International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 09 Issue 11 ǁ 2021 ǁ PP. 17-24

Student Engagement to Online Learning and the Effects on Higher Education Student's Performance: A Bibliometric Review

Ali Yusny Daud[1], Cik Fazilah Hibadullah [2]
*[*1,2](School of Information Technology, Universiti Utara Malaysia, UUM Sintok, Malaysia)*

Abstract
Online learning is a process of providing education through the internet. One of the critical components of quality online education is to ensure student engagement. Successful online learning with student engagement will influence their performance in their study. Therefore, this paper aims to analyze and report published documents related to it, based on the data obtained from the Scopus database. We focus on analysis on publication by year, documents and source types, the language of publications, subject area, the geographical distribution of publications, most active source title, important keywords, and citation analysis. From 2001 to 2021, the data suggest a rise in the pace of expansion of literature which shows a growing interest on this field.
Keywords: *Student Engagement, Online Learning, Higher Education, Student's Performance, Bibliometric.*

Date of Submission: 24-10-2021 Date of acceptance: 07-11-2021

I. INTRODUCTION

Higher education is going through a period of changes in response to the evolution of technology in knowledge delivery to the student. The threat posed by COVID-19 has meant that teaching and learning worldwide are looking for the best ways to continue to support student learning. This has meant many are looking towards solutions such as online learning. Online learning refers to a method of delivering educational information using the internet [1, 2]. Online learning overcomes the constraints of time and space that go with face-to-face teaching. It can be a more accessible form of learning for people seeking a range of educational opportunities and is the basis of many distance education programs [3, 4]. The power of online teaching and learning is that it gives different and sometimes better learning experiences.

One of the critical components of quality online education is to ensure learner engagement. A significant amount of research demonstrates that educational technology can usefully support the engagement of online learners [4 - 6]. Based on data linked to the National Survey of Student Engagement (NSSE) in the United States, there is a positive relationship between the use of learning technology, student engagement, and learning outcomes. According to [6], the term' student engagement refers in general terms to the effort and commitment that students give to their learning. However, NSSE specifically considers ways in which active and collaborative learning, the level of academic challenge, the interaction between students and faculty, and a supportive campus environment all influence such engagement. Specific uses of educational technology have been seen to positively influence student engagement. [3] defined student engagement as "a student's emotional, behavioral and cognitive connection to their study," directly impacting student success and achievement. In addition, [5] agree that online learning is a promising new technology designed to engage students in independent learning.

Maintaining motivation in an online course is yet another challenge that online learners face. Typically, successful students tend to have stronger beliefs they will succeed, higher self-responsibility, higher self-organization skills, and better use of technology and access. Overall, students who lacked independence and self-motivation had lower success rates than their counterparts [4, 7]. Therefore, students must also be capable of evaluating the motivating factors that will contribute to the continuance of momentum for the online course duration. Students lacking motivation can easily lose sight of their original goal, quickly become lost, and ultimately withdraw from the course. Thus, understanding learning styles and self-behavior is pertinent to determining one's success in an online course.

For some students, online courses tend to be reading and writing intensive. Students with low reading abilities may find the heavy text and writing curriculum to be a burden. In addition, some learners struggle to overcome is the absence of an instructor in each place and given time throughout the semester. Some online learners experience a learning curve when they first ask questions in various forums instead of a traditional face-to-face classroom setting [7]. Online learning can break down barriers that have restricted individuals from an

equitable education in the past. The student's needs must be put first to establish a conducive learning environment accessible for all learners.

A research finding by [8] concluded that the effectiveness of online instruction for online learning is dependent on; 1) well-designed course content, motivating interaction between the instructor and learners, well-prepared and fully-supported instructors; 2) creation of a sense of online learning community, and 3) rapid advancement of technology. It is hoped that this will stimulate an ongoing discussion of effective strategies that can enhance universities and faculty success in transitioning to teach online. Under current debates on the cost and quality of higher education, this study could help for the improvement of higher education and student enrolment and retention.

Despite growing interest in student engagement in online learning research, there have been relatively limited attempts to report the literature trend, particularly those that used the bibliometric approach. For example, a recent article by [9] reported on the bibliometric review in student engagement and higher education (SEHE). However, this article focuses on online learning and its evolution, especially the increasing need because of the pandemic.

Bibliometric analysis is described as applying statistical approaches to the objective and quantitative evaluation of scholarly publications within a given topic [10]. We used bibliometric methodologies in this paper to better understand the accomplishments in this subject, including research productivity, key articles, and important issues that the research community is concerned about. The remainder of this article is arranged in the following manner. The method for this analysis is described in Section 2. The study's findings are presented in Section 3. Section 4 brings this paper to a conclusion.

II. METHODS

A bibliometric study is gaining prominence as one of the tools for determining study trends [11]. The data source for this paper was gathered from the Scopus database to meet the paper's goal. The database contains about 36,000 titles from nearly 11,000 publishers, with citations primarily from peer-reviewed journals in the social, physical, health, and biological sciences [12]. The search query of "Student Engagement to Online Learning and the Effects on Higher Education Student's Performance" was applied within the Scopus database on 12 September 2021. The flow of the query process is shown in Figure 1.

As part of the data sets, the data has been exported in CSV and RIS formats. The search is also restricted to document titles, keywords and abstracts to find the most relevant articles based on the field. We utilized a date range of all years to the present, which is 2021. This query produced a total of 293 and refined to 291 documents for us to further analyzed. A few applications were used to analyze the obtained documents, including Microsoft Excel and Harzing's Publish and Perish software.

The search is also restricted to document titles, keywords and abstracts to find the most relevant articles with titles that match the search terms. From all years to the present, which is 2021, we used it as our date range. We perform analysis on publication by year, documents and source types, the language of publications, subject area, the geographical distribution of publications, most active source title, important keywords, and citation analysis.

III. RESULTS

The results and findings are discussed in this section. All the findings are explained in the subsections below.

3.1 Publication By Year

This first analysis will examine research productivity based on the number of documents published per year. The research productivity in this area can be based on the number of documents produced per year. The distributions of the 291 documents according to the year of publication are illustrated in Figure 2.

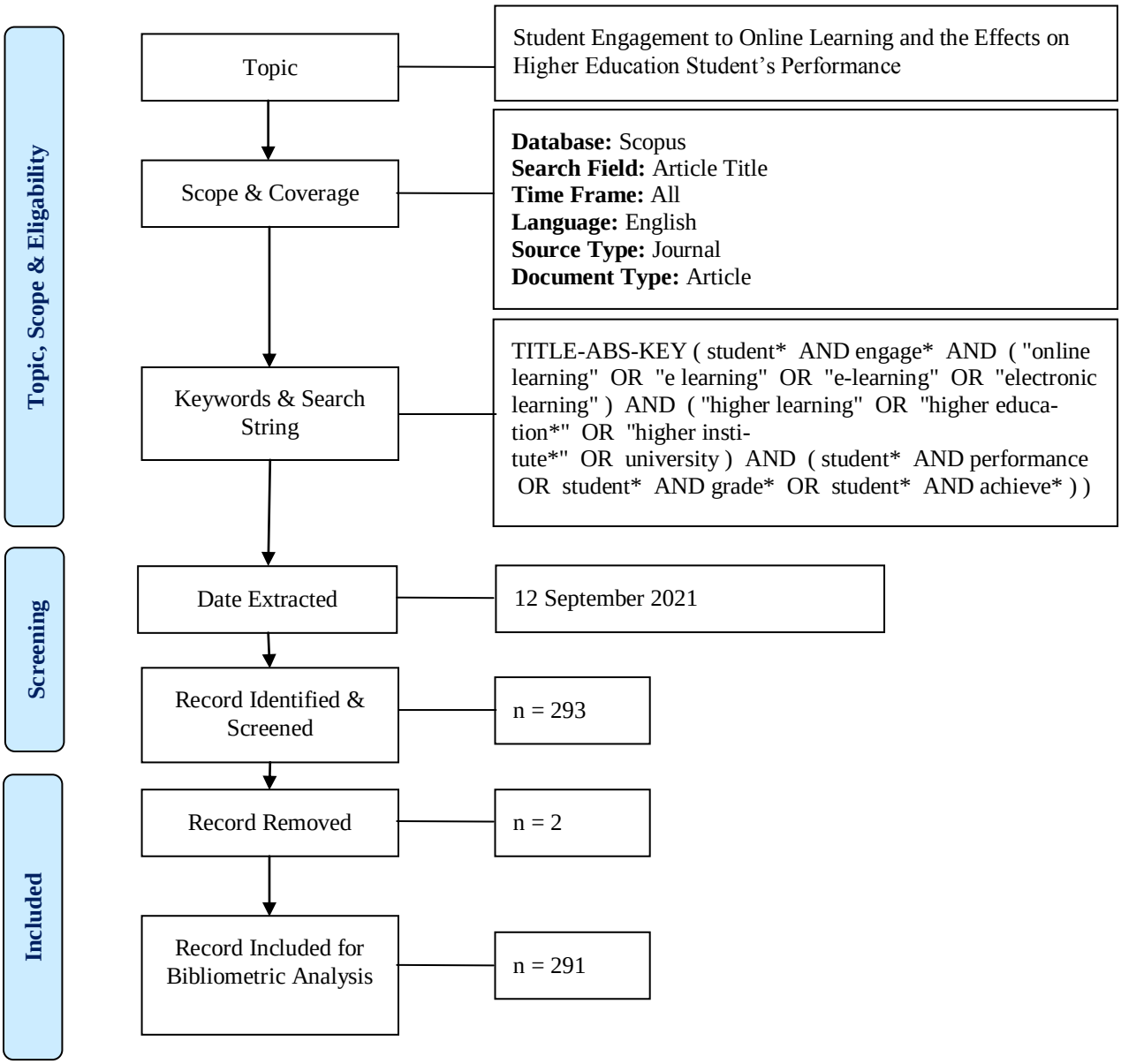

Figure 1: Flow diagram of the search strategy (source: [13])

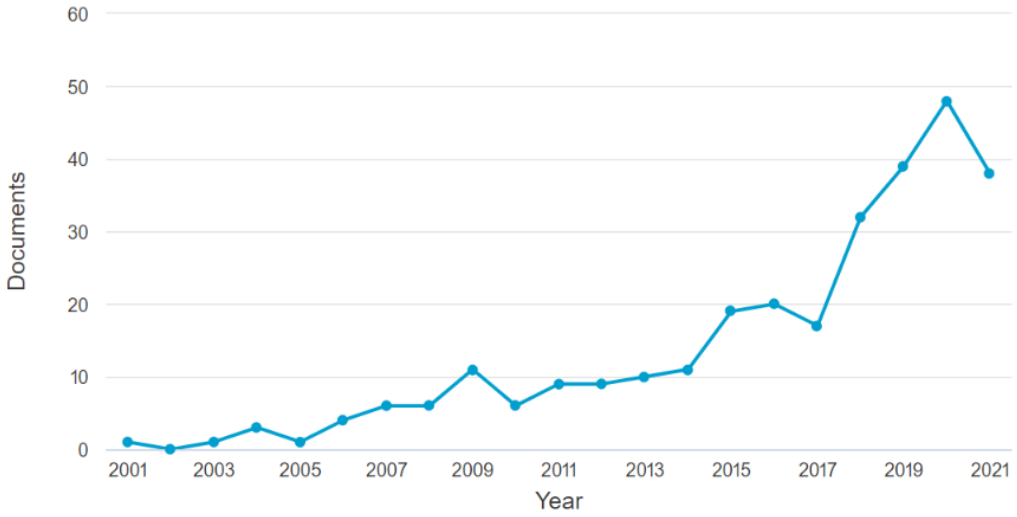

Figure 2: Number of Publications per Year

Table 1 also summarizes the annual growth percentage. Campos, Laferrière, and Harasim published the first introduction to online learning publication in 2001. Since then, the growth of publication was increased gradually until 2017. From 2017 onwards, the publications significantly increased until now. In 2020, the highest number of publications was recorded at 48, but in 2021, the total publication was 38, and it is only until September. We can expect the total publication in 2021 might exceed the publications in 2020. Based on the pattern of the number of publications, it seems that it will continue to become the favorite topic among academics.

We can see that the articles from 2010 received the highest citations (663) in terms of citation. Even though the total number of publications in that year is only 6, the citations received are the highest.

Table 1: Year of Publication

Year	TP	%	NCP	TC	C/P	C/CP	*h*	*g*
2021	38	13.06%	11	32	0.84	2.91	2	5
2020	48	16.49%	22	81	1.69	3.68	5	7
2019	39	13.40%	23	205	5.26	8.91	9	13
2018	32	11.00%	23	309	9.66	13.43	9	17
2017	17	5.84%	15	280	16.47	18.67	9	16
2016	20	6.87%	18	157	7.85	8.72	6	12
2015	19	6.53%	14	166	8.74	11.86	6	12
2014	11	3.78%	8	102	9.27	12.75	4	10
2013	10	3.44%	8	232	23.20	29.00	5	10
2012	9	3.09%	8	148	16.44	18.50	4	9
2011	9	3.09%	5	7	0.78	1.40	2	2
2010	6	2.06%	6	663	110.50	110.50	5	6
2009	11	3.78%	7	46	4.18	6.57	4	6
2008	6	2.06%	5	84	14.00	16.80	4	6
2007	6	2.06%	3	27	4.50	9.00	2	5
2006	4	1.37%	3	5	1.25	1.67	2	2
2005	1	0.34%	1	222	222.00	222.00	1	1
2004	3	1.03%	2	75	25.00	37.50	2	3
2003	1	0.34%	1	1	1.00	1.00	1	1
2001	1	0.34%	1	12	12.00	12.00	1	1
Total	**371**							

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

3.2 Document Types and Sources

All of the documents are also analyzed according to their types and also their sources. In terms of the types of the documents, more than half of the documents (153 or 52.58%) are Articles, as shown in Table 2. This is followed by Conference Papers (119 or 40.89.19%), Book chapters (12 or 4.12%), and Conference Reviews (4 or 1.37%). The remaining documents below 1% are Note (2 or 0.69%) and Editorial (1 or 0.34%).

Table 2: Document Type

Document Type	Total Publications (TP)	Percentage (%)
Article	153	52.58%
Conference Paper	119	40.89%
Book Chapter	12	4.12%
Conference Review	4	1.37%
Note	2	0.69%
Editorial	1	0.34%
Total	**291**	**100%**

In terms of the sources of the documents, there are five source types: Journal, Conference Proceeding, Book Series, Book, and Trade Journal. Table 3 reviews the distribution of the retrieved documents in these five source categories. It can be seen that a large portion of the documents is of type Journal (154 or 52.92%) Conference Proceeding (109 or 37.46%), and followed by Book Series (17 or 5.84%). In addition, there is ten (3.44%) from Book and one (0.34%) from the Trade Journal source type.

Table 3: Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	154	52.92%
Conference Proceeding	109	37.46%
Book Series	17	5.84%
Book	10	3.44%
Trade Journal	1	0.34%
Total	**291**	**100.00**

3.3 Languages of Documents

Another interesting bibliometric attribute that is thought for this study is the languages used by the documents. Table 4 shows the distribution of the documents in terms of the used languages. As can be seen from the table, English is the dominant language being used by most of the documents (289 or 99.31%). Chinese and Spanish are the rest of the languages used where only one publication for each language.

Table 4: Languages

Language	Total Publications (TP)	Percentage (%)
English	289	99.31%
Chinese	1	0.34%
French	1	0.34%
Total	**291**	**100.00**

3.4 Subject Areas

The following bibliometric attribute that is studied is the subject areas of the documents. Table 5 shows the distribution of the publications based on the subject area. It can be observed that Social Sciences emerges as the top subject area (198 or 68.04%) as the student engagement and online learning are fields under the Social Sciences area. This is closely followed by Computer Science (175 or 60.14%). The third place goes to Engineering with 48 publications or 16.49 percent. Next are Business, Management and Accounting, Mathematics, and Medicine where they produce the same amount of publications, which is 13 publications. Other subject areas in the table accounted for less than 10 of the published documents. Note that the number of documents (N) in the table is more than 291 because some documents are included in more than one subject area.

Table 5: Subject Area

Subject Area	Total Publications (TP)	Percentage (%)
Arts and Humanities	9	3.09%
Biochemistry, Genetics and Molecular Biology	1	0.34%
Business, Management and Accounting	13	4.47%
Chemical Engineering	2	0.69%
Computer Science	175	60.14%
Decision Sciences	7	2.41%
Earth and Planetary Sciences	1	0.34%
Economics, Econometrics and Finance	4	1.37%
Energy	8	2.75%
Engineering	48	16.49%
Environmental Science	6	2.06%
Health Professions	1	0.34%
Materials Science	2	0.69%
Mathematics	13	4.47%
Medicine	13	4.47%
Multidisciplinary	2	0.69%
Nursing	4	1.37%
Physics and Astronomy	2	0.69%
Psychology	9	3.09%
Social Sciences	198	68.04%
Veterinary	1	0.34%

3.5 Geographical Distribution of Publications

The next aspect of interest is countries that contributed to the publications in this area. It is found that there are a total of 41 countries that contributed to all of the documents. Table 6 shows the list of top 20 countries with their number of the document published. The United Kingdom is the most dominant country in this area with 15.12 percent publications, followed by the United States with 13.4 percent publications. Australia is at number three with 34 publications higher than Canada in fourth place, with 14 publications. Notably, Malaysia is next to them and an active country in this field which amounts to 13 publications.

Table 6: Top 20 Countries contributed to the publications

Country	Total Publication	Percentage (%)
United Kingdom	44	15.12%
United States	39	13.40%
Australia	34	11.68%
Canada	14	4.81%
Malaysia	13	4.47%
China	12	4.12%
Spain	12	4.12%
Taiwan	12	4.12%
India	9	3.09%

Country	Total Publication	Percentage (%)
Portugal	8	2.75%
Germany	7	2.41%
Italy	7	2.41%
New Zealand	7	2.41%
Saudi Arabia	7	2.41%
South Africa	7	2.41%
South Korea	6	2.06%
Ireland	5	1.72%
Bahrain	4	1.37%
Hong Kong	4	1.37%
Japan	4	1.37%

3.6 Source Titles

There are 104 source titles published documents of "University Student's Engagement in Online Learning and the Effects on Student's Performance". Table 7 shows the top ten source titles of publications on this topic. About 24.74% of documents have been published in these source titles. The most productive source type is the Proceedings Of The International Conference On E-Learning Icel, which published nearly 5.15% of these documents. Followed by ACM International Conference Proceeding Series, Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics and Proceedings Of The European Conference On E-Learning Ecel.

Table 7: Most Active Source Title (Top Ten)

Source Title	Total Publication	Percentage (%)
Proceedings Of The International Conference On E Learning Icel	15	5.15%
ACM International Conference Proceeding Series	8	2.75%
Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics	8	2.75%
Proceedings Of The European Conference On E-Learning Ecel	8	2.75%
British Journal Of Educational Technology	7	2.41%
ASEE Annual Conference And Exposition Conference Proceedings	6	2.06%
Education And Information Technologies	6	2.06%
Proceedings Of The European Conference On Games Based Learning	6	2.06%
Anatomical Sciences Education	4	1.37%
Internet And Higher Education	4	1.37%

3.7 Important Keywords

Table 8 depicts the top 20 most frequently used keywords which provided insights into the issues discussed in this topic. Our data shows that the most frequently used keyword is "E-learning" (used in 166 articles), followed by "Students" (136), "Teaching" (70), "Curricula" (55), and "Education" (54). Other important keywords include "Student Engagement" (48), "Higher Education" (46), "Computer Aided Instruction" (45), "Online Learning" (45), "Education Computing" (34), and "Engineering Education" (27). It can be seen from these keywords that the keyword "E-learning" was more popularly used as compared to its similar meaning keywords, which are "Online Learning" and "Online System".

Table 8: Top 20 Keywords

Author Keywords	Total Publications (TP)	Percentage (%) N=291
E-learning	166	57.04%
Students	136	46.74%
Teaching	70	24.05%
Curricula	55	18.90%
Education	54	18.56%
Student Engagement	48	16.49%
Higher Education	46	15.81%
Computer Aided Instruction	45	15.46%
Online Learning	45	15.46%
Education Computing	34	11.68%
Engineering Education	27	9.28%
Learning Systems	26	8.93%
Blended Learning	24	8.25%
Social Networking (online)	22	7.56%
Learning	17	5.84%
Motivation	17	5.84%
Surveys	17	5.84%
Human	16	5.50%
Online Systems	16	5.50%
Academic Performance	15	5.15%

3.8 Citation Analysis

The citation metrics information from 2001 – 2021 generated from Harzing's Publish and Perish software is reviewed in Table 9. Generally, there are 291 papers with 2854 citations that average 142.7 citations per year. Each paper is cited 9.81 times, and the number of h-index and the g-index is at 24 and 48 respectively for all the publications.

Table 9: Citations Metrics

Metrics	Data
Papers	291
Citations	2854
Years	20
Cites_Year	142.7
Cites_Paper	9.81
Cites_Author	1291.8
Papers_Author	138.18
Authors_Paper	2.78
h_index	24
g_index	48

Table 10 below discloses the top 20 most cited articles (according to the number of documents being cited) in the Scopus database. The highest citation article by Macfadyen and Dawson, (2010), entitled "Mining LMS data to develop an "early warning system" for educators: A proof of concept" has received the highest number of citations (563 citations or an average of 51.86 citations per year).

Table 10: Top 20 Highly cited articles

No.	Authors	Title	Year	Cites	Cites per Year
1	L.P. Macfadyen, S. Dawson	Mining LMS data to develop an "early warning system" for educators: A proof of concept	2010	563	51.18
2	L.V. Morris, C. Finnegan, S.-S. Wu	Tracking student behavior, persistence, and achievement in online courses	2005	222	13.88
3	R. Owston, D. York, S. Murtha	Student perceptions and achievement in a university blended learning strategic initiative	2013	167	20.88
4	G. Makransky, L. Lilleholt	A structural equation modeling investigation of the emotional value of immersive virtual reality in education	2018	93	31
5	F.H. Wang	An exploration of online behaviour engagement and achievement in flipped classroom supported by learning management system	2017	90	22.5
6	A. Pardo, F. Han, R.A. Ellis	Combining University student self-regulated learning indicators and engagement with online learning events to Predict Academic Performance	2017	77	19.25
7	R.G. SaadÃ©, D. Morin, J.D.E. Thomas	Critical thinking in E-learning environments	2012	72	8
8	L. Hakulinen, T. Auvinen, A. Korhonen	The effect of achievement badges on students' behavior: An empirical study in a university-level computer science course	2015	67	11.17
9	I.A. Qureshi, K. Ilyas, R. Yasmin, M. Whitty	Challenges of implementing e-learning in a Pakistani university	2012	56	6.22
10	N. Shin, J.K.Y. Chan	Direct and indirect effects of online learning on distance education	2004	56	3.29
11	V.M.C. Tze, R.M. Klassen, L.M. Daniels	Patterns of boredom and its relationship with perceived autonomy support and engagement	2014	48	6.86
12	D. Kim, Y. Park, M. Yoon, I.-H. Jo	Toward evidence-based learning analytics: Using proxy variables to improve asynchronous online discussion environments	2016	47	9.4
13	R. Oliver	Engaging first year students using a Web-supported inquiry-based learning setting	2008	46	3.54
14	S. Dawson, L. Heathcote, G. Poole	Harnessing ICT potential: The adoption and analysis of ICT systems for enhancing the student learning experience	2010	42	3.82
15	A.P. Lopes, F. Soares	Perception and performance in a flipped Financial Mathematics classroom	2018	37	12.33
16	A. Tarhini, M. Hassouna, M.S. Abbasi, J. Orozco	Towards the acceptance of RSS to support learning: An empirical study to validate the technology acceptance model in Lebanon	2015	37	6.17
17	J. Lee, H.-D. Song, A.J. Hong	Exploring factors, and indicators for measuring students' sustainable engagement in e-learning	2019	35	17.5
18	S. Villagrasa, D. Fonseca, J. DurÃ¡n	Teaching case: Applying gamification techniques and virtual reality for learning building engineering 3D arts	2014	35	5

19	H.J. Kim, A.J. Hong, H.-D. Song	The roles of academic engagement and digital readiness in studentsâ€™ achievements in university e-learning environments	2019	32	16
20	N. Moore, M. Gilmartin	Teaching for better learning: A blended learning pilot project with first-year geography undergraduates	2010	32	2.91

IV. CONCLUSION

In this work, we examined the global research trend in SEHE towards online learning and the consequences on student performance by doing a bibliometric analysis of the 291 publications acquired from the Scopus database published till around the third quarter of the year 2021. The results show that publications in this area started in 2001 and rose drastically, especially from 2017 to 2020. More than half of the documents are traced from journals. The United Kingdom is the main country in generating these articles, and almost all (99.31%) of the articles are in the English language. The findings also reveal that the publications are distributed in various subject areas, mainly Social Sciences, Computer Science, and Engineering. According to the analysis of the essential keywords, "E-learning" and "student" are gaining traction among academics in this field. Overall, we feel that the findings of this study can assist researchers in getting insights on research trends, citation effect, distributions, significant contributors to this research area, and topics that research communities in this field have discussed.

REFERENCES

[1] Hart, C. M. D., Berger, D., Jacob, B., Loeb, S., & Hill, M. (2019). Online Learning, Offline Outcomes: Online Course Taking and High School Student Performance. *AERA Open, 5(1),* 2332858419832852. doi: 10.1177/2332858419832852

[2] Omar, N. D., Hassan, H., & Atan, H. (2012). Student Engagement in Online Learning: Learners Attitude Toward E-Mentoring. *Procedia - Social and Behavioral Sciences, 67,* 464-475. doi: https://doi.org/10.1016/j.sbspro.2012.11.351

[3] Farrell, O., & Brunton, J. (2020). A balancing act: a window into online student engagement experiences. *International Journal of Educational Technology in Higher Education, 17(1),* 25. doi: 10.1186/s41239-020-00199-x

[4] Rajabalee, B. Y., Santally, M. I., & Rennie, F. (2019). A study of the relationship between students' engagement and their academic performances in an eLearning environment. *E-Learning and Digital Media, 17(1),* 1-20. doi: 10.1177/2042753019882567

[5] Beketova, E., Leontyeva, I., Zubanova, S., Gryaznukhin, A., & Movchun, V. (2020). Creating an optimal environment for distance learning in higher education: discovering leadership issues. *Palgrave Communications, 6(1),* 66. doi: 10.1057/s41599-020-0456-x

[6] Kahn, P., Everington, L., Kelm, K., Reid, I., & Watkins, F. (2017). Understanding student engagement in online learning environments: the role of reflexivity. *Educational Technology Research and Development, 65(1),* 203-218. doi: 10.1007/s11423-016-9484-z

[7] Gilbert, B. (2015). *Online Learning Revealing the Benefi ts and Challenges* Education Masters Master, St. John Fisher College.

[8] Sun, A., & Chen, X. (2016). Online Education and Its Effective Practice: A Research Review. *Journal of Information Technology Education: Research., 15,* 157-190. doi: https://doi.org/10.28945/3502

[9] Aparicio, G., Iturralde, T., & Maseda, A. (2021). A holistic bibliometric overview of the student engagement research field. *Journal of Further and Higher Education*, *45(4)*, 540-557.

[10] Radev, D. R., Joseph, M. T., Gibson, B., & Muthukrishnan, P. (2016). A bibliometric and network analysis of the field of computational linguistics. *Journal of the Association for Information Science and Technology*, *67(3)*, 683–706.

[11] Ahmi, A., & Mohamad, R. (2019). Bibliometric analysis of global scientific literature on web accessibility. *International Journal of Recent Technology and Engineering*, *7(6)*, 250–258.

[12] Rusly, F. H., Ahmi, A., Yakimin, Y., Talib, A., & Rosli, K. (2019). Global Perspective on Payroll System Patent and Research: A Bibliometric Performance. *International Journal of Recent Technology and Engineering, 8(2S2)*, 148–157.

[13] Zakaria, R., Ahmi, A., Ahmad, A. H., & Othman, Z. (2020) Worldwide melatonin research: A bibliometric analysis of the published literature between 2015 and 2019, *Chronobiology International*. https://doi.org/10.1080/07420528.2020.1838534