The Role of Online Learning in Mediating Grit and IT Skills' Influences on Student Academic Achievement

Gat
Information System
STMIK Pontianak
Pontianak, Indonesia
gutsy0818@yahoo.com

Kusrini
Magister of Informatics Engineering
Magister of Informatics Engineering
Yogyakarta, Indonesia
kusrini@amikom.ac.id

Sandy Kosasi
Information System
STMIK Pontianak
Pontianak, Indonesia
sandykosasi@stmikpontianak.ac.id

Kartika Sulastri
Information System
STMIK Pontianak
Pontianak, Indonesia
kartika.sulastri@stmikpontianak.ac.id

***Abstract*—The quality of education evidenced in the high level of student academic achievement becomes an expectation for universities, including private STMIK in Indonesia. Variables play an important role in the success of student academic achievement. This study aims to determine the influence of grit and IT skills on student academic achievement, and the role of online learning in mediating those influences on student academic achievement. Samples from 367 students of ten (10) private STMIKs in Indonesia were analyzed using SEM-AMOS. The results of the statistical test show that grit played a role in influencing online learning and academic achievement. IT Skills played a role in affecting students on online learning, instead of on student academic achievement. Moreover, online learning played a role in influencing student academic achievement. However, grit and IT Skills can provide an influence on Academic Achievement through online learning. Although the research was conducted at private STMIK in Indonesia, the results of the research can be applied by other universities in Indonesia in the process of achieving student academic achievement. In the future, it is necessary to involve various universities to get better results**

Keywords—grit, IT Skills, online learning, academic achievement, SEM-AMOS, STMIK.

I. INTRODUCTION

Education is an important foundation for building a person's character and quality. The Indonesian Government through its Regulation Number 30, the year of 1990 in the higher education sector has stated one of the objectives that are preparing scholars to develop academically and/or professionally abilities to create and/or to advance science, technology, and/or arts. Considering its importance, the government continues to improve the quality of education through its policy in the Minister of National Education Regulation Number 045/U/2002 concerning the higher education curriculum that regulates higher education competency elements [1]. Starting in 2021, the Ministry of Education and Culture carries out a National Assessment to map the quality of education in Indonesia.

Universities as the provider of higher education obligate to improve student's quality of learning. In return, qualified students will benefit the institutions. Moreover, the quality of students is frequently used as a tool in measuring the institution's performance [2]. Qualified students are shown in excellent academic grades [3]. These are evidenced through Grade Point Average (GPA) [4] - [5] where GPA is one of the measures for student academic achievement [6] in addition to communication skills [7] and leadership proficiencies [8]. For universities, particularly private STMIKs in Indonesia, student achievement improves the institutions' reputation within communities and field works [9].

The low level of student academic achievement has become an unresolved problem in Indonesia. Given its importance for both scholars and higher educational institutions, it is important to identify factors that affect student academic achievement [10]. Private STMIKs in Indonesia, where information technology has been the core field of study, witness that online learning has a significant influence and positive contribution to student academic achievement [11]-[12]. Online learning provides students the opportunities to improve their skills in developing communication using technology, solving problems, experiencing critical thinking, and doing research [13]. The online learning environment also encourages students and lecturers to enhance their sense of responsibility and self-discipline [14]. The active students would productively involve in the online learning processes and would view the positive impacts of these learning activities.

To be active and productive in the online learning process requires persistence and high desire [15]. Persistence in high desirable actions contributes to students' productivity in learning. One of the attributes that contribute to learning success, as mentioned in psychology, is grit [16]. Grit is a combination of persevering effort and consistency [17] and is associated with sincerity for long-term goals [18]. Duckworth, in the book Grit: The Power of Passion and Perseverance, has stated that passion and perseverance contribute to success [19]. Being talented, on the other hand, also puts a significant value on success. Persistence and consistency become an encouragement for students during their hard times and real trials. Students' enthusiasm, persistence, and self-confidence would lead to satisfactory academic achievements [20]. Thus, grit has been proven to be a significant predictor of student academic success [21]-[23] and has put a positive contribution to student academic achievement [24]. Getting good results in every learning process requires enthusiasm, commitment, and the struggle to face difficulties or challenges [25]-[26].

In addition to grit, information technology (IT) skills provide influence for students in practicing online learning

[27]. During the activities, students must at least comprehend how to use the internet in attaining information [28]. Moreover, online learning platforms such as the Modular Object-Oriented Dynamic Learning Environment (MOODLE) have become a global online learning management system used by many schools recently [29]. The use of MOODLE requires users' good comprehension of information technology to operate it properly [30]. Thus, the comprehension of information technology in the learning process relates and has been an inseparable point to quality achievement [31], especially for universities [32]. The utilization of IT has had an encouraging impact on students' academic outcomes [33]. IT can be employed to solve various problems [34], more specifically, for students in accessing information and knowledge broadly [35].

This study estimates that students' academic achievement has been influenced by grit and IT skills. Several previous studies have existed which supported grit and IT skills played a role in influencing students' academic achievement. Nevertheless, none has yet investigated the influence of grit and IT skills using online learning on students' academic achievement. This study aims to determine the role of online learning on grit and IT skills' influences on student academic achievement. The results of this study would be a reference for institution managers in establishing policies regarding the implementation of online learning, especially to those who promote the recent implementation of the concept of *Kampus Merdeka* and *Merdeka Belajar*. In supporting the concept, it requires a wider perception of all parties to ensure that the teaching and learning process runs well and in the end provides a positive academic outcome.

II. Research Method

This study was a quantitative research with a survey method that presented an overview of the relationship between the variables studied [36]. The survey was carried out from January to April 2020, with a total population of 19,671 undergraduate students towards ten private STMIKs in Indonesia were identified. A total of 394 research samples were analyzed using the Structural Equation Modeling (SEM) model with the support of the Analysis of Moment Structure (AMOS) computer program in the data processing. The research questionnaire consisted of 41 closed-ended questions which were divided into 4 (four) groups based on the number of research variables. This questionnaire was designed to define students' opinions or perceptions of their academic achievement (which were 11 questions), the online learning process (which were 10 questions), grit (which were 8 questions), and IT skills (which were 12 questions). The scoring technique utilizes a 6-point Likert scale system, namely, 1 = Strongly Disagree, 2 = Disagree, 3 = Tend to Disagree, 4 = Tend to Agree, 5 = Agree, 6 = Strongly Agree. The use of the 6 Likert scale technique was considered essential to provide more accurate data by removing the doubt factor [37].

III. Result And Discussion

This research was conducted at 10 (ten) accredited private colleges in Indonesia, namely the College of Information and Computer Management (STMIK) with the focus of analysis are students in the 2nd, 4th, 6th, and 8th semesters. The questionnaire distributed online to students using google for 4 (four) months has reached 367 of data collection. In terms of quantity, these samples have met the SEM assumptions and Maximum Likelihood limitation of 100-200 samples [38]. The following is Table I that shows respondent data by the college.

TABLE I. Respondent Data By college

No.	Private Universities in Indonesia	Sample	Filled in Sample
1	STMIK AMIK Riau	30	29
2	STMIK Banjarbaru	35	28
3	STMIK Bina Sarana Global	25	25
4	STMIK Dipanegara Makassar	81	78
5	STMIK Hang Tuah Pekanbaru	18	10
6	STMIK Indonesia Padang	32	32
7	STMIK Pontianak	27	27
8	STMIK Royal Kisaran	80	76
9	STMIK Tasikmalaya	22	22
10	STMIK Widya Cipta Dharma	44	40
Total Amount		394	367

Source: Research Compilation, 2021

By taking colleges as benchmarking to differentiate the largest number from those of the lowest number of samples, Table 1 shows that STMIK Dipanegara Makassar has reached the largest number of samples with a total of 78 participants (21%). Meanwhile, STMIK Hang Tuah Pekanbaru has reached the lowest number of samples, with a total of 10 participants (3%). Overall, 93% of the total respondents filled out the questionnaire. This has confirmed the respondent's participation in supporting this research. Moreover, among 10 universities, they revealed a great variety of sample combinations, due to its significant difference in the total population. Of those universities, 4 colleges have fulfilled the whole questionaries, while the average number of respondents who filled out the questionnaire for each university was 91%. The following is Table II of respondent data by semester.

TABLE II. Respondent Data by Semester

Semester	Respondent	Percentage
2	45	12.3%
4	120	32.7%
6	139	37.9%
8	63	17.2%
	367	100.0%

Source: Research Compilation, 2021

Table II above explains that the smallest number of respondents with a total of 45 participants came from students of the 2nd semester. Meanwhile, the largest number of respondents came from students of the 6th semester, amounting to 139 participants. Since the number of samples was not based on the semester, the difference in the number of samples from each semester would not be matter. The following is Table III that provides respondent data by GPA.

TABLE III. Respondent Data by GPA

No	Universities	GPA		
		Excellent	Good	Average
1	STMIK AMIK Riau	96.6%	3.4%	0.0%
2	STMIK Banjarbaru	100.0%	0.0%	0.0%
3	STMIK Bina Sarana Global	100.0%	0.0%	0.0%
4	STMIK Dipanegara Makassar	83.3%	7.7%	9.0%
5	STMIK Hang Tuah Pekanbaru	100.0%	0.0%	0.0%
6	STMIK Indonesia Padang	90.6%	9.4%	0.0%
7	STMIK Pontianak	96.3%	3.7%	0.0%
8	STMIK Royal Kisaran	65.8%	30.3%	3.9%
9	STMIK Tasikmalaya	86.4%	9.1%	4.5%
10	STMIK Widya Cipta Dharma	92.5%	7.5%	0.0%

Source: Research Compilation, 2021

Of 10 universities shown in Table III above, 3 universities reported the excellent category of GPA with a total score of 100%. This indicates that students of those institutions have held excellent academic achievements. Overall, the average GPA for excellent, good, and average categories were 91%, 7%, and 2% respectively. This revealed that students involved in filling out the questionnaire had excellent academic accomplishments.

A. Measurement Model Test

The measurement model (outer model) shows how to manifest/observed variables (indicator) represent latent constructs to be measured, by testing their validity and reliability of these latent constructs through confirmatory factor analysis. This model test confirms a dimension or factor based on its empirical indicators. Its analysis uses Secondary Order Confirmatory Factor Analysis (CFA) with the assumptions and expectations were based on the most suitable previous theory regarding the number of factors or model [39]. Confirmatory analysis was conducted both on the exogenous constructs, namely, grit and IT skills, and the endogenous constructs, which are online learning and academic achievement. The purpose of the validity and reliability instrument test with CFA was to measure the constructs [40]. The indicator is declared valid if the Critical Ratio (CR) of the regression weight shows a value above 2.0 with a p-value less than 0.05 [41]. Fig. 1 shows a measurement model resulted from the calculation of all respondent data using AMOS 32 software.

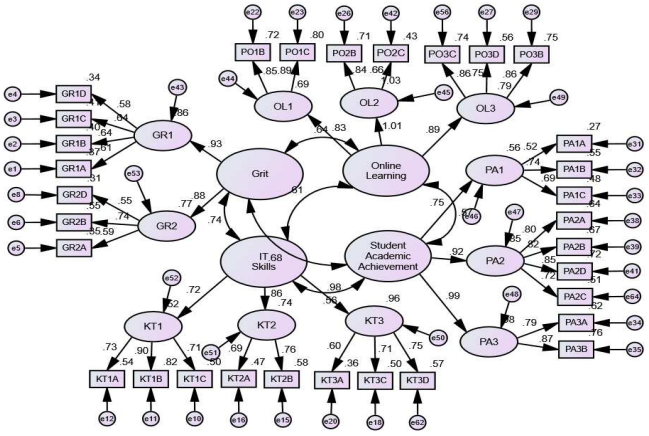

Fig. 1. Measurement Model

Fig. 1 above explains that the results of the confirmatory factor analysis on the exogenous and endogenous variables have shown a high significance of each indicator since its probability value is less than 0.05. Thus, the indicators of forming latent variables are considered good as a measuring tool.

A reliability test examines an instrument used to obtain reliable information in the field as a data collection tool by examining the reliability and consistency of data. The data meet the criteria if CR> 0.7 and the variance extracted value> = 0.50. The CR values between 0.6 and 0.7 are acceptable if the construct validity model is good [42]. The following Table IV provides the results of the Construct Reliability test on the construct and dimension.

TABLE IV. CR & AVE TEST RESULT ON CONSTRUCT & DIMENSION

Construct	Dimension	Factor Loading	C.R	AVE
Grit	Passion Consistency	0.93	0.90	0.81
	Perseverance	0.88		
Online Learning	Peer Collaboration	0.83	0.94	0.84
	Learning Management	1.01		
	Cognitive Problem Solving	0.89		
Academic Achievement	Academic Skill	0.75	0.92	0.80
	Leadership Skill	0.92		
	Communication Skill	0.99		
IT Skills	Information and Internet	0.72	0.89	0.74
	Analysis and Development	0.86		
	Solution to problem	0.98		

Source: Research Compilation, 2021

Table IV above shows the accomplishment of the convergent validity and reliability of the composite for grit, online learning, academic achievement, and IT skills as all Construct Reliability (CR) values are higher than 0.5 and all Average Variance Extract (AVE) values greater than 0.6 [43]. Thus, this study concludes that the composite reliability and convergent for all constructs have been achieved. The next assessment was the construct reliability test to evaluate discriminant validity including cross-loading and compare the AVE root value with the correlation between constructs. Table V provides cross-loading average variance extract.

TABLE V. CROSS LOADING AVERAGE VARIANCE EXTRACT (AVE)

Construct	Grit	IT Skills	Online Learning	Academic Achievement
Grit	**0.90**			
IT Skills		**0.86**		
Online Learning	0.61	0.51	**0.92**	
Academic Achievement	0.48	0.08	0.14	**0.89**

Source: Research Compilation, 2021

Table V above shows the results of the discriminant validity of the research model by reflecting the cross-loading value. Discriminant validity is valid if the value of the loading of each indicator has a greater value than the value of the loading of the other variables. Discriminant validity was used by comparing the coefficient of AVE Root (√AVE) of each variable with the correlation value between variables in the model. The indicator is considered valid if the square root of the average variance extracted (√AVE) value of each variable is greater than the correlation value between the latent variable and other latent variables with the minimum value is 0.5 [44]. The discriminant validity test resulted in greater AVE value of each latent variable correlation than other latent variables with a minimum value of 0.86. As can be seen in Table V, this can be concluded that all latent constructs or variables have better discriminant validity than the indicators in other blocks.

B. Structural Model Test

The structural model describes a causal (cause-effect) relationship model between constructs which consists of the independent (exogenous) and the dependent (endogenous) variables [45], unlike the other measurement model where it usually treats all variables (constructs) as independent ones. The significant structural model adopts the Goodness of Fit Index (GOFI) criterion [46]. Assessing the goodness-of-fit index is very important for the validity and suitability of the model [47]. The crucial focus of GOFI lies upon the significance of a specified model. Hence GOFI helps the researchers to differentiate the estimated model and observed model statistically with the help of some required fit indices.

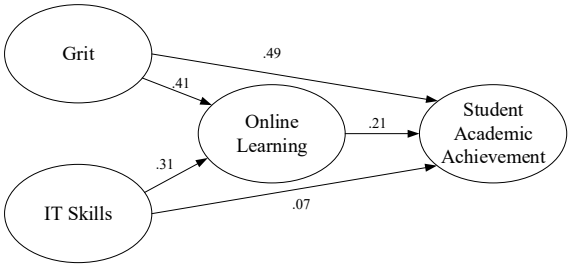

Fig. 2. Structural Model

Fig. 2 presents the structural model that consists of 4 (four) latent variables, namely 2 (two) exogenous variables (grit and IT skills), 1 (one) endogenous variable (academic achievement), and 1 (one) mediating variable (online learning). Variables of grit and IT skills give an influence on online learning and academic achievement. Apart from having a direct effect on academic achievement, they also provide an indirect effect on academic achievement through online learning. The following is Table VI that presents the fit indices model.

TABLE VI. MODEL FIT INDICES

Goodness of Fit Measure	Cut Off Value	Index Value	Description
χ^2 *(Chi Square)*	≤ 553.80	751,52	Marginal Fit
Cmin/DF	≤ 2.00	1.80	Good Fit
Significance probability (p)	≥ 0.05	.00	Poor Fit
Adjusted Goodness of Fit (AGFI)	≥ 0.90	.86	Marginal Fit
Goodness of Fit Index (GFI)	≥ 0.90	.89	Marginal Fit
Comparative Fit Index (CFI)	≥ 0.90	.94	Good Fit
Tucker Lewis Index (TLI)	≥ 0.90	.93	Good Fit
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	.05	Good Fit

Source: Research Compilation, 2021

Table VI displays the results. One out of the 8 (eight) goodness of fit criteria used, namely probability, does not fit the criteria. The more criteria accomplish the need, the more suitable the models to be a sample. However, researchers do not have to achieve all of the goodness of fit criteria. A few criteria that have been met are sufficient for them to assess the feasibility of the model, as long as they are valid, so, it provides correct interpretation [48]. Moreover, it is important to assess the parameter significance test on the latent variable to observe whether the latent variable had been empirically tested by the estimated value of the indicator (first-order) and dimension (second-order). If p-value ≤ 0.05 or C.R. ≥ 1,967 (C.R. = t-count), thus the indicator or dimension is declared significant. Table VII below shows the variable significance test:

TABLE VII. VARIABLE SIGNIFICANCE TEST

Path Significance Test	C.R.	P-Value	Description
Grit → Online Learning	3.67	0.001	Significant
Grit → Academic Achievement	3.76	0.001	Significant
IT Skills → Online Learning	2.98	0.003	Significant
IT Skills → Academic Achievement	0.76	0.45	Unsignificant
Online Learning → Academic Achievement	2.75	0.006	Significant

Source: Research Compilation, 2021

The CR (Critical Ratio) value shows the significant effect of the independent variable (grit) on the dependent variable (online learning and Academic Achievement). Table VII presents the results. All variables have greater C.R values than the t-Table value at 1.96. In addition, the probability value of all indicators is below 0.05. In this respect, it can be concluded that all variables have established a positive and significant effect. Moreover, the coefficient of determination (R2) test is employed to measure the ability of the model in defining endogenous variation in the dependent variable [49]. The coefficient of determination value is beneficial for predicting and observing how much variable X influences variable Y. The following is Table VIII that presents the coefficient of determination.

TABLE VIII. COEFFICIENT OF DETERMINATION

Direct Effect	Estimate	S.E	R-Square
Grit → Online Learning	0.62	0.17	45%
IT Skills → Online Learning	0.51	0.17	
Grit → Academic Achievement	0.48	0.13	49%
IT Skills → Academic Achievement	0.08	0.10	
Online Learning → Academic Achievement	0.14	0.05	

Source: Research Compilation, 2021

Table VIII above shows the results. Students in high grit and IT skills have put quite similar impacts in the increase of online learning activities by 62% and 51% respectively. Meanwhile, those are more likely to have different accomplishments regarding academic achievement. Students with high grit can affect the increase of academic achievement by 48%. Unlikely, students with good IT skills can have an impact on the rise of academic achievement by only 8%. In addition, student's interest in the online learning process was also able to improve student's academic achievement by 14%. These results suggest that grit has held a very significant influence both on online learning and academic achievement. Furthermore, the coefficient of determination on online learning which was amounted to 45% meant that the diversity of online learning can be described by grit and IT skills variables. The remaining 55% was explained by other variables. Meanwhile, the coefficient of determination on the academic achievement explained by grit, IT skills, and online learning variables was 49%. The remaining 51% was explained by other variables.

C. Path Coefficients

Structural equation modeling is a combination of factor analysis and path analysis into a comprehensive statistical method [50]. The extent of the influence of an exogenous variable on certain endogenous variables is stated by the numerical value of the path coefficient. This coefficient is used to describe the influence of each independent variable on the dependent variable. The following is Table IX that presents path coefficient value:

TABLE IX. PATH COEFFICIENT VALUE

Path	Estimate	P-Value
Grit → Online Learning	0.62	0.001
Grit → Academic Achievement	0.51	0.001
IT Skills → Online Learning	0.48	0.003
IT Skills → Academic Achievement	0.08	0.451
Online Learning → Academic Achievement	0.14	0.006

Source: Research Compilation, 2021

As can be seen from Table IX above, grit significantly has given a positive effect on online learning and academic achievement by 62% and 51% respectively. IT Skills also have a significant and positive effect on online learning by 48%. However, it did not give a significant effect on academic achievement as the p-value> 0.05, at 0.451. Meanwhile, online learning has put a positive effect significantly on academic achievement by 14%.

The extent of the direct effect is the amount of the standardized path coefficient (Standardized Regression Weights). The extent of the indirect effect of the independent variable on the dependent variable through the mediating variable is using the Sobel test formula. The following is Table X that presents direct and indirect effect path coefficients:

TABLE X. DIRECT & INDIRECT IMPACT PATH COEFFICIENT

Path	Impact	
	Direct	Indirect
Grit → Online Learning	0.62	
Grit → Academic Achievement	0.51	
IT Skills → Online Learning	0.48	
IT Skills → Academic Achievement	0.08	
Online Learning → Academic Achievement	0.14	
Grit → Online Learning → Academic Achievement		2.21
IT Skills → Online Learning → Academic Achievement		2.02

Source: Research Compilation, 2021

Table X above shows the extent of the direct effect of grit on online learning was 0.62 (62%). This can be interpreted that the greater student's persistence, the higher it increases the online learning activities. The extent of the direct effect of grit on academic achievement was 0.15 (51%). This can be understood that the higher the grit of a student, the higher it increases academic achievement. Moreover, the extent of the direct influence of IT Skills on online learning was 0.48 (48%), which meant that the greater student's knowledge of information technology, the higher the student's academic achievement would be. The extent of the influence of IT Skills on Academic Achievement was 0.08 (8%) which indicates only a little role of IT Skills in academic achievement. This assumes that whether students perform high or low knowledge of IT Skills, they did not provide an impact on students' academic achievement. In addition, online learning has also a little role in academic achievement, at only 0.14 (14%). This suggests that an increase in the online learning process more likely did not give a major impact on increasing academic achievement. Moreover, the indirect effect of grit on academic achievement through online learning provides an impact at 2.21. This can be seen that online learning was provenly intermediated grit and academic achievement. The high enthusiasm and persistence of students increase their online learning activities that resulted in student academic improvement. Likewise, online learning facilitates IT Skills into academic achievement with a score of 2.02, which meant online learning has been proven to establish IT Skills to provide an impact on student academic achievement. This suggests that IT Skills would contribute to improving student academic achievement.

Universities, together with lectures could hold activities such as character-building seminars, including putting character-building elements into the curriculum as an effort to increase students' enthusiasm and motivation. Concerning the role of grit on student academic achievement, management obliges to ensure lecturers play an active role in building positive relationships with students and deliver good materials combine with frequent interactive discussions. Lecturers invite students to actively join in seminars and workshops to keep them motivated. As IT skills have been proven to provide an influence on online learning, therefore, students must conduct continuous improvement on computer practicals. Even though online learning provided little impact on academic achievement, it has to be always well-managed by management. This is because grid and IT Skills -mediated in online learning- gave an influence on student academic achievement.

IV. CONCLUSION

This research observed the role of grit and IT skills on online learning and student academic achievement as well as on academic achievement through mediated online learning. The statistical tests resulted in the influence of grit on online learning and academic achievement. IT Skills played a role in influencing online learning. However, it did not put an influence on student academic achievement. Meanwhile, online learning plays a role in influencing academic achievement and more likely has an important role in mediating grit and IT skills for academic achievement. Thus, grit and IT skills provided an influence on academic achievement through the online learning process. The results of this study can be applied as a valuable reference for management for several purposes on students such as fostering grit and improving their IT skills. For management, it has a purpose to manage online learning properly due to its proven achievement. Although the research was conducted at private STMIK in Indonesia, the results of the research can be applied by other universities in Indonesia in the process of achieving student academic achievement. In the future, it is necessary to involve various universities to get better results. Finally, we acknowledge the contributions of the anonymous reviewers, editors, and STMIK Pontianak for their valuable support in this paper.

REFERENCES

[1] A. C. Rosito, "Academic achievement among university students: The role of causal attribution of academic success and failure," HUMANITAS: Indonesian Psychological Journal, vol. 17, no. 1, pp. 23-33, February 2020.

[2] E. Alyahyan, & D. Düştegör, "Predicting academic success in higher education: literature review and best practices," International Journal of Educational Technology in Higher Education, vol. 17, no. 1, pp. 1-21, December 2020.

[3] A. P. Prasetio, E. Azis, D. D. Fadhilah, & A. F. Fauziah, "Lecturers' Professional Competency and Students' Academic Performance in Indonesia Higher Education," International Journal of Human Resource Studies, vol. 7, no. 1, pp. 86-93, March 2017.

[4] S. Muluk, "Part-Time Job and Students' Academic Achievement," Jurnal Ilmiah Peuradeun, vol. 5, no. 3, pp. 361-372, September 2017.

[5] Y. Furqoni, & L. Mufidah, "The Effect of Time Management on Academic Achievement among University Students Who Memorizing Qur'an (Hifdz)," In 4th ASEAN Conference on Psychology, Counselling, and Humanities (ACPCH 2018), 2019, pp. 150-153. Atlantis Press.

[6] I. Fatwa, & Z. Rofiq, "Relationship between Student Activity Unit Involvement and Cumulative Achievement Index of Students at the Departement of Mechanical Engineering Education, State University of Medan," In 3rd International Conference on Current Issues in Education (ICCIE 2018), 2019, pp. 280-283. Atlantis Press.

[7] A. A. Shah, S. Z. Fatima, & U. Shahzadi, "Students' Academic Achievement at University as Determined by their Communication Skills," Global Educational Studies Review, vol. 5, no. 1, pp. 10-18, 2020.

[8] S. Ab Ghani, M. M. Awang, G. Ajit, & M. A. M. Rani, "Participation in Co-Curriculum Activities and Students' Leadership Skills," Journal of Southwest Jiaotong University, vol. 55, no. 4, pp. 1-13, August 2020.

[9] A. J. I. Wibowo, "Kinerja Riset Universitas, Reputasi Universitas, dan Pilihan Universitas: Sebuah Telaah Sistematis," Jurnal Manajemen Maranatha, vol. 13, no. 2, pp. 91-115, Mei 2016.

[10] S. Helal, J. Li, L. Liu, E. Ebrahimie, S. Dawson, & D. J. Murray, “Identifying key factors of student academic performance by subgroup discovery,” International Journal of Data Science and Analytics, vol. 7, no. 3, pp. 227-245, April 2019.

[11] I. Mohammed, C. N. Hassan, H. A. Jalil, “Influential Predictors of Students’ Academic Achievement in Online Peer Learning Among Undergraduate Students,” New Media and Mass Communication, vol. 39, pp. 107-117, 2015.

[12] M. Firat, “Determining the effects of LMS learning behaviors on academic achievement in a learning analytic perspective,” Journal of Information Technology Education: Research, vol. 15, no. 1, pp. 75-87, 2016.

[13] C. M. Hart, D. Berger, B. Jacob, S. Loeb, & M. Hill, “Online learning, offline outcomes: Online course taking and high school student performance,” AERA Open, vol. 5, no. 1, 2019.

[14] L. Harris, D. Harrison, D. McNally, & C. Ford, “Academic Integrity in an Online Culture: Do McCabe’s Findings Hold True for Online, Adult Learners?” Journal of Academic Ethics, vol. 18, no. 4, pp. 419-434, 2020.

[15] Y. Fang, B. Nye, Y. Pavlik, Y. J. Xu, A. Graesser, & X. Hu, “Online Learning Persistence and Academic Achievement. International Educational Data Mining Society, 2017, pp. 312-317.

[16] C. McClendon, R. M. Neugebauer, & A. King, “Grit, Growth Mindset, and Deliberate Practice in Online Learning,” Journal of Instructional Research, vol. 8, pp. 8-17, 2017.

[17] A. L. Duckworth, & P. D. Quinn, "Development and validation of the Short Grit Scale (GRIT–S)," Journal of personality assessment, vol. 91, no. 2, pp. 166-174, 2009.

[18] A. Duckworth, “Grit: Perseverance and Passion for Long-Term Goals,” Journal Of Personality & Social Psychology, vol. 92, no. 6, 1087-1101. by the American Psychological Association.

[19] A. Duckworth, Grit: The power of passion and perseverance (Vol. 234). New York, NY: Scribner, 2016.

[20] S. W. Ratnasari, A. Novandalina, & D. Perhatian, “The Effect of Self Effecacy on the Quality of Knowledge to Increase Academic Achievement Students of Gayo in Overseas,” Journal of the International Academy for Case Studies, vol. 25, no. 2, pp. 1-7, Februari 2019.

[21] R. E. Allen, C. Kannangara, & J. Carson, "True Grit: How Important is the Concept of Grit for Education? A Narrative Literature Review," International Journal of Educational Psychology, vol. 10, no. 1, pp. 73-87, 2021.

[22] D. Bennett, C. McCarty, S. & Carter, "THE RELATIONSHIP BETWEEN GRIT AND ACADEMIC PERFORMANCE IN THE CLASSROOM," Journal for Economic Educators, vol. 20, no. 2, pp. 1-15, 2020.

[23] K. Rimfeld, Y. Kovas, P. S. Dale, & R. Plomin, "True grit and genetics: Predicting academic achievement from personality," Journal of personality and social psychology, vol. 111, no. 5, 780, 2016.

[24] A. A. Owusu, E. Larbie, & C. Bukari, “Is Grit the Best Predictor of University Students’ Academic Achievement?.Journal of Education and Practice, vol.11, no. 29, pp. 73-82, 2020.

[25] D. Terry, & B. Peck, “Academic and clinical performance among nursing students: What's grit go to do with it?,” Nurse education today, vol. 88, pp. 1-28, 2020.

[26] D. Arli, F. Tjiptono, A. Tkaczynski, & M. Bakpayev, “Grit: the good, the bad and the ugly,” Asia Pacific Journal of Marketing and Logistics, pp. 1-16, November 2020.

[27] A. Balavivekanandhan, S. & Arulchelvan, “A study on students acquisition of IT knowledge and its implication on M-learning,” The Scientific World Journal, vol. 2015. pp. 1-11, 2015.

[28] E. Alqurashi, "Self-efficacy in online learning environments: A literature review," Contemporary Issues in Education Research (Online), vol. 9, no. 1, pp. 45-51, 2016.

[29] A. R. Memon, & F. A. Rathore, "MOODLE and Online Learning in Pakistani Medical Universities: An opportunity worth exploring in higher education and research," JPMA. The Journal of the Pakistan Medical Association, vol. 68, no. 7, pp. 1076-1078, 2018.

[30] A. A. M. Al-araibi, M. Naz’ri bin Mahrin, & R. C. M. Yusoff, "Technological aspect factors of E-learning readiness in higher education institutions: Delphi technique," Education and Information Technologies, vol. 24, no. 1, pp. 567-590, 2019.

[31] M. Liesa-Orús, C. Latorre-Cosculluela, S. Vázquez-Toledo, & V. Sierra-Sánchez, "The technological challenge facing higher education professors: Perceptions of ICT tools for developing 21st century skills," Sustainability, vol. 12, no. 13, pp. 1-14, 2020.

[32] M. Bullen, & T. Morgan, “Digital learners in higher education: Implications for teaching, learning & technology,” Teaching and learning in digital worlds: Strategies and issues in higher education, pp. 11-19, 2015.

[33] M. Wihlborg, E. E. Friberg, K. M. Rose & L. Eastham, “Facilitating learning through an international virtual collaborative practice: A case study,” Nurse education today, vol. 61, pp. 3-8, 2018.

[34] M. Pinto, & C. Leite, “Digital technologies in support of students learning in Higher Education: literature review,” Digital Education Review, vol. 37, pp. 343-360, 2020.

[35] G. Anandhalli, “Impact of Information Literacy Skills on The Academic Achievement of The Students: A Case Study Of Anjuman Degree College, Vijayapura,” International Journal of Research in Humanities (IJRHAL), vol. 6, no. 3, pp. 1-16, 2018.

[36] Sugiyono, Metode Penelitian Kuantitatif, Kualitatif dan Kombinasi (Mixed Methods), Publisher: CV. Alfabeta, 2016.

[37] N. W. A. Majid, T. Ridwan, A. Fauzi, R. Hikmawan, “Integrating of E-learning to Improve Students Competence in Vocational School,” In 5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018), 2019, pp. 73-79. Atlantis Press.

[38] I. Ghozali, Model Persamaan Struktural Konsep dan Aplikasi Dengan Program AMOS 24 Update Bayesian SEM. Semarang (ID): Badan Penerbit Universitas Diponegoro. Edisi, 7, 2017.

[39] J. Baistaman, Z. Awang, A. Afthanorhan, & M. Z. A. Rahim, "Developing and validating the measurement model for financial literacy construct using confirmatory factor analysis," Humanit. Soc. Sci. Rev, vol. 8, no. 2, pp. 413-422, 2020.

[40] M. Mohamad, A. Afthanorhan, Z. Awang, & M. Mohammad, “Comparison between CB-SEM and PLS-SEM: Testing and confirming the maqasid syariah quality of life measurement model,” The Journal of Social Sciences Research, vol. 5, no. 3, pp. 608-614, 2019.

[41] I. Ghozali, Aplikasi analisis multivariate dengan program IBM SPSS 23, Semarang: Universitas Diponegoro, 2018.

[42] J. F. Hair, W. C. Black, B. J. Babin, & R. E. Anderson, Multivariate Data Analysis Seventh Edition Prentice Hall. Upper Saddle River, New Jersey, 2010.

[43] A. S. Shkeer, & Z. Awang, “The Impact of Marketing Information System Components on Organizational Decision Making: A Case of Jordanian Five Star Hotels,” International Review of Management and Marketing, vol. 9, no. 6, pp. 197-204, 2019.

[44] J. F. Hair, M. Gabriel, & V. Patel, “AMOS covariance-based structural equation modeling (CB-SEM):Guidelines on its application as a marketing research tool,” Brazilian Journal of Marketing, vol. 13, no. 2, pp. 44-55, Maret 2014.

[45] S. Santosa, Structural Equation Modeling, Konsep dan Aplikasi dengan AMOS 18.0, PT. Elex Media Komputindo, Jakarta, 2011.

[46] S. Haryono, & P. Wardoyo, Structural equation modeling untuk penelitian manajemen menggunakan AMOS 18.00. Bekasi. Penerbit PT Intermedia Personalia Utama, 2012.

[47] M. Sahoo, Structural Equation Modeling: Threshold Criteria for Assessing Model Fit. In Methodological Issues in Management Research: Advances, Challenges, and the Way Ahead. Emerald Publishing Limited, 2019.

[48] D. Dalila, H. Latif, N. Jaafar, I. Aziz, & A. Afthanorhan, “The mediating effect of personal values on the relationships between attitudes, subjective norms, perceived behavioral control and intention to use.” Management Science Letters, vol. 10, no. 1, pp. 153-162, 2020.

[49] I. Ghozali, Model Persamaan : Konsep dan Aplikasi dengan Program AMOS 16.0, Badan Penerbit Universitas Diponegoro, Semarang, 2008.

[50] I. Ghozali, Aplikasi Analisis Multivariate dengan Program IBM SPSS 22 Update PLS Regresi, Penerbit Universitas Diponegoro, 2013.