The Seybold Report

ISSN 1533-9211

DOI: 10.5281/zenodo.11044477

THE INFLUENCE OF STUDENT INTERACTION ON SUCCESSED ONLINE LEARNING, SUPPORTED BY SYSTEM QUALITY, SOCIAL INFLUENCE AND INSTRUCTOR QUALITY, STRENGTHENED BY ATTITUDE TOWARD USE OF AI

I KADEK DWI NURYANA [1], PURWANTO PURWANTO [2] and

R. RIZAL ISNANTO [3]

[1] Doctorate Program of Information System School of Postgraduate Studies Universitas Diponegoro Semarang, Indonesia, Information System Program Faculty of Engineering Universitas Negeri Surabaya, Indonesia.
[2] Doctorate Program of Information System School of Postgraduate Studies Universitas Diponegoro Semarang, Indonesia, Department of Chemical Engineering Faculty of Engineering, Universitas Diponegoro Semarang, Indonesia.
[3] Department of Computer Engineering, Universitas Diponegoro Semarang, Indonesia.

Abstract

This research aims to examine the influence of system quality, instructor quality and social influence on student interactions and their contribution to the success of online learning which is moderated by attitudes towards the use of Artificial Intelligence digital technology. This quantitative research involved 200 respondents. All respondents are engineering students in 2023/2024 from Surabaya State University. This research collects data using a questionnaire. Data analyst were carried out with SEM PLS analysis. The results of this research show that student interaction greatly influences the success of online learning, which can be strengthened by the intensity of AI use and is also supported by good system quality, qualified instructors and high social support.

Keywords: System Quality, Instructor Quality, Social Influence, Student Interactions, Success of Online Learning, Attitudes towards the Use of Artificial Intelligence Digital Technology.

INTRODUCTION

Online learning is currently widely carried out in higher education, this is a new innovation in the world of education which really supports the continuity of the learning process even though lecturers and students cannot meet directly in learning classes for certain reasons. [1]. Online learning is convenient, promotes student participation and caters students' needs. Meanwhile, this also discovered lack of interaction among students, unclear assessment strategy, lack of precise feedback and support from lecturers, and lack of interest in learning [2]. Online learning is an innovation in learning mode brought by the inevitability of information and communication technology. Online learning is argued to have positively affected students' autonomy, motivation, and collaboration skills while providing flexible learning for the students.

The abundance of online sources, tools, and networking enables students to navigate their learning. [3] On this research imply that teachers, educators, and students should embrace online learning and it’s supporting applications to improve learning processes and student

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

academic performance. The present study contributes to the limited literature on a general overview of online learning benefits seen from the students' side.

Even though online learning provides many benefits, in practice lecturers and students face many obstacles during the implementation of online learning. One of the main problems is the low level of student interaction both with lecturers, interaction with other students and student interaction with the content discussed in online learning [4]. Online learning can be carried out well and produce good outcomes if students can interact well during online learning [5]. Teachers and universities must be able to develop strategies so that students can interact well during online learning [6]. Teacher–student interaction directly affects students' learning effects [7]. In this research, student interaction encompasses three types of interaction: instructor-student, student-content, and student-student [8], [9]. The first type of interaction is interaction between the student and the content or subject of study. This is a defining characteristic of education. Without it there cannot be education, since it is the process of intellectually interacting with content that results in changes in the student's understanding, the student's perspective, or the cognitive structures of the student's mind [9]. The second type of interaction-regarded as essential by many educators, and as highly desirable by many students-is interaction between the student and the expert who prepared the subject material, or some other expert acting as instructor. In this interaction, distance instructors attempt to achieve aims held in common with all other educators. First having planned or been given a curriculum, a program of content to be taught, they seek to stimulate or at least maintain the student's interest in what is to be taught, to motivate the student to learn, to enhance and maintain the student's interest, including self-direction and self-motivation. Then instructors make presentations-or cause them to be made. These may be presentations of information, demonstrations of skill, or modelling of certain attitudes and values. Next instructors try to organize students' application of what is being learned, either the practice of skills that have been demonstrated, or manipulation of information and ideas that have been presented. Instructors organize evaluation to ascertain if students are making progress, and to help decide whether to change strategies. Finally, instructors provide counsel, support, and encouragement to each student, though the extent and nature of this support varies according to educational level of the students, the teacher's personality and philosophy, and other factors [9]. The next type is interaction between student and student, this type is a new dimension of distance education that will be a challenge to our thinking and practice in the 1990s. This is inter-student interaction, between one student and other students, alone or in group settings, with or without the real-time presence of an instructor. Through the history of education the class or educational group has more often than not been organized for reasons that have nothing to do with students' needs. At present many classes are organized because the class is the only organizational form known to most teachers and because in the short term-though not usually the long term-it is the cheapest way of delivering the teaching acts of stimulation, presentation, application, evaluation, and student support. However, student-student interaction among members of a class or other group is sometimes an extremely valuable resource for learning, and is sometimes even essential.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

Surabaya State University is one of the state universities in Indonesia that carries out a lot of online learning. This is because one of the principles at the university is that even though face-to-face learning cannot be carried out, learning must still take place even if it is done online. One of the courses that most often implements online learning is the digital literacy course, with a study group of 10 groups with each group consisting of 40 students, so each lecture must be carried out face to face, on the other hand, digital literacy It is also a course that prioritizes students' ability to carry out digital literacy obtained online, so that the implementation of online learning is also expected to hone students' ability to receive material online.

Nowdays, artificial intellegents is one of digital technology that can support academic system. AI is important in online learning for several reasons, as it brings a range of benefits that enhance the educational experience for both students and educators. AI algorithms can analyze individual learning patterns, preferences, and performance data to tailor educational content and pace according to each student's needs. This personalization fosters a more effective learning experience. AI-driven adaptive learning platforms can dynamically adjust the difficulty of content based on a student's progress. This ensures that students are appropriately challenged and engaged, preventing boredom or frustration. AI automates the grading process for assignments and quizzes, providing instant feedback to students. This not only saves time for educators but also offers immediate insights to learners, helping them understand and address mistakes promptly. AI analytics tools process vast amounts of data to identify trends and patterns in student performance. Educators can make informed decisions based on these insights, such as adjusting course content or providing additional support to students who may be struggling. AI-powered chatbots and virtual assistants can provide round-the-clock support to students, answering queries related to coursework, assignments, or technical issues. This ensures that learners have access to assistance whenever they need it. AI can facilitate language translation, making educational materials accessible to students who speak different languages. Accessibility features, such as text-to-speech and speech-to-text, cater to diverse learning needs, including those with visual or auditory impairments. AI enables the creation of virtual labs and simulations, allowing students to gain practical experience in a digital environment. This is particularly valuable in subjects that require hands-on practice, such as science or engineering. AI can recommend group formations based on complementary skills or learning styles, promoting collaborative online learning environments. Chatbots can facilitate group discussions, ensuring all members contribute and promoting a positive online learning community. Automation of administrative tasks, such as grading and data analysis, reduces the burden on educators and institutions, allowing them to allocate resources more efficiently. AI tools can continuously monitor student engagement and performance, alerting educators when intervention may be needed. This proactive approach enables timely support to students who may be at risk of falling behind. AI-driven systems can easily scale to accommodate a large number of students, making it feasible to provide personalized learning experiences even in massive open online courses (MOOCs). In summary, AI in online learning optimizes education by providing personalized, efficient, and accessible learning experiences. It supports educators in delivering high-quality education while allowing students to learn at their own pace and in a way that suits their individual needs and preferences. Based on this description, in this

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

research, attitude toward use of AI will be positioned as a variable that is thought to strengthen the influence of student interaction on online learning

METHOD

The population in this study were all 2023/2024 engineering students from Surabaya State of University, wich totaling 400 student consitt of 10 stucy group or in Indonesia we call it rombel. Using the Slovin formula at a significance level of 5%, minimum sample of this research was 200 respondents. However, during the data collection process, 250 questionnaires were successfully collected, by filtering the questionaire, the number of research samples is 200 respondents. This study's respondents were male students (84%), all student take digital literacy course on their study.

$$n = \frac{N}{1 + (e^2.N)} = \frac{400}{1 + (e^2.400)} = 200$$

The research questionnaire consists of two parts. The first part contains questions related to the demographics of the respondents, such as gender, age and domicile, while the second part contains questions related to the respondents' perceptions of the research variables. This research instrument adopted from previouse research. Table 1 Show the reference of each instrument.

Instrumen of Student interaction adopted from [53], its consist of 15 item, 5 item in from dimension student-instructur interaction, 5 item from dimension student-student interaction and 5 item from dimension student -content interaction. Student satisafction consist of 5 item, adopted from [53]. Student engagement have 17 item, adopted from [54]. Then, academic performance consist of 3 item questions adopted from [31]. All instruments utilize the Likert scale, with 1 = Strongly Disagree, 2 = Strongly Agree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Before the questionnaire was used, expert judgment was conducted on four experts. The results of the approved questionnaire were then tested on 30 students. The results of filling out the questionnaire were then tested using the Corrected Item Total Correlation validity test, and a reliability test was carried out using the Aplha Cronbachs reliability test. The results of the validity and reliability tests show that all instruments are valid and can be used as research instruments. The data collection results in this study had a response rate of 95%, which means that this survey is included in the good survey category, so there is no need to add samples again.

RESULTS

There are two PLS procedures both tested in the measurement and structural model. Hence, the model measurement (outer model) identified validity and reliability testing including loading/weight scores, individual and composite reliability, and discriminant validity as well. To test hypotheses, structural measurement (inner model) to examine associations of readiness constructs related to adoption and their impact on performances were presented [16].

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

3.1 Assesment of the Measurement Models

Convergent validity testing is carried out to determine the level of validity of each relationship between the indicator and its latent construct. In this test, indicators are declared valid if they have a loading factor value > 0.7 and each construct has an AVE value > 0.5. The outer model test results in Table 1 show that all indicators in the PLS model are valid in measuring the construct, because they have values loading factor > 0.7 and the analysis results in Table 5 show that each construct has an AVE value > 0.5.

Table 1: Result of Measurement Model Test

Variabels	Indikator	Loading factor	Cut Value	AVE	Cronbachs Alpha	Composite Reliability
Attittude toward use AL	ATUAI1	0,835	0,7	0,803	0,938	0,953
	ATUAI2	0,918	0,7			
	ATUAI3	0,864	0,7			
	ATUAI4	0,939	0,7			
	ATUAI5	0,919	0,7			
Succes Online Learning	ELSS1	0,920	0,7	0,883	0,973	0,978
	ELSS2	0,967	0,7			
	ELSS3	0,965	0,7			
	ELSS4	0,902	0,7			
	ELSS5	0,943	0,7			
	ELSS6	0,938	0,7			
Instructor Quality	IQ1	0,867	0,7	0,824	0,951	0,959
	IQ2	0,939	0,7			
	IQ3	0,896	0,7			
	IQ4	0,921	0,7			
	IQ5	0,914	0,7			
Moderate ATT	SI * ATT	0,920	0,7	1,000	1,000	1,000
Student Interaction	SI1	0,937	0,7	0,779	0,863	0,913
	SI2	0,942	0,7			
	SI3	0,755	0,7			
System Quality	SQ1	0,929	0,7	0,859	0,920	0,948
	SQ2	0,932	0,7			
	SQ3	0,920	0,7			
Sistem Information	Sinf1	0,886	0,7	0,877	0,953	0,966
	Sinf2	0,963	0,7			
	Sinf3	0,965	0,7			
	Sinf4	0,930	0,7			

Table 2: Descriminant Validity - HTMT

	ATT	IQ	Moderation	SF	SI	SOL	SQ
ATT							
IQ	0,451						
Moderation	0,380	0,562					
SF	0,427	0,772	0,682				
SI	0,267	0,187	0,067	0,355			
SOL	0,514	0,683	0,669	0,687	0,446		
SQ	0,519	0,866	0,653	0,839	0,314	0,850	

ISSN 1533-9211

DOI: 10.5281/zenodo.11044477

Discriminant validity is carried out to ensure that each concept of each latent variable model is different from other variables. In this test, the indicator is declared to have met the required discriminant validity criteria if the HTMT between constructs is below 0.9. The results of the discriminant validity test in Table 3 show that the HTMT value between constructs is below 0.9, which means that the discriminant validity has been met by each construct [16]. The results of the discriminant validity test in the table show that all indicators and constructs have met the required discriminant validity criteria, HTMT between constructs < 0.9.

Composite Reliability measures the true reliability value of a variable, while Crombach Alpha measures the lowest value (lower bound) of the reliability of a variable. In measuring construct reliability, the required Cronbach's alpha value is > 0.7, as well as the required composite reliability value is > 0.7 [16]. The results of the construct reliability test in Table 5 show that the Cronbach's alpha value for all constructs is > 0.7 as well as the composite reliability value for all constructs > 0.7, which means that all constructs are reliable.

3.2 Assesment of the Structural Models

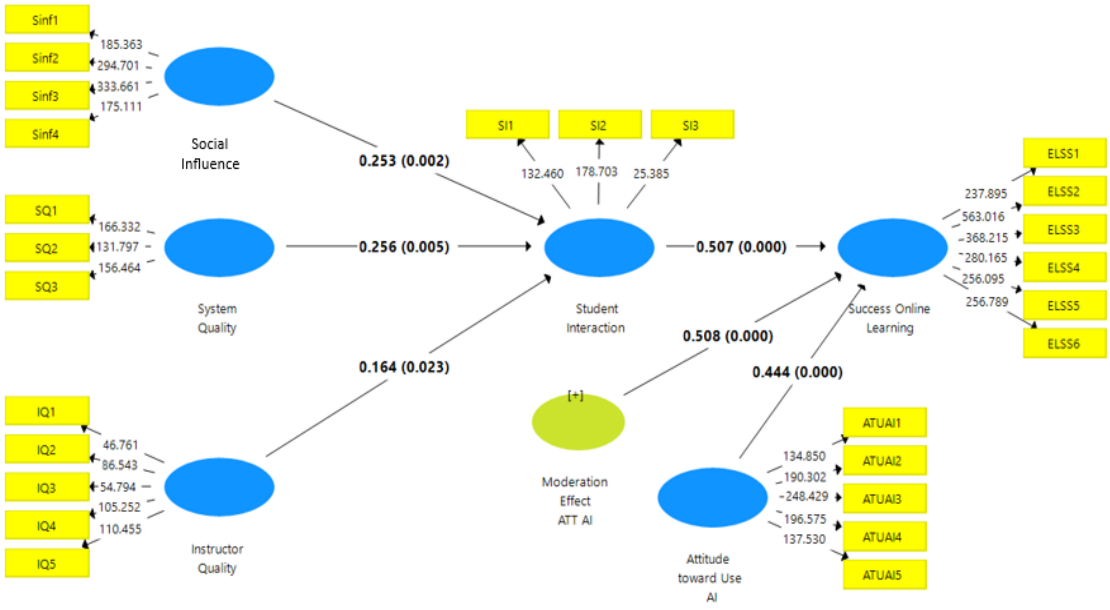

Figure 1: PLS SEM Model and Result of Structural Model Measurement

Table 5: Dirrect Effect Test

Direct Effect Path	Path Coefficient	T Statistics	P Values	conclusion
ATT -> SOL	0,444	13,498	0,000	supported
IQ -> SI	0,164	2,005	0,023	supported
Moderation -> SOL	0,508	13,307	0,000	supported
SIF -> SI	0,253	2,864	0,002	supported
SI -> SOL	0,507	15,108	0,000	supported
SQ -> SI	0,256	2,587	0,005	supported

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

The analysis results in Table 5 show that (1) Social Influence has a positive effect on student interaction (p value = 0.000; path coefficient 0.444) which means that H1 is accepted; (2) System Quality has a positive effect on student interaction (p value = 0.005; path coefficient 0.256), which means that H2 is accepted; (3) Instructor quality has a positive effect on student interaction (p value = 0.023; Path Coeff 0.164) which means that H3 is accepted; (4) Student Interaction has a positive effect on Success Online Learning (P value 0.000, Path Coef 0.507) which means that H4 is accepted; (5) Attitude toward using AI strengthens the influence of student interaction on online learning success (p value 0.000, pth coefficient 0.508) which means that H5 is accepted.

Furthermore, the results of the indirect influence test show that student interaction mediates the influence of Social Influence (p value 0.003), system quality (p value 0.010) and instructor quality (p value 0.031) on online learning success, this gives the finding that the information system, The quality of the system and the quality of the instructors can actually indirectly support the success of online learning if these three factors work well so that they support student interaction in each learning session.

Table 4: Indirect Effect Test

Indirect Path	Path Coeffocoent	T Statistics	P Values
IQ -> SI -> SOL	0,083	1,876	0,031
SIF -> SI -> SOL	0,128	2,744	0,003
SQ -> SI -> SOL	0,130	2,324	0,010
R2 adjusted *Student Interaction* = 0,120; R2 adjusted *Succes Online Learning* = 0,762			

DISCUSSION

The results of this research show that social influence has an effect on student interaction, the better the social influence obtained by students during online learning, the higher the student interaction in online learning, and vice versa, less social support can reduce student engagement in online learning. The results of this study are in line with the results of previous research [24]; [27]; [28] which also shows the results that social influence is a factor that influences student interaction. The results of further research also show that system quality has a positive effect on student engagement.

Good system quality will support high student interaction. The results of this study are in line with the results of research [25]; [29]; [23] which also shows the results that the quality of the system greatly influences the poor level of student interaction during online learning. The results of the analysis in this research also show that instructor quality influences the level of student interaction during online learning. The results of this research are supported by the results of research [31]; [32]; [33]. The results of this research show that student interaction supports the achievement of online learning success. The results of this study are supported by the results of previous research by [34]; [35]; [36]. The results of this research also show that the use of AI can strengthen the influence of student interaction on the success of online learning.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

Acknowledgements

This study is supported by Faculty of Engginering Universitas Negeri Surabaya for their generous financial support and opportunities that enable author (I Kadek Dwi Nuryana) to pursue a doctoral program at graduate school of Diponegoro University Semarang, and thanks to the participants and reviewer for their valuable contribution to the research.

References

1) M. Meletiou-Mavrotheris, N. Eteokleous, And A. Stylianou-Georgiou, 'Emergency Remote Learning In Higher Education In Cyprus During Covid-19 Lockdown: A Zoom-Out View Of Challenges And Opportunities For Quality Online Learning', *Educ Sci (Basel)*, Vol. 12, No. 7, 2022, Doi: 10.3390/Educsci12070477.

2) H. Tareen And M. T. Haand, 'A Case Study Of Uitm Post-Graduate Students' Perceptions On Online Learning: Benefits & Challenges', *Internation Journal Of Advanced Research And Publications*, Vol. 4, No. 6, 2020.

3) N. K. A. Suwastini, K. I. R. Dewi, And G. R. Dantes, 'Benefits Of Online Learning According To Recent Studies', *Jurnal Inovasi Dan Teknologi Pembelajaran*, Vol. 10, No. 1, 2023, Doi: 10.17977/Um031v10i12023p032.

4) T. M. Wut, S. W. Lee, And J. Xu, 'How Do Facilitating Conditions Influence Student-To-Student Interaction Within An Online Learning Platform? A New Typology Of The Serial Mediation Model', *Educ Sci (Basel)*, Vol. 12, No. 5, 2022, Doi: 10.3390/Educsci12050337.

5) S. G. T. Ong And G. C. L. Quek, 'Enhancing Teacher–Student Interactions And Student Online Engagement In An Online Learning Environment', *Learn Environ Res*, Vol. 26, No. 3, 2023, Doi: 10.1007/S10984-022-09447-5.

6) Y. Xie, Y. Huang, W. Luo, Y. Bai, Y. Qiu, And Z. Ouyang, 'Design And Effects Of The Teacher-Student Interaction Model In The Online Learning Spaces', *J Comput High Educ*, 2022, Doi: 10.1007/S12528-022-09348-9.

7) H. L. Sun *Et Al.*, 'The Influence Of Teacher–Student Interaction On The Effects Of Online Learning: Based On A Serial Mediating Model', *Front Psychol*, Vol. 13, 2022, Doi: 10.3389/Fpsyg.2022.779217.

8) Z. L. Berge, 'Obstacles To Distance Training And Education In Corporate Organizations', *Journal Of Workplace Learning*, Vol. 14, No. 5, 2002, Doi: 10.1108/13665620210433873.

9) M. G. Moore, 'Editorial: Three Types Of Interaction', *American Journal Of Distance Education*, Vol. 3, No. 2. 1989. Doi: 10.1080/08923648909526659.

10) O. F. Ayanbode, A. Fagbe, R. Owolabi, S. Oladipo, And O. R. Ewulo, 'Students' Interactions, Satisfaction And Perceived Progress In An Online Class: Empirical Evidence From Babcock University Nigeria', *Cogent Education*, Vol. 9, No. 1, 2022, Doi: 10.1080/2331186x.2022.2060783.

11) X. Wang, A. Bin Hassan, H. S. Pyng, And H. Ye, 'Exploring The Influence Of Teacher-Student Interaction Strength, Interaction Time, Interaction Distance And Interaction Content On International Student Satisfaction With Online Courses', *International Journal Of Learning, Teaching And Educational Research*, Vol. 21, No. 2, 2022, Doi: 10.26803/Ijlter.21.2.21.

12) S. Bećirović, E. Ahmetović, And A. Skopljak, 'An Examination Of Students Online Learning Satisfaction, Interaction, Self-Efficacy And Self-Regulated Learning', *European Journal Of Contemporary Education*, Vol. 11, No. 1, 2022, Doi: 10.13187/Ejced.2022.1.16.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

13) L. She, L. Ma, A. Jan, H. Sharif Nia, And P. Rahmatpour, 'Online Learning Satisfaction During Covid-19 Pandemic Among Chinese University Students: The Serial Mediation Model', *Front Psychol*, Vol. 12, 2021, Doi: 10.3389/Fpsyg.2021.743936.

14) H. Q. Yousaf, S. Rehman, M. Ahmed, And S. Munawar, 'Investigating Students' Satisfaction In Online Learning: The Role Of Students' Interaction And Engagement In Universities', *Interactive Learning Environments*, 2022, Doi: 10.1080/10494820.2022.2061009.

15) S. J. Lee, A. Ngampornchai, T. Trail-Constant, A. Abril, And S. Srinivasan, 'Does A Case-Based Online Group Project Increase Students' Satisfaction With Interaction In Online Courses?', *Active Learning In Higher Education*, Vol. 17, No. 3, 2016, Doi: 10.1177/1469787416654800.

16) X. Wang, A. Bin Hassan, H. S. Pyng, And H. Ye, 'Development And Empirical Study Of International Student Satisfaction Model Of Online Course Learning Interaction In Chinese Universities', *Educ Inf Technol (Dordr)*, Vol. 28, No. 12, 2023, Doi: 10.1007/S10639-023-11752-2.

17) S. Banahene, J. J. Kraa, And P. A. Kasu, 'Impact Of Hedperf On Students' Satisfaction And Academic Performance In Ghanaian Universities; Mediating Role Of Attitude Towards Learning', *Open J Soc Sci*, Vol. 06, No. 05, 2018, Doi: 10.4236/Jss.2018.65009.

18) P. Kostagiolas, C. Lavranos, And N. Korfiatis, 'Learning Analytics: Survey Data For Measuring The Impact Of Study Satisfaction On Students' Academic Self-Efficacy And Performance', *Data Brief*, Vol. 25, 2019, Doi: 10.1016/J.Dib.2019.104051.

19) N. Zamri, N. B. Omar, I. S. Khair Anwar, And F. H. Mohd Fatzel, 'Factors Affecting Students' Satisfaction And Academic Performance In Open & Distance Learning (Odl)', *International Journal Of Academic Research In Business And Social Sciences*, Vol. 11, No. 11, 2021, Doi: 10.6007/Ijarbss/V11-I11/11194.

20) S. Butt, A. Mahmood, S. Saleem, S. A. Murtaza, S. Hassan, And E. Molnár, 'The Contribution Of Learner Characteristics And Perceived Learning To Students' Satisfaction And Academic Performance During Covid-19', *Sustainability (Switzerland)*, Vol. 15, No. 2, 2023, Doi: 10.3390/Su15021348.

21) A. Ejubović And A. Puška, 'Impact Of Self-Regulated Learning On Academic Performance And Satisfaction Of Students In The Online Environment', *Knowledge Management And E-Learning*, Vol. 11, No. 3, 2019, Doi: 10.34105/J.Kmel.2019.11.018.

22) F. P. Simbolon And L. Yanti, 'Customer Engagement In Higher Education: How Important The Role Of Social Media Marketing, E-Service Quality And E-Satisfaction For Generation Z Students?', *The Winners*, Vol. 22, No. 1, 2021, Doi: 10.21512/Tw.V22i1.6970.

23) A. Mendez-Reguera And M. V. Lopez Cabrera, 'Engaging My Gen Z Class: Teaching With Memes', *Med Sci Educ*, Vol. 30, No. 4, 2020, Doi: 10.1007/S40670-020-01078-W.

24) S. Dass, H. S. Ramananda, B. Jagadeesha, P. C. Rajesh Kumar, And R. K. Cherian, 'Effectiveness Of Collaborative Learning Among Gen Z Engineering Students', *Journal Of Engineering Education Transformations*, Vol. 34, No. 3, 2021, Doi: 10.16920/Jeet/2021/V34i3/155375.

25) K. Swan, 'Building Learning Communities In Online Courses: The Importance Of Interaction', *Education, Communication & Information*, Vol. 2, No. 1, 2002, Doi: 10.1080/1463631022000005016.

26) E. Vázquez-Cano, S. Mengual-Andrés, And E. López-Meneses, 'Chatbot To Improve Learning Punctuation In Spanish And To Enhance Open And Flexible Learning Environments', *International Journal Of Educational Technology In Higher Education*, Vol. 18, No. 1, 2021, Doi: 10.1186/S41239-021-00269-8.

27) A. G. Picciano, 'Beyond Student Perceptions: Issues Of Interaction, Presence, And Performance In An Online Course', *Journal Of Asynchronous Learning Network*, Vol. 6, No. 1. 2002. Doi: 10.24059/Olj.V6i1.1870.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

28) G. Wilson And E. Stacey, 'Online Interaction Impacts On Learning: Teaching The Teachers To Teach Online', *Australasian Journal Of Educational Technology*, Vol. 20, No. 1, 2004, Doi: 10.14742/Ajet.1366.

29) D. R. Garrison, T. Anderson, And W. Archer, 'Critical Inquiry In A Text-Based Environment: Computer Conferencing In Higher Education', *Internet And Higher Education*, Vol. 2, No. 2–3, 1999, Doi: 10.1016/S1096-7516(00)00016-6.

30) A. Alshanqiti And A. Namoun, 'Predicting Student Performance And Its Influential Factors Using Hybrid Regression And Multi-Label Classification', *Ieee Access*, Vol. 8, 2020, Doi: 10.1109/Access.2020.3036572.

31) R. E. Bawack And J. R. Kala Kamdjoug, 'The Role Of Digital Information Use On Student Performance And Collaboration In Marginal Universities', *Int J Inf Manage*, Vol. 54, 2020, Doi: 10.1016/J.Ijinfomgt.2020.102179.

32) V. P. Dennen, A. A. Darabi, And L. J. Smith, 'Instructor-Learner Interaction In Online Courses: The Relative Perceived Importance Of Particular Instructor Actions On Performance And Satisfaction', *Distance Education*, Vol. 28, No. 1, 2007, Doi: 10.1080/01587910701305319.

33) D. U. Bolliger And E. A. Erichsen, 'Student Satisfaction With Blended And Online Courses Based On Personality Type', *Canadian Journal Of Learning And Technology*, Vol. 39, No. 1, 2013.

34) D. F. Bayrak, D. M. Moanes, And D. A. Altun, 'Development Of Online Course Satisfaction Scale', *Turkish Online Journal Of Distance Education*, Vol. 21, No. 4, 2020, Doi: 10.17718/Tojde.803378.

35) D. U. Bolliger And E. A. Erichsen, 'Student Satisfaction With Blended And Online Courses Based On Personality Type / Niveau De Satisfaction Des Étudiants Dans Les Cours Hybrides Et En Ligne Basé Sur Le Type De Personnalité', *Canadian Journal Of Learning And Technology / La Revue Canadienne De L'apprentissage Et De La Technologie*, Vol. 39, No. 1, 2012, Doi: 10.21432/T2b88w.

36) F. Inan, E. Yukselturk, M. Kurucay, And R. Flores, 'The Impact Of Self-Regulation Strategies On Student Success And Satisfaction In An Online Course', *International Journal On E-Learning: Corporate, Government, Healthcare, And Higher Education*, Vol. 16, No. 1, 2017.

37) D. Y. Shee And Y. S. Wang, 'Multi-Criteria Evaluation Of The Web-Based E-Learning System: A Methodology Based On Learner Satisfaction And Its Applications', *Comput Educ*, Vol. 50, No. 3, 2008, Doi: 10.1016/J.Compedu.2006.09.005.

38) F. Ke And D. Kwak, 'Constructs Of Student-Centered Online Learning On Learning Satisfaction Of A Diverse Online Student Body: A Structural Equation Modeling Approach', *Journal Of Educational Computing Research*, Vol. 48, No. 1, 2013, Doi: 10.2190/Ec.48.1.E.

39) S. S. Liaw, 'Investigating Students' Perceived Satisfaction, Behavioral Intention, And Effectiveness Of E-Learning: A Case Study Of The Blackboard System', *Comput Educ*, Vol. 51, No. 2, 2008, Doi: 10.1016/J.Compedu.2007.09.005.

40) Y. C. Kuo, A. E. Walker, B. R. Belland, And K. E. E. Schroder, 'A Predictive Study Of Student Satisfaction In Online Education Programs', *International Review Of Research In Open And Distance Learning*, Vol. 14, No. 1, 2013, Doi: 10.19173/Irrodl.V14i1.1338.

41) N. Li, V. Marsh, And B. Rienties, 'Modelling And Managing Learner Satisfaction: Use Of Learner Feedback To Enhance Blended And Online Learning Experience', *Decision Sciences Journal Of Innovative Education*, Vol. 14, No. 2, 2016, Doi: 10.1111/Dsji.12096.

42) I. Sahin And M. Shelley, 'International Forum Of Educational Technology & Society Considering Students ' Perceptions : The Distance Education Student Satisfaction Model', *Educational Technology & Society*, Vol. 11, No. 3, 2017.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.11044477

43) L. Bomia, L. Beluzo, D. Demeester, K. Elander, M. Johnson, And B. Sheldon, 'The Impact Of Teaching Strategies On Intrinsic Motivation', *Us Department Of Education: Educational Resources Information Centre*, Vol. 2:, 2022.

44) B. J. Mandernach, E. Donnelli-Sallee, And A. Dailey-Hebert, 'Assessing Course Student Engagement', *Promoting Student Engagement, Volume 1: Programs, Techniques And Opportunities*, 2011.

45) A. Briggs, 'Ten Ways To Overcome Barriers To Student Engagement Online — Academic Technology', *Academic Technology*, 2015.

46) M. M. Handelsman, W. L. Briggs, N. Sullivan, And A. Towler, 'A Measure Of College Student Course Engagement', *Journal Of Educational Research*, Vol. 98, No. 3, 2005, Doi: 10.3200/Joer.98.3.184-192.

47) M. Kolhar, R. N. A. Kazi, And A. Alameen, 'Effect Of Social Media Use On Learning, Social Interactions, And Sleep Duration Among University Students', *Saudi J Biol Sci*, Vol. 28, No. 4, 2021, Doi: 10.1016/J.Sjbs.2021.01.010.

48) A. Zhou *Et Al.*, 'Academic Performance And Peer Or Parental Tobacco Use Among Non-Smoking Adolescents: Influence Of Smoking Interactions On Intention To Smoke', *Int J Environ Res Public Health*, Vol. 20, No. 2, 2023, Doi: 10.3390/Ijerph20021048.

49) M. Luo, D. Sun, L. Zhu, And Y. Yang, 'Evaluating Scientific Reasoning Ability: Student Performance And The Interaction Effects Between Grade Level, Gender, And Academic Achievement Level', *Think Skills Creat*, Vol. 41, 2021, Doi: 10.1016/J.Tsc.2021.100899.

50) G. Cao And Q. Tian, 'Social Media Use And Its Effect On University Student's Learning And Academic Performance In The Uae', *Journal Of Research On Technology In Education*, Vol. 54, No. 1, 2022, Doi: 10.1080/15391523.2020.1801538.

51) J. I. Oviawe, 'Effect Of Student-Interaction Patterns On Students' Academic Performance In Basic Technology In Edo State Secondary Schools', *Journal Of Technology And Operations Management*, Vol. 15, No. 1, 2020, Doi: 10.32890/Jtom2020.15.1.1.

52) L. M. Olórtegui-Alcalde, A. Deroncele-Acosta, M. Romero-Salas, W. F. Aguilar-Morante, And O. W. Olórtegui-Alcalde, 'The University Student As Customer: Relationship With Student Satisfaction And Academic Performance', *Universidad Y Sociedad*, Vol. 15, No. 3, 2023.

53) Scott D. Johnson, S. R. Aragon, And N. Shaik, 'Comparative Analysis Of Learner Satisfaction And Learning Outcomes In Online And Face-To-Face Learning Environments', *Journal Of Interactive Learning Research*, Vol. 11, No. 1, 2000.

54) D. Kember And D. Y. P. Leung, 'Development Of A Questionnaire For Assessing Students' Perceptions Of The Teaching And Learning Environment And Its Use In Quality Assurance', *Learn Environ Res*, Vol. 12, No. 1, 2009, Doi: 10.1007/S10984-008-9050-7.