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ORIGINAL RESEARCH

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Correlation of Uji Tahap Bersama (National Joint Exam) Results with Multiple Choice Questions (MCQ) Exam Scores in Medical Students

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ABSTRACT

Background: Uji Tahap Bersama is a form of formative assessment initiated by the Association of Indonesian Medical Education Institutions (AIPKI) and the Ministry of Education and Culture (Kemendikbud) to maintain the quality of medical student learning in Indonesia. The Faculty of Medicine Universitas Andalas uses the Problem-Based Learning (PBL) method in organizing an educational system with summative assessment in the form of a computer-based Multiple-Choice Questions (MCQ) exam. Formative and summative assessment is a form of assessment that assesses the extent to which students understand the learning material that has been given. This study aims to determine the correlation between summative and formative assessment results in medical students' classes in 2017 and 2018, Faculty of Medicine, Universitas Andalas.

Methods: This analytic, cross-sectional research involved 174 medical students from the Faculty of Medicine, Universitas Andalas, representing the 2017 and 2018 classes. The participants completed all pre-clinical phase blocks (except elective blocks) and took Uji Tahap Bersama I and II during their respective periods. Purposive sampling, meeting inclusion and exclusion criteria, determined the sample. The secondary data, which included the results of Uji Tahap Bersama I and II as well as MCQ scores before remedial, were analyzed through regression using the Pearson correlation test. To determine the extent to which MCQ affects the UTB outcomes, the coefficient of determination (r2) is used, which is obtained from the square of the correlation coefficient (r). The findings were interpreted based on Colton's correlation interpretation guidelines.

Results: The findings revealed significant correlations in all four analyses conducted. UTB I results correlated significantly with average MCQ scores for the 1st to 4th semesters, while UTB II results correlated substantially with average MCQ block scores for the 1st to 7th semesters across batches. These correlations ranged from moderate to very strong.

Conclusion: This study establishes a noteworthy correlation between UTB results and the average MCQ scores among medical students at the Faculty of Medicine, Universitas Andalas. The findings underscore the relevance of UTB as a formative assessment tool in maintaining and gauging the quality of medical education in Indonesia.

Keywords: Uji Tahap Bersama, Progress Test, Multiple Choice Questions, Formative Examination, Medical Education

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PRACTICE POINTS

- This research analyzed the correlation between formative and summative assessments of medical students.
- The implementation of Uji Tahap Bersama as a formative assessment needs to be implemented in medical education institutions to evaluate student learning outcomes longitudinally.
- The combination of formative and summative assessment in medical education can produce more complete evaluation results for the development of the medical education system.
- Appropriate evaluation methods are needed in the learning process to ascertain how students have achieved their learning objectives.

INTRODUCTION

Medical Education is a conscious and planned effort in formal education, consisting of academic and professional education at the higher education level whose study programs are accredited to produce graduates who are competent in medicine or dentistry, in order to achieve this requires a verified process that is in accordance with the future needs of public health services.[1,2]

Learning outcomes assessment is needed as an evaluation material to determine the extent of the quality of the teaching and learning process. Learning assessments can be summative and formative, and students get feedback on their learning outcomes within a certain time.[3] Summative assessment is based on assignment grades, practicum exam grades, tutorial discussion summaries, and final block exams. It is the most commonly recognized way of evaluating learning outcomes. Still, formative evaluation is also needed as an indicator of student assessment of prior knowledge and can strengthen students' motivation to learn and achieve higher standards.[4] Progress Test is one of the assessment methods that can be implemented as a formative assessment. It is currently implemented as Uji Tahap Bersama (UTB), which is given simultaneously with a certain time interval to class students who are active in that year.[3] Comprehensive, curriculum-sequential progress tests intend to counteract the restrictive focus on final exams and foster profound, long-lasting learning.[5] Through a progressive assessment system, this evaluation confirms students acquire the program's intended knowledge base.[6] A study by Simaremare at a medical school in North Sumatra in North Sumatra showed that the Progress Test scores achieved by students were getting higher or directly proportional to the length of student study.[3]

To maintain the quality of medical students in Indonesia, the Ministry of Education and Culture (Kemendikbud), in collaboration with the Association of Indonesian Medical Education Institutions (AIPKI), held a Uji Tahap Bersama (UTB) for medical students.[7] Uji Tahap Bersama is a form of formative assessment in medical education in Indonesia. It also provides information on the development and effectiveness of students' learning processes.[8] Uji Tahap Bersama is carried out in two stages: the first after the 4th semester and the second after the 7th semester. As a result, this information can be one of the considerations in implementing innovations in the teaching and learning process in Medical Education.

Uji Tahap Bersama is a modified progress test, a form of formative assessment. Research from Findyartini et al. in 2023 found that the curriculum in Indonesia currently emphasizes summative rather than formative forms. The description of the implementation of student-centered learning in the medical curriculum in this study is far from what it should be and tends to be teacher-centered learning.[9] Progress tests can be a tool for students to reflect on and get feedback on the learning process's

achievements. The UTB results are given to students along with the blueprint of the questions so that students can reflect on and identify their strengths and weaknesses.

Initial data The implementation of UTB at Universitas Andalas was carried out for the class of 2017 students in the 4th semester in June 2019 and the 7th semester in 2021. Different for the class of 2018 students, UTB was carried out in the 6th semester in February 2021 and the 7th semester in December 2021. The COVID-19 pandemic resulted in UTB being implemented online from home with remote supervision using a video conference application. The exam method is a computer-based (CBT) test with multiple-choice questions (MCQ). There are differences in question blueprints between UTB I and UTB II, where UTB I consists of a review of basic and clinical medical science. UTB II focuses on clinical medicine.

The academic curriculum (preclinical phase) at the Faculty of Medicine Universitas Andalas consists of 21 blocks distributed over 7 semesters. Each block comprises 5 modules and lasts for 5 weeks. The evaluation system implemented is a Computer-Based Test (CBT) using multiple-choice questions (MCQ), which is conducted at the end of each block. The block exams consist of 100 items, which are developed by expert faculty members involved in the respective block and are reviewed by the student assessment team. The review process includes an evaluation of both the question item writing and the content of the questions.

Multiple-choice questions (MCQ) are a widely used assessment method in professional education. They allow for the efficient evaluation of a significant portion of the curriculum in a brief period, requiring minimal effort from students. However, creating high-quality MCQ demands considerable time and effort from the examiner. Despite this, MCQ is an effective tool for assessing students and offering valuable guidance to teachers.[10] Most medical tests consist of questions in a multiple-choice format.[11] Multiple-choice questions are a popular tool for evaluating medical students because they can test many candidates with minimal human intervention.[12]

Because not many studies have been conducted to see the correlation of the implementation of the Progress Test as an assessment in the form of a Uji Tahap Bersama as formative assessment with Multiple-Choice Questions as summative assessment of medical education in Indonesia, the researcher intends to analyze the correlation of the Uji Tahap Bersama results with the Multiple-Choice Questions Scores for Students at the Faculty of Medicine, Universitas Andalas as an effort to develop the learning process.

METHODS

The type of research used is observational analytic research with a cross-sectional study approach. Data collection is done simultaneously. The research was conducted at the Faculty of Medicine, Universitas Andalas, from March to October 2023. This study used a purposive sampling method. The study population was medical study program students from the Faculty of Medicine, Universitas Andalas, class of 2017 and 2018. The research sample was Medical Study Program Students of the Faculty of Medicine, Universitas Andalas Class of 2017 and 2018 who had attended all blocks of the lecture system at the Faculty of Medicine, Universitas Andalas, except elective blocks, and had taken two stages of Uji Tahap Bersama. The sample amounted to 174 students, consisting of 87 medical students from the class of 2017 and 87 medical students from the class of 2018. This study has received ethical approval from the Research Ethics Committee of the Faculty of Medicine, Universitas Andalas, with number 299/UN.16.2/KEP-FK/2023.

The data used in this study are secondary in the form of UTB I and II results and MCQ results before remedial, except for elective blocks in medical students of the Faculty of Medicine, Universitas Andalas, classes of 2017 and 2018. Correlation analysis was carried out between UTB I, with the average MCQ scores from the 1st to 4th semesters, and UTB II, with the average MCQ scores from the 1st to 7th semesters. Correlation strength was interpreted using correlation interpretation according to Colton's Correlation Interpretation. To

assess the influence of variable variance, statistical techniques can be employed by calculating the magnitude of the coefficient of determination. The coefficient of determination is computed by squaring the previously found correlation coefficient and then multiplying by 100%. The coefficient of determination (explained variance) is expressed as a percentage.[13] To determine the extent to which MCQs affect the UTB outcomes, the coefficient of determination (r^2) is used, which is obtained from the square of the correlation coefficient (r).

Table 1. Colton Correlation Interpretation

r value	Description
0.00-0.25	No/Weak relationship
0.26-0.50	Fair relationship
0.50-0.75	Strong relationship
0.76-1.00	Very strong/Perfect relationship

RESULTS AND DISCUSSION

Statistics Description of UTB Results and MCQ Scores Medical Students Faculty of Medicine, Universitas Andalas

Based on Table 2, the statistics description of UTB results is less varied because the standard deviation value is smaller than the average at UTB I and II in the 2017 and 2018 batches. In UTB I, the highest average scores were found in the class of 2017, with an average of 44,61. The lowest minimum score is found in the class of 2018, with a score of 18.50. The maximum score is in the class of 2017, with a score of 61.33. In UTB II, the highest average scores are found in the class of 2018, with an average of 46,40. The lowest minimum score is found in both batches, with a score of 18.50. The highest maximum score is in the class of 2018, with a score of 70.00. Descriptive analysis of UTB score results nationally shows an increase in the mean value between UTB I and II. At Universitas Andalas, the 2018 and 2017 classes showed an increase in mean scores. The difference in UTB I and II scores that are not too far away (an increase of 3.2 points and 2.39 points) illustrates that student knowledge between the 4th semester and 7th semester is not too far away. UTB is a modification of the progress test, with changes in the blueprint of the questions, 20% of UTB I. In addition, the lowest score of 18.50 in 7th-semester students is quite concerning.

One possible answer to this problem is that students do not understand the importance of formative assessment and self-motivation.[9] A study obtained by Lyndon et al. has demonstrated an important relationship between burnout and quality of life profiles, academic motivation, and achievement on progress tests over time. Lower Burnout Higher Quality of Life students had more optimal academic motivation with higher intrinsic motivation and self-efficacy and lower motivation and test anxiety.[14] Henning et al., investigated associations between medical students' perceptions of quality of life, learning motivation, and self-disclosed academic achievement. Their study's findings suggested positive correlations between quality of life, motivation to learn, and written examination grades.[15]

A more in-depth evaluation reveals that some students did not show significant improvements in their UTB scores, and in some cases, there was a decline. This is suspected to be due to the retention of learning materials not lasting long enough. This issue may be related to the timing of the UTB exams, which are spaced one to two years apart, leading to a decrease in the retention of previously learned material and a shift in focus to the current block being followed. The work of Van der Vleuten, Heeneman, and Schuwirth provides insight into the implementation of progress tests at their institution. These progress tests are conducted using 200 multiple-choice questions, covering content from all disciplines and all organ system categories. This formative evaluation is held four times a year for all students. For students, it is almost impossible to strategically revise in preparation for the progress test. The progress test is expected to encourage students to engage in regular study activities, as it generally leads to better scores and less stress[16] Integrating spaced repetition methods into the curriculum can enhance long-term learning retention. Consistent engagement with the material through cumulative assessments facilitates the consolidation of knowledge and supports improved recall during progress tests.[17]

Apart from that, the results of UTB as a formative assessment can also be influenced by the length of time students have been studying. Research conducted by Mirfat shows that the longer it takes a student study period to follow the learning process then the progress test value achieved will also increase Good.[4] This is also in line with research conducted by Menaldi et al., at the Faculty of Medicine, University of Indonesia, that the longer students attend lectures, the better the progress test scores they get.[18]

It is a challenge for our institution to further develop the atmosphere of formative feedback. A significant number of students experience considerable anxiety associated with progress tests, which can adversely affect their performance and overall learning experience. This anxiety may arise from the pressure to uphold high academic standards or the fear of failure, particularly during the transition from traditional high-stakes assessments.[19]

Students frequently employ diverse preparation strategies for progress tests, with some placing substantial emphasis on practice questions, while others may not engage in effective study techniques. Subpar initial performance often prompts the development of improvement strategies, although there continues to be a notable dependence on external support systems, such as academic remediation.[20]

The average MCQ exam results of medical students at the Faculty of Medicine, Universitas Andalas, are obtained from the accumulated scores of students in each block. In the 1st to 4th semester, an average of 62.09 was obtained in the class of 2017, while in the class of 2018, an average of 61.36 was obtained. In semesters 1st to 7th semesters, an average of 63.46 was obtained in the class of 2017, while in the class of 2018, an average of 62.20 was obtained.

Correlation of UTB Results with Average MCQ scores of Medical Students Faculty of Medicine, Universitas Andalas

In the class of 2017, the analysis conducted on the UTB I results with the average MCQ 1st to 4th semesters scores obtained a significant correlation ($p < 0.05$) with strong correlation strength ($r = +0.624$, strong relationship, r = 0.51 to 0.75). The coefficient of determination obtained is 0.38, which means that the influence of MCQs on UTB outcomes is 38%, while the remaining 62% is influenced by other factors. The analysis carried out on the UTB II results with the average MCQ scores from the 1st to 7th semesters obtained a significant correlation ($p < 0.05$) with moderate correlation strength ($r = +0.497$, moderate relationship, r = 0.26 to 0.50). The coefficient of determination obtained is 0.24, which means that the influence of MCQs on UTB outcomes is 38%, while the remaining 76% is influenced by other factors

In the class of 2018, the analysis conducted on UTB II results with the average MCQ 1st to 4th semesters scores obtained a significant correlation ($p < 0.05$) with a very strong correlation strength ($r = 0.797$, very strong relationship, r = 0.76 to 1.00). The coefficient of determination obtained is 0.62, which means that the influence of MCQs on UTB outcomes is 62%, while the remaining 38% is influenced by other factors The analysis conducted on the UTB II results with the average MCQ scores of the 1st to 7th semesters obtained a significant correlation ($p < 0.05$) with a strong correlation strength ($r = 0.712$, strong relationship, r = 0.51 to 0.75). The coefficient of determination obtained is 0.50, which means that the influence of MCQs on UTB outcomes is 50%, while the remaining 50% is influenced by other factors.

Table 2. Statistics Description of UTB Results and MCQ Scores Medical Students Faculty of Medicine, Universitas Andalas

Batch	n	UTB	National Mean	Local Mean	SD	Min	Max	MCQ Scores (x Semester)	
								1st - 4th	1st - 7th
2017	87	I	42,28	44,61	6,63	28,66	61,33	62.09	63.46
		II	44,67	45,99	7,82	18,50	64,50		
2018	87	I	42,18	43,20	9,15	18,50	60,50	61.36	62.20
		II	43,87	46,40	10,22	18,50	70,00		

According to Colton, the four correlation analyses conducted between UTB results and average MCQ scores all showed meaningful results, with details of one moderate correlation, two strong correlations, and one very strong correlation, using the interpretation of the relationship between two variables.

Table 2. Statistics Description of UTB Results and MCQ Scores Medical Students Faculty of Medicine, Universitas Andalas

Batch	UTB	MCQ Scores (x Semester)		
		r	r^2	p
2017	I	+0,624	0.38	0,000
	II	+0,497	0.24	0,000
2018	I	+0,797	0.62	0,000
	II	+0,712	0.50	0,000

The results showed that implementing UTB as a formative exam influenced the summative MCQ exam. This aligns with research conducted by Manoppo et al. at the Faculty of Medicine Sam Ratulangi University, which found that continuous formative assessment is related to improving student summative assessment results.[4] Formative exams have an important role for medical students because at the end of the module, the learning competencies expected from the module have been achieved so that when the summative exam takes place, students can carry it out well.[21]

Multiple-choice questions (MCQ) tests are amongst the most commonly used methods of assessment in healthcare education.[22] Compared to other methods of assessment, the utility of MCQ testing can be justified by its high validity and reliability, but this is only applicable for certain aspects of curricula that are more knowledge-based and when question writing is of high quality to avoid any biases.[23] Multiple Choice Questions are generally recognized as having a high content validity, and this is largely influenced by the common use of blueprinting in healthcare education.[24,25]

The goal of Medical Education in Indonesia is to produce competent and high-quality doctors. This can be achieved through continuous and repetitive learning, which is the foundation of the learning process. Repeatedly putting ourselves to the test, which deepens our understanding, makes this attainable.[26] It is observed that many medical students lack repeated study sessions and proper spacing in their study habits.[27] While cramming may be a common student practice before final exams, its effectiveness is limited, particularly in vast and complex subjects like medicine. Focused on short-term memorization for immediate score gains, cramming often fails to provide genuine understanding or long-term knowledge retention.[28]

Internal and external factors can also influence the results of the learning process. Intrinsic factors in the learning environment are influenced by the related personality type with motivation, satisfaction, and learning effectiveness in medical students. This personality type will determine various learning behavior patterns, such as the learning behavior of a student extroverts prefer a discussion or two-way learning process and introverts prefer a one-way learning.[29] Extrinsic factors in the learning environment are influenced by physical factors and psychosocial factors. Physical factors can influence the satisfaction of students in a learning environment, such as air quality, lighting, and noise. Factor psychosocial that can influence the environment learning is having an environment support such as friends who help and supportive family during the learning process taking place.[30,29]

Until now, few other studies have discussed the relationship or correlation between UTB results and the average MCQ score in Medical Students in Indonesia. Research conducted by Dr. Mohan Murugesan et al., showed a positive correlation between formative and summative assessment results in students at Kanyakumari Government Medical College, India. Formative assessments structured with additional interventions help students in the learning process.[31] Another study by Meliani et al. at the Faculty of Medicine, Padjadjaran University, showed a positive effect of formative and summative assessment on student learning.[32] Similar research conducted by Khadafianto showed a moderate correlation between UTB and the GPA of medical students.[33]

From this research, it was found that there is a linear correlation between MCQ scores and UTB results, where students with high MCQ scores tend to achieve high UTB results. The same results also showed from research conducted by Meher et al., who researched the effectiveness of implementing formative examination on summative examination. The observed outcomes can be attributed to the role of spaced assessments in fostering effective study routines among students, which enhance learning. Moreover, repeated testing has been demonstrated to be more beneficial than relying solely on repetitive reading[28] Students who undergo frequent weekly assessments tend to stay consistent with reading and organize their study routines over time.[34]

Uji Tahap Bersama, as a form of formative assessment, utilizes the programmatic assessment model. This model will enhance the student's learning experience by aiding them in reflecting, planning, and engaging in their learning process.

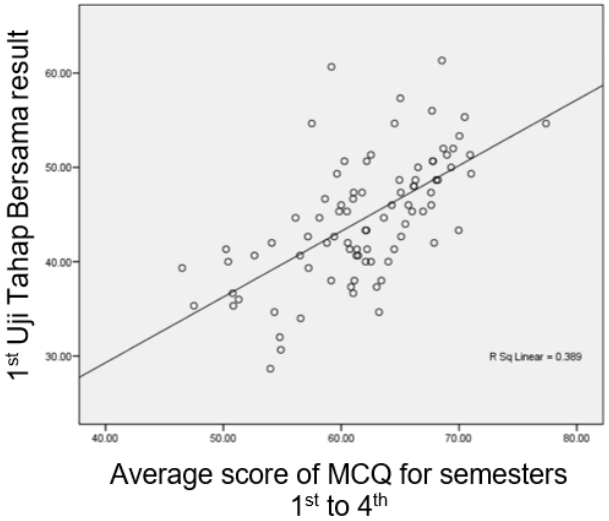

Figure 1. The Correlation between the UTB I Results and The Average Scores of MCQ for Semester 1st to 4th in the 2017 Class

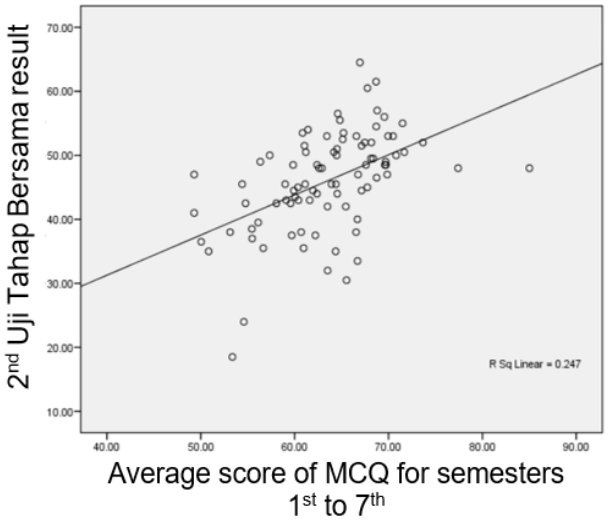

Figure 2. The Correlation between the UTB II Results and The Average Score of MCQ for Semester 1st to 7th in the 2017 Class

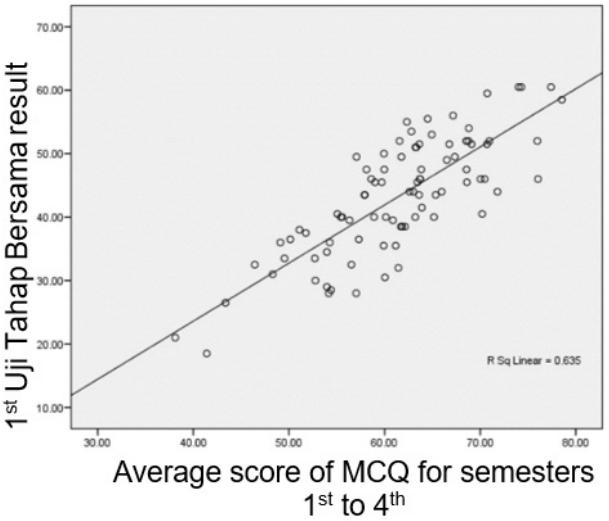

Figure 3. The Correlation between the UTB I results and The Average Score of MCQ for Semester 1st to 4th in the 2018 Class

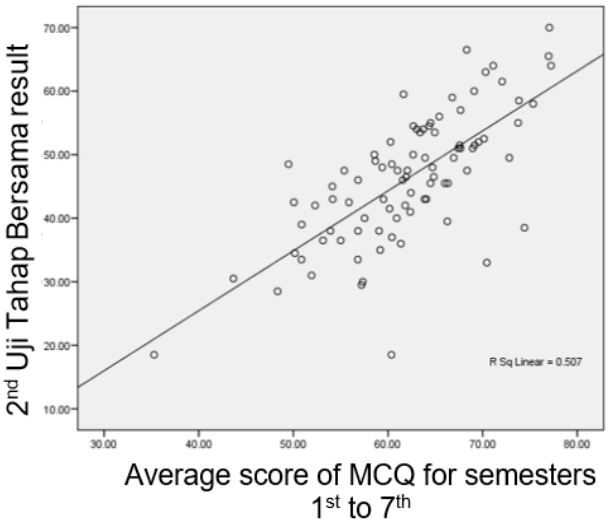

Figure 4. The Correlation between the UTB II results and The Average Score of MCQ for Semester 1st to 7th in the 2018 Class

Consequently, students will not merely study for the test but will gain essential lessons that enable progress in their learning journey.[35] The results of Uji Tahap Bersama as a progress test can be used as a tool for self-reflection, which can motivate students to improve in the future.[36] A systematic review of progress tests reveals the potential to identify possible gaps in the courses or topics being followed, to improve and intervene in teaching methods. Students benefit by measuring their learning progress over time, which also aids in preparing them for selection exams for advanced educational stages. For institutions and their administrators, it becomes possible to pinpoint areas of weakness and assess the efficiency of the curriculum, thereby enabling improvements in teaching methods.[37]

CONCLUSION

There is a significant correlation between UTB results and the average MCQ block score in medical students of the Faculty of Medicine, Universitas Andalas. From the four correlation analyses conducted between the UTB results and the average MCQ scores, all showed significant results and positive correlation directions, with details of one moderate correlation, two strong correlations, and one very strong correlation using the interpretation of the relationship between two variables, according to Colton. The higher the average MCQ score, the higher the UTB result. Based on the analysis with the coefficient of determination, there is a percentage stating that there are other factors that also influence the relationship between MCQ as a summative assessment and UTB as a formative assessment which may require further research. The existence of formative and summative assessments of the learning process of medical students is expected to improve the quality of the learning process. In addition, this assessment can be one of the materials educational institutions should consider when developing the medical education curriculum. It can be an instrument for equalizing the competence of medical students in Indonesia.

RECOMMENDATION

Looking at the progress test, which is a formative assessment to assess students' abilities in the middle of the learning process, this method helps see to what extent students have been shaped by the learning process that has been carried out.

Uji Tahap Bersama or progress test should be conducted more frequently as it can encourage students to engage in regular study activities. The outcome is that the knowledge learned can be retained for a longer period and internalized within the students. The policies of educational institutions are significant in this regard, one of which can be making progress tests one of the mandatory requirements for students who have taken this assessment within a certain period, the results of which can be used as a reference in developing the learning system in each institution in particular, and for medical education in Indonesia in general. When medical faculties incorporate formative assessments into their curricula, it is essential to establish a framework that recognizes these assessments as a fundamental component of the educational program. Further research is needed to assess the correlation between UTB results and average MCQ scores in medical students in different batches and curricula. This research is expected to be a reference for developing Medical Education in Indonesia.

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- Local Committee of *Uji Tahap Bersama* at Faculty of Medicine, Universitas Andalas.

COMPETING INTEREST

The authors declare that there is no conflict of interest regarding the study of this manuscript.

LIST OF ABBREVIATIONS

UTB : Uji Tahap Bersama
PBL : Problem Based Learning
AIPKI : Asosiasi Institusi Pendidikan Kedokteran Indonesia (Indonesian Association of Medical Education Institution)
KKI : Konsil Kedokteran Indonesia (Indonesian Medicine Council)

SPICES : Student-Centered, Integrated, Community Based, Elective/Early Clinical Exposure, Systematic
MCQ : Multiple-Choice Questions

KONTRIBUSI PENULIS

Gabriel Septian Hendra - developing a research proposal, collecting data, data analysis, writing, and finalizing the manuscript.

Yulistini – developing research ideas, giving feedback on research plans, writing the manuscript and proofreading the manuscript.

Netti Suharti - providing feedback on research plans and proofreading the manuscript.

Firdawati - providing feedback on research plans and results.

Elly Usman - providing feedback on research plans and results.

Biomechy Oktomalio Putri - providing feedback on research plans and results.

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