assessment methods that assess the same type of competency [30].

Factors that influence academic achievement are self-motivation and self-efficacy. Kusurkar, *et al*. [8], [15] state that an adequate level of motivation will also impact good academic performance. Academic motivation has an essential role in the student learning process, which will later affect the results of the learning evaluation or educational performance, in this study, student's GPA. Based on the previous explanation, it can be concluded that PT can indirectly influence a student's GPA by increasing learning motivation [31], [32]. The study also showed that an increase in PT means score aligns with increased learning duration. Supporting these, Raupach, *et al*. [32] stated PT results tend to increase year by year student studying. This increase is caused by the longer the duration of learning, the higher the student's knowledge.

4. CONCLUSION

This study concluded that there is a relationship between PTs and the academic motivation of medical students. This finding supports the evidence regarding PT as a helpful assessment method that can increase medical students' motivation to achieve academic achievement. In addition, PT could encourage student motivation because it provides comprehensive and meaningful feedback to students. From the feedback, students can identify gaps in their knowledge. As a result, students can construct a better knowledge basis, preparing them for the national competency examination. This study adds body knowledge regarding the use of progress testing in medical education. It can also be designed as an assessment method in other health professional education to support health profession students.

REFERENCES

[1] H. A. Ferris and D. O' Flynn, "Assessment in Medical Education; What Are We Trying to Achieve?," *International Journal of Higher Education*, vol. 4, no. 2, p. 139, May 2015, doi: 10.5430/ijhe.v4n2p139.
[2] R. Sood and T. Singh, "Assessment in medical education: Evolving perspectives and contemporary trends," *National Medical Journal of India*, vol. 25, no. 6, pp. 357–364, 2012.
[3] D. J. R. Evans, P. Zeun, and R. A. Stanier, "Motivating student learning using a formative assessment journey," *Journal of Anatomy*, vol. 224, no. 3, pp. 296–303, Mar. 2014, doi: 10.1111/JOA.12117.
[4] L. Konopasek, J. Norcini, and E. Krupat, "Focusing on the Formative: Building an Assessment System Aimed at Student Growth and Development," *Academic Medicine*, vol. 91, no. 11, pp. 1492–1497, Nov. 2016, doi: 10.1097/ACM.0000000000001171.
[5] E. J. van Rossum and R. Hamer, *The Meaning of Learning and Knowing*. Leiden, The Netherlands: Brill, 2019. doi: 10.1163/9789460912535.
[6] J. Ormrod, *Human Learning, 6th Edition*, Sixth edition. Boston: Pearson, 2012.
[7] A. Wouters, G. Croiset, F. Galindo-Garre, and R. A. Kusurkar, "Motivation of medical students: selection by motivation or motivation by selection," *BMC Medical Education 2016 16:1*, vol. 16, no. 1, pp. 1–9, Jan. 2016, doi: 10.1186/S12909-016-0560-1.
[8] R. A. Kusurkar, Th. J. Ten Cate, C. M. P. Vos, P. Westers, and G. Croiset, "How motivation affects academic performance: a structural equation modelling analysis," *Advances in Health Sciences Education 2012 18:1*, vol. 18, no. 1, pp. 57–69, Feb. 2012, doi: 10.1007/S10459-012-9354-3.
[9] L. T. Wasson *et al.*, "Association Between Learning Environment Interventions and Medical Student Well-being: A Systematic Review," *JAMA*, vol. 316, no. 21, pp. 2237–2252, Dec. 2016, doi: 10.1001/JAMA.2016.17573.
[10] S. P. Chonkar *et al.*, "The predominant learning approaches of medical students," *BMC Medical Education 2018 18:1*, vol. 18, no. 1, pp. 1–8, Jan. 2018, doi: 10.1186/S12909-018-1122-5.

[11] R. A. Kusurkar, "Autonomous motivation in medical education," *Medical Teacher*, vol. 41, no. 9, pp. 1083–1084, 2019, doi: 10.1080/0142159X.2018.1545087.
[12] R. A. Kusurkar, G. Croiset, F. Galindo-Garré, and O. ten Cate, "Motivational profiles of medical students: Association with study effort, academic performance and exhaustion," *BMC Medical Education*, vol. 13, no. 1, p. 87, 2013, doi: 10.1186/1472-6920-13-87.
[13] R. A. Kusurkar, "Autonomous motivation in medical education," *Medical Teacher*, vol. 41, no. 9, pp. 1083–1084, 2019, doi: 10.1080/0142159X.2018.1545087.
[14] U. Isik *et al.*, "Factors Influencing Academic Motivation of Ethnic Minority Students: A Review," *SAGE Open*, vol. 8, no. 2, Jun. 2018, doi: 10.1177/2158244018785412.
[15] R. A. Kusurkar, G. Croiset, F. Galindo-Garré, and O. Ten Cate, "Motivational profiles of medical students: Association with study effort, academic performance and exhaustion," *BMC Medical Education 2013 13:1*, vol. 13, no. 1, pp. 1–8, Jun. 2013, doi: 10.1186/1472-6920-13-87.
[16] K. Hakan and E. Münire, "Academic Motivation: Gender, Domain and Grade Differences," *Procedia - Social and Behavioral Sciences*, vol. 143, pp. 708–715, Aug. 2014, doi: 10.1016/j.sbspro.2014.07.469.
[17] L. W. T. Schuwirth and C. P. M. van der Vleuten, "The use of progress testing," *Perspectives on Medical Education 2012 1:1*, vol. 1, no. 1, pp. 24–30, Mar. 2012, doi: 10.1007/S40037-012-0007-2.
[18] Y. Chen, M. Henning, J. Yielder, R. Jones, A. Wearn, and J. Weller, "Progress testing in the medical curriculum: students' approaches to learning and perceived stress," *BMC Medical Education 2015 15:1*, vol. 15, no. 1, pp. 1–8, Sep. 2015, doi: 10.1186/S12909-015-0426-Y.
[19] I. Al Alwan *et al.*, "The progress test as a diagnostic tool for a new PBL curriculum," *Education for Health: Change in Learning and Practice*, vol. 24, no. 3, pp. 1–10, Dec. 2011.
[20] A. Plessas, "Validity of progress testing in healthcare education," *International Journal of Humanities Social Sciences and Education*, vol. 2, no. 8, pp. 23–33, 2015.
[21] R. A. Kusurkar, G. Croiset, and T. J. Ten Cate, "Twelve tips to stimulate intrinsic motivation in students through autonomy-supportive classroom teaching derived from self-determination Theory," *Medical Teacher*, vol. 33, no. 12, pp. 978–982, Dec. 2011, doi: 10.3109/0142159X.2011.599896.
[22] R. A. Kusurkar, Th. J. Ten Cate, M. van Asperen, and G. Croiset, "Motivation as an independent and a dependent variable in medical education: A review of the literature," *https://doi.org/10.3109/0142159X.2011.558539*, vol. 33, no. 5, May 2011, doi: 10.3109/0142159X.2011.558539.
[23] L. W. T. Schuwirth and C. P. M. Van Der Vleuten, "How to Design a useful Test: The Principles of Assessment," in *Understanding Medical Education: Evidence, Theory and Practice*, John Wiley & Sons, Ltd, 2010, pp. 195–207. doi: 10.1002/9781444320282.ch14.
[24] L. Pangaro and O. Ten Cate, "Frameworks for learner assessment in medicine: AMEE Guide No. 78," *Medical Teacher*, vol. 35, no. 6, Jun. 2013, doi: 10.3109/0142159X.2013.788789.
[25] K. W. Eva *et al.*, "Towards a program of assessment for health professionals: from training into practice," *Advances in Health Sciences Education 2015 21:4*, vol. 21, no. 4, pp. 897–913, Nov. 2015, doi: 10.1007/S10459-015-9653-6.
[26] A. I. Alhaqwi, "Importance and process of feedback in undergraduate medical education in Saudi Arabia.," *Saudi journal of kidney diseases and transplantation : an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia*, vol. 23, no. 5, pp. 1051–1055, 2012, doi: 10.4103/1319-2442.100949.
[27] S. Y. Patil, M. Gosavi, H. B. Bannur, and A. Ratnakar, "Blueprinting in assessment: A tool to increase the validity of undergraduate written examinations in pathology," *International Journal of Applied and Basic Medical Research*, vol. 5, no. Suppl 1, p. S76, 2015, doi: 10.4103/2229-516X.162286.
[28] J. G. Kornegay *et al.*, "Feedback in Medical Education: A Critical Appraisal," *AEM Education and Training*, vol. 1, no. 2, pp. 98–109, Apr. 2017, doi: 10.1002/AET2.10024.
[29] N. Sölpük Turhan, "Gender Differences in Academic Motivation: A Meta-Analysis," *International Journal of Psychology and Educational Studies*, vol. 7, no. 2, pp. 211–224, 2020, doi: 10.17220/ijpes.2020.02.019.
[30] G. M. Sullivan, "A Primer on the Validity of Assessment Instruments," *Journal of Graduate Medical Education*, vol. 3, no. 2, pp. 119–120, Jun. 2011, doi: 10.4300/jgme-d-11-00075.1.
[31] M. G. K. Dijksterhuis, L. W. T. Schuwirth, D. D. M. Braat, and F. Scheele, "An exploratory study into the impact and acceptability of formatively used progress testing in postgraduate obstetrics and gynaecology," *Perspectives on Medical Education*, vol. 2, no. 3, pp. 126–141, Jun. 2013, doi: 10.1007/s40037-013-0063-2.
[32] T. Raupach, D. Vogel, S. Schiekirka, C. Keijsers, O. Ten Cate, and S. Harendza, "Increase in medical knowledge during the final year of undergraduate medical education in germany," *GMS Zeitschrift fur Medizinische Ausbildung*, vol. 30, no. 3, 2013, doi: 10.3205/ZMA000876.