

STATISTICAL ANALYSIS OF ONLINE ENGAGEMENT OF COLLEGE STUDENTS DURING COVID-19

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This study aims to measure students' engagement (Affective, Behavioural, Cognitive, and whole) in online learning environments at university levels during COVID-19 and test the impact of gender, academic level, and college on online engagement. The sample of the study was composed of 174 college students enrolled in the Fall semester of 2020-2021. The study used the Students' Engagement Scale (SES) which was developed by (Lee, Song, and Hong, 2019). The scale was administered as an electronic survey using Google Forms. Three hypotheses were set to analyse the objective of the study and statistical tests (t-test and ANOVA test) were used for the analysis of the primary data. The results revealed that the engagement values are all at the average level and there was a statistically significant difference in online engagement attributed to gender. At the same time, there were no statistically significant differences in online engagement attributed to academic levels or colleges.

Keywords: Online Learning, Engagement, University Level, COVID-19.

1. Introduction

COVID-19 has changed approximately every aspect of our life. Everything has been affected; how we live, work, communicate, move around, and travel. While many everyday functions are completely or partially stopped, the status of education has been doing much better as schools and universities switched to online learning.

The internet is the motor of online learning and because of the huge advancement of this technology in the last decade, the field of online learning has grown significantly. Even before COVID-19, research reported that the online education market is increasing and will have hit \$350 Billion by 2025. Expectations will definitely change after studying more carefully the effect of the COVID-19 crisis on this field (Koksal, 2020).

According to Watson, Murin, Vashaw, Gemin, and Rapp (2013), online learning “is teacher-led education that takes place over the Internet, with the teacher and student separated geographically, using a web-based educational delivery system that includes software to provide a structured learning environment” (p. 8).

At first glance, the meaning of engagement may seem clear. Insight into the literature shows the indistinctness of the concept. Engagement as a construct is an interaction between many separate domains such as school climate, belonging, and motivation (Fredericks, Blumenfeld, and Paris, 2004). Many authors reported that concepts and terminology used to define or process the engagement construct across research are not consistent. (Furlong et al., 2003; Jimerson, Campos, & Greif, 2003).

Dennen, Darabi, & Smith (2007) and Kehrwald (2008) stated that students’ engagement is a major factor in fostering learners’ connection with the activities delivered in the course, and eventually with their learning. When the engagement level is very high, students can enhance their performance, develop critical thinking, and eventually improve their course grades (Carini, Kuh, and Klein, 2006).

Natriello (1984) reported that early studies were considering just one dimension when defining students’ engagement, namely, the behavioural aspect. According to this viewpoint, engagement was defined as “students’ participation in various activities related to learning”. Mosher and MacGowan (1985) highlighted the behavioural aspects of engagement and defined it as “attitudes towards the learning program or participatory behaviour”. However, Fredricks and Blumenfeld (2004), Reschly and Christenson (2012) stated that the term engagement involves three basic elements: the behavioural dimension, the psychological state of the student, and the student's recognition of learning.

Fredricks and Blumenfeld (2004) explained each dimension as follows:

- behavioural engagement – This focuses on academic and social participation;
- emotional engagement – This emphasizes students’ relationships with classmates, teachers, and other persons involved in the school environment; and
- cognitive engagement – This concentrates on students’ willingness to master challenging tasks and seek further knowledge.

1.1 Problem Statement

While Education everywhere switched to online because of the pandemic COVID-19, there was an urgent need to study the performance of students in online environments, particularly,

in countries where online learning was not popular. Dhofar University was the first higher education institution in the Sultanate of Oman which activates and invests in online learning after the pandemic COVID-19 as it has an advanced technological infrastructure. The interaction between students and their instructor usually takes place through either audio or written discussions. Based on the experiences of authors as instructors at Dhofar University, students (boys and girls) highly prefer written interaction which explains the reading-intensive nature of online courses taught at Dhofar University. Little research exists that is specifically focused on student engagement (behavioral, emotional, and cognitive) in an online learning environment that seeks to identify factors that predict student success (e.g., reading attitude) (Brozo, Shiel, & Topping, 2008; Lutz, Guthrie, & Davis, 2006). Unfortunately, researchers do not fully understand the skills, attitudes, and habits necessary for students to fully interact and succeed in online courses (Barbour & Reeves, 2009; Molnar (Ed.), Huerta, Shafer, Barbour, Miron, & Gulosino, 2015). This research tries to fill this gap by measuring online engagement and its dimensions in addition to testing the effect of some variables on online engagement such as gender, academic level, and college.

1.2 Research Questions

This study is addressing the overall research question: “What is the students’ engagement (behavioral, emotional, and cognitive) in an online learning environment at university levels during COVID-19 ?” This study also addresses the following research sub-questions:

- 1) what is the student engagement level (affective, cognitive, and behavioral) in the online learning environment at the university level during COVID-19?
- 2) what is the effect of gender, academic level, and college on students’ engagement scores in the online learning environments at the university level during COVID-19?

1.2.1 Hypotheses

From Question 2, the following hypotheses emerged.

- 1) There is no statistically significant difference at ($\alpha = 0.05$) in the student's engagement in the online learning environment at the university level attributed to gender.
- 2) There is no statistically significant difference at ($\alpha = 0.05$) in the student's engagement in the online learning environment at the university level attributed to the academic level.
- 3) There is no statistically significant difference at ($\alpha = 0.05$) in the student's engagement in the online learning environment at the university level attributed to the college.

1.3 Purpose of the Study

The purpose of this study is to measure student engagement in the online learning environment. Although research supported the critical issue of student engagement in an online learning environment (Borup, Graham, & Drysdale, 2014 and Roblyer et al., 2008) and other studies explored factors that affect or have a strong relation to academic achievement other than engagement such as Abdelkarim, Siddiqui and Ben Jabeur (2021), Adam and Juma (2021), Majeed (2021) and Sinha (2017)., limited previous research have studied the issue of student engagement in an online learning environment at university level in Sultanate of Oman. This study fills the gap in research by addressing exploring students’

engagement in an online learning environment at the university level and its relation to some variables such as gender, academic level, and college.

1.4 Study Limitations

The current study was limited by several factors.

- Participants – The study was limited to Dhofar University students in Oman who were willing to complete the survey.
- The validity and reliability of instruments used in the study;
- Experience – The study was limited by the experience a student had with completing an online survey and technological efficacy.
- External factors – The study was limited by other factors of students' daily lives that may have impacted learning and engagement including family and relational issues as well as the amount of academic assistance a student might have received from teachers, parents, and instructors.

2. Literature Review

2.1: Engagement

Audas & Willms (2001) defined the construct engagement in terms of participating in schools' activities (academic or non-academic) and the extent to which students value the goals of schooling. Other researchers such as Skinner, Wellborn, and Connell (1990) reported that Engagement is about taking the initiative to start action, effort, and firm or obstinate continuance with schoolwork. Dixson (2015) defined students' engagement in terms of students' active involvement in activities such as talking, thinking, and interacting with their peers, teacher, and the content of the course.

Cho and Cho (2014) found that the level of engagement in online learning environments is less than that of engagement in face-to-face learning and this reduction of engagement is due to distance. The effect of distance thwarts students' rich and easy communication the absence of which discourages learners from active and constant participation resulting in weak engagement and eventual dropout (Leeds et al, 2013). Kim et al (2017) claimed that a high dropout rate is one of the most significant problems encountering online learning

Lee and Choi (2011) reviewed the reasons for online dropout and they reported that students' low engagement level is a primary reason for the high dropout rate. They reported that two main factors are behind students' disengagement in Mathematics class. The first factor is employing inappropriate teaching methods, and the second is the teacher failing to have students involved in the instructional activities. Dabbagh, and Kitsantas (2004) found out that online learning is justly a challenging environment to develop, particularly for students' self-regulation. Students' poor self-regulation in learning can be a bit of a challenge to active engagement in learning.

Robinson and Hullinger (2008) considered students' engagement a good indicator of the quality of education and whether the delivery is active or not. De Villiers, and Werner (2018) reported that scholars consider students' engagement an essential factor in achievement in higher education. Kong, Wong, and Lam (2003) stated that learners who are involved in a

specific activity will be more focused and could take challenges to learn and achieve their desired outcome.

3. Methodology

Here we present the methodology used in the current study by establishing the research design and variables, sample, and instrument.

3.1 Study Design and Variables

This study employs a descriptive design. It examines student engagement in an online learning environment and analyzes primary data from the collection of student engagement data gathered from students who were enrolled in the Fall semester of 2020-2021 at Dhofar University.

Independent variables:

- Gender, and this includes two levels (female and male)
- Academic level, and this includes four levels (Year 1: students who completed ≤ 30 credit hours; Year 2: students who completed from 31-60 credit hours; Year 3: students who completed from 61-90 credit hours; and Year 4: students who completed > 90 credit hours).
- College, and this includes four levels (College of Arts and Applied Sciences CAAS, College of Commerce and Business Administration CCBA, College of Engineering CE, and College of Law CL)

Dependent variable:

- Students' engagement

3.2 Population: The population of the study composed of all students enrolled in the Fall semester 2020-2021 at Dhofar University in all four colleges (College of Arts and Applied Sciences (CAAS); College of Commerce and Business Administration (CCBA); College of Engineering (CE); College of Law (CL), totalling (5000) students.

3.3 Study sample: The study sample consisted of 174 students from Dhofar University who were chosen randomly. The scale was converted into an electronic form via Google Forms and sent to all students. Teachers were asked to encourage students to fill out the scale and the following table shows the distribution of the study sample according to gender. Academic

Level, College, and place of residence. Table 1 and Fig 1 explain the sample

Table 1: Sample of the study

Variable	Level	Number	Percent %
Gender	Female	113	64.9
	Male	61	35.1
	Total	174	100
Academic Level	1st year	64	36.8
	2nd year	47	27.0
	3rd year	30	17.2
	4th year	33	19.0
	Total	174	100.0
College	CAAS	67	38.5
	CCBA	63	36.2
	CE	24	13.8
	CL	20	11.5
	Total	174	100.0

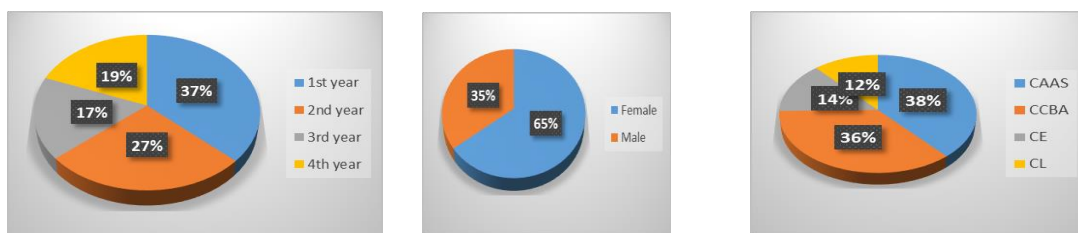


Fig 1: Sample of the study

3.4 Instrumentation

Students’ engagement Scale:

To measure engagement in the e-learning environment in its three dimensions (knowledge, skill, and emotional), the study used the scale developed by Lee and Song (Lee, Song, and Hong, 2019). The scale in its primary form consisted of 48 items. The scale was presented to a group of experts and the scale was applied to 737 Korean students from the university level. After calculating the validity and reliability, the scale is in its final form of 25 items and three dimensions.

The table (2) shows the scale, items and dimensions:

Dimension	How many items	Items numbers
Affective Engagement	9	1,2,3,4,5,6,19,20,21
Behavioural Engagement	10	7,8,9,10,11,12,13,14,15,16
Cognitive Engagement	6	17,18,22,23,24,25
Total	15	All

The scale was translated from English into Arabic, as the teaching language in some colleges and departments is in English and others is in Arabic, then the scale was converted to electronic form in both languages using Google Forms. The five-point Likert scale was used in the scale so that the responses were as follows: (always, often, sometimes, rarely, and never), respectively (5, 4, 3, 2, 1).

3.4.1 Validity of the scale:

Face Validity: The term face validity refers to the extent to which a test appears to measure what it claims to measure based on face value. The surveys were sent to experts in translation, a Professor in assessment and evaluation, a Professor in educational psychology, a Professor in educational technology, and an Arabic language teacher. The comments and the suggestions of the referees were discussed and changes had been made accordingly.

Internal consistency validity: The tool was applied to an exploratory sample consisting of (67) males and females from three different colleges, and then the correlation coefficient (Pearson) was calculated for the dimensions of the scale the results obtained are shown in Table 3.) As follows:

Table (3) Correlation coefficient (Pearson) for scale dimensions

Dimension	Correlation Coefficient
Affective Engagement	.901**
Behavioural Engagement	.932**
Cognitive Engagement	.852**

** : Significant at 0.01

From Table No. (3), we note that the correlation coefficients for the dimensions of the academic engagement scale and the total score were, respectively (0.901), (0.932), (0.852), and all of them were significant at the 0.01 level. The degrees of the correlation coefficients between items and dimensions ranged between (0.626 - 0.850), and the correlation coefficients were significant at the significance level (0.01).

3.4.2 Reliability: Cronbach's Alpha

The Cronbach's alpha coefficient was calculated for each dimension of the scale on the survey sample. The number of students who responded to the scale was (67) male and female students. Table No. (4) shows the obtained Cronbach's alpha values:

Table No. (4) Cronbach's alpha Coefficient

Dimension	No of items	Cronbach's Alpha Coefficient
Affective Engagement	9	0.925
Behavioural Engagement	10	0.901
Cognitive Engagement	6	0.832
All	25	0.955

It is clear from table 4 that the values of Cronbach's alpha coefficient for the dimensions of the engagement scale in the e-learning environment are (0.925) for the affective dimension, (0.9.1) for the behavioral dimension, and (0.892) for the cognitive dimension. The value of Cronbach's alpha coefficient for the scale as a whole was estimated at (0.955). These are high values and indicate a high degree of reliability of the scale.

4. Data Analysis

The independent variables of this study are gender, academic levels, and college. The dependent variables are students' engagement. In this study, students' engagement will be measured by the survey developed by Lee, Song, and Hong (2019).

Question 1: what is the student engagement level (affective, cognitive, and behavioral) in the online learning environment at the university level during COVID-19?

To answer this question, the mean and standard deviation were calculated for the engagement in the e-learning environment with its dimensions (cognitive, behavioural, and emotional), as well as the amount of skewness and the amount of kurtosis were calculated in order to understand the data distribution and compare it with the normal distribution, and Table No. (5) explains this.

Table No. (5): Engagement in the e-learning environment with its dimensions

	Affective Engagement	Behavioural Engagement	Cognitive Engagement	Whole Engagement
Mean	3.4567	3.4500	3.5449	3.4752
Standard Deviation	1.4493	1.3493	1.4266	1.3680
Skewness	-0.501	-0.544	-0.679	-0.571
kurtosis	-1.236	-0.944	-0.951	-0.993

From Table No. (5) it is clear that the value of engagement as a whole in the e-learning environment is 3.475 with a standard deviation of 1.37, while the affective engagement reached 3.46 with a standard deviation of 1.45 and the behavioural engagement recorded a score of 3.45 with a standard deviation of 1.35 and finally the cognitive engagement with a rate of 3.54 and a standard deviation of 1.43. By extrapolating the values, we find that all values are very close, with very little preference for cognitive engagement. As for the values of the amount of Skewness, it ranged from -0.501 to -0.679, and the values of the amount of kurtosis ranged from -0.944 to -1.24. George & Mallery (2010) indicated that if the values of the amount of skew range from -2 to 2 and the values of the amount of kurtosis do not exceed 7, then the distribution can be considered normal.

To find out the level or degree of engagement, the value of the difference between the highest score on the scale, which is (5), and the lowest score, which is (1), was calculated, so the difference was (4). Then the difference was divided into (3), so the result was 1.33. On this basis, the engagement was divided into three sections as follows: a low level with an upper limit of $1 + 1.33 = 2.33$, a medium level ranging from 2.34 to $(2.33 + 1.33) = 3.66$, and a high level which starts from a score of 3.67, and its end touches the score (5).

Referring to Table No. (5), the engagement values are all at the average level and are very close to the maximum of this level represented by the value of 3.66. This result is in full agreement with the result of Abdelkarim et al (2020) and Abdelkarim et al (2021).

Question 2: what are the effect of gender, academic level, and college on students' engagement scores in the online learning environments at the university level during COVID-19?

From Questions 2, the following hypotheses emerged.

Hypothesis 1: There is no statistically significant difference at ($\alpha = 0.05$) in the students' engagement in the online learning environments at the university level attributed to gender. To test the effect of the gender variable on the amount of engagement in its three dimensions, a "t" test was carried out for each dimension separately and for engagement as a whole. The results are shown in Table No. (6).

Table (6): T-test for each dimension separately and for engagement as a whole according to the gender variable

	Gender	No	Mean	STDEV	T-VALUE	Degree of Freedom	Significance
Affective Engagement	Female	113	3.17	1.36	-3.72	172	0.000
	Male	61	3.99	1.46			
Behavioural Engagement	Female	113	3.20	1.26	-3.48	172	0.001
	Male	61	3.92	1.39			
Cognitive Engagement	Female	113	3.32	1.36	-2.83	172	0.005
	Male	61	3.95	1.47			
Whole Engagement	Female	113	3.22	1.28	-3.50	172	0.001
	Male	61	3.95	1.41			

From Table No. (6) it can be clearly seen that there are statistically significant differences in the level of engagement in the e-learning environment due to the gender factor and in favor of males, whether in engagement as a whole or in the three dimensions of engagement (cognitive, behavioral, and Affective). Thus, the null hypothesis is rejected and the alternative hypothesis is accepted.

It can be seen that the engagement of males in all dimensions is at a high level, while the engagement of females is at the middle level, and that the difference between them is significant. This can be explained by the fact that most of the study sample students are from the Dhofar region (74.7%), which is a conservative region and is predominantly tribal and clan in character.

The people of Dhofar in general show great reservations about photographing females or appearing on cameras. In addition to their resistance to mixing between males and females and to crowd out males in public discussions. Remembering that about two-thirds of the sample was composed of female students, and this negatively affected the level of female engagement, in addition to other problems, such as the lack of a place designated for learning in homes and the weakness of the Internet in remote such as the mountain, where male students may be able to move to the city to follow lessons in places where the Internet is stronger and faster, unlike females.

Hypothesis 2: There is no statistically significant difference at ($\alpha = 0.05$) in the students' engagement in the online learning environment at the university level attributed to the academic level.

ANOVA test has been employed for each dimension of engagement and also for the entire engagement. Table 7 explains the results: Table 7: ANOVA test of the independent variable Academic Level.

	Academic level	No	Mean	STDEV	df	F	Sig.
Affective Engagement	Year 1	64	3.2106	1.40620	3	1.023	0.384
	Year 2	47	3.6572	1.47385			
	Year 3	30	3.5293	1.70461			
	Year 4	33	3.5821	1.22683			
	All	174	3.4567	1.44928			
Behavioural Engagement	Year 1	64	3.3547	1.17391	3	0.613	0.607
	Year 2	47	3.6766	1.42938			
	Year 3	30	3.4067	1.70939			
	Year 4	33	3.3515	1.19977			
	All	174	3.4500	1.34932			
Cognitive Engagement	Year 1	64	3.3625	1.32753	3	0.764	0.516
	Year 2	47	3.6909	1.41949			
	Year 3	30	3.4777	1.75585			
	Year 4	33	3.7521	1.30213			
	All	174	3.5449	1.42655			
Whole Engagement	Year 1	64	3.3044	1.24209	3	0.676	0.568
	Year 2	47	3.6732	1.41830			
	Year 3	30	3.4680	1.71404			
	Year 4	33	3.5309	1.18606			
	All	174	3.4752	1.36800			

From Table 7 we can see clearly that there is no statistically significant difference at ($\alpha = 0.05$) in the students' engagement in the online learning environment at the university level attributed to the academic level. The results of table 7 can be summarized as follow:

Affective Engagement: $F(3, 170)=[1.023]$, $p = 0.384$.

Behavioural Engagement: $F(3, 170)=[0.613]$, $p = 0.607$.

Cognitive Engagement: $F(3, 170)=[0.764]$, $p = 0.516$.

Whole Engagement: $F(3, 170)=[0.676]$, $p = 0.568$.

Hypothesis 3: There is no statistically significant difference at ($\alpha = 0.05$) in the students' engagement in the online learning environment at the university level attributed to the college level.

ANOVA test has been employed for each dimension of engagement and also for the entire engagement. Table 8 explains the results: Table 8: ANOVA test of the independent variable College.

	Academic level	No	Mean	STDEV	df	F	Sig.
Affective Engagement	CAAS	67	3.1542	1.46555	3	1.864	0.138
	CCBA	63	3.6495	1.34404			
	Engineering	24	3.4671	1.52638			
	Law	20	3.8500	1.52964			
	All	174	3.4567	1.44928			
Behavioural Engagement	CAAS	67	3.3194	1.35056	3	0.791	0.500
	CCBA	63	3.5397	1.30946			
	Engineering	24	3.3042	1.49680			
	Law	20	3.7800	1.30610			
	All	174	3.4500	1.34932			
Cognitive Engagement	CAAS	67	3.3431	1.41434	3	1.341	0.263
	CCBA	63	3.6243	1.38760			
	Engineering	24	3.4863	1.68579			
	Law	20	4.0415	1.19556			
	All	174	3.5449	1.42655			
Whole Engagement	CAAS	67	3.2657	1.36105	3	1.273	0.285
	CCBA	63	3.5994	1.31756			
	Engineering	24	3.4067	1.51572			
	Law	20	3.8680	1.33602			
	All	174	3.4752	1.36800			

From Table 8 we can see clearly that there is no statistically significant difference at ($\alpha = 0.05$) in the students' engagement in the online learning environment at the university level attributed to the college. The results of table 8 can be summarized as follow

Affective Engagement: $F(3, 170)=[1.864]$, $p = 0.138$.

Behavioural Engagement: $F(3, 170)=[0.791]$, $p = 0.500$.

Cognitive Engagement: $F(3, 170)=[1.341]$, $p = 0.263$.

Whole Engagement: $F(3, 170)=[1.273]$, $p = 0.285$.

The results of the table no 7 and table no 8 could be justified based on the fact that the skills which impact engagement, such as participation, asking questions, focusing attention, perseverance, performing academic tasks, self-learning strategies such as the ability to plan and link old and new information are an accumulated product acquired by the student as a result of his practice over a long time of face-to-face learning so when the student practice e-learning he employed all mentioned skills smoothly and easily in. Hence, we find that there are no statistically significant differences between students from different academic levels or from different colleges.

Recommendations:

- Provide awareness and training programs for university teachers and those in charge of the educational system on the importance of engaging in university life in e-learning.

- Conducting a qualitative field study to find out how to increase the level of engagement, especially among females, in order to overcome the problems and obstacles that prevent female students from participating and engaging in e-learning.
- Conducting more studies and research on the relationship between academic engagement and academic achievement in light of some variables.

References

- Abdelkarim, R., S. Siddiqui and T. Ben Jabeur (2021). *Statistical Analysis of Multiple Intelligence Profiles: STEM Students Vs Humanities Students: Study of Students of Salalah, Oman*. *Int. J. Agricult. Stat. Sci.*, 17(Supplement 1), . 1089-1097.
- Abdelkarim, R., S. Siddiqui and H. Sadig (2021). *Statistical Analysis of the Online Engagement in Flipped Classroom Model on Students of Oman*. *Int. J. Agricult. Stat. Sci.*, 17(Supplement 1), 1581-1591.
- Abdelkarim, R., S. Siddiqui and A. Eteiwi (2020). *Statistical Analysis of the Correlation Between Engagement and Attitude in Online Learning*. *Int. J. Agricult. Stat. Sci.*, 16(2), 875-869.
- Audas, R., & Willms, J. D. (2001). *Engagement and dropping out of school: A life course perspective*. *Human Resources and Social Development Canada*. Retrieved September 2002, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.466.7579&rep=rep1&type=pdf>.
- Barbour, M. K., & Reeves, T. C. (2009). *The reality of virtual schools: A review of the literature*. *Computers & Education*, 402-416. <https://doi.org/10.1016/j.compedu.2008.09.009>.
- Borup, J., Graham, C. R., & Drysdale, J. S. (2014). *The nature of teacher engagement at an online high school*. *British Journal of Educational Technology*, 45(5), 793-806. <https://doi.org/10.1111/bjet.12089>.
- Brozo, W. G., Shiel, G., & Topping, K. (2008). *Engagement in reading: Lessons learned from three PISA countries*. *Journal of Adolescent & Adult Literacy*, 51(4), 304-315. <https://doi.org/10.1598/JAAL.51.4.2>
- Carini, R.M.; Kuh, G.D.; Klein, S.P. (2006). *Student engagement and student learning: Testing the linkages*. *Res. High. Educ*, 47, 1–32. <https://doi.org/10.1007/s11162-005-8150-9>.
- Cho, M.H.; Cho, Y. (2014). *Instructor scaffolding for interaction and students' academic engagement in online learning: Mediating role of perceived online class goal structures*. *Int. High. Educ.*, 21, 25–30. <https://doi.org/10.1016/j.iheduc.2013.10.008>.
- Dabbagh, N. and Kitsantas, A. (2004) 'Supporting self-regulation in student-centered web-based learning environments', *International Journal on E-Learning*, Vol. 3, pp.40–48.

Dennen, V. P., Darabi, A. A., & Smith, L. J. (2007). *Instructor-learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction*. *Distance Education*, 28(1), 65–79.

<https://doi.org/10.1080/01587910701305319>.

De Villiers, B & Werner, A. (2018). *The relationship between student engagement and academic success*. *Journal for New Generation Sciences*. 14. 36.

Dixson, M. D. (2015). *Measuring Student Engagement in the Online Course: The Online Student Engagement Scale (OSE)*. *Online Learning*, 19(4).

<https://doi.org/10.24059/olj.v19i4.561>.

Fadam, E., and Juma, A. (2021). *Analysis and Evaluation of Social, Economic and Educational Indicators for the Displaced Persons in Iraq (Using the National Survey of Displaced Persons)*. *Int. J. Agricult. Stat. Sci.*, 17(Supplement 1), 1525-1535. DocID: <https://connectjournals.com/03899.2021.17.1525>

Fredricks, J.A.; Blumenfeld, P.C. Paris, A.H. (2004). *School engagement: Potential of the concept, state of the evidence*. *Rev. Educ. Res*, 74, 59–109.

<https://doi.org/10.3102/00346543074001059>.

Furlong, M. J., Whipple, A. D., St. Jean, G., Simental, J., Soliz, A., & Punthuna, S. (2003). *Multiple contexts of school engagement: Moving toward a unifying framework for educational research and practice*. *California School Psychologist*, 8, 99 – 114.

<https://doi.org/10.1007/BF03340899>.

George, D. and M. Mallery (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference 17.0 (10th ed.)*. Boston: Pearson

Guthrie, J. T., Alao, S., & Rinehart, J. M. (1997). *Engagement in reading for young adolescents*. *Journal of Adolescent & Adult Literacy*, 438-446.

Jimerson, S. R., Campos, E., & Greif, J. L. (2003). *Toward an understanding of definitions and measures of school engagement and related terms*. *California School Psychologist*, 8, 7 – 27. <https://doi.org/10.1007/BF03340893>.

Kehrwald, B. (2008). *Understanding social presence in text-based online learning environments*. *Distance Education*, 29(1), 89–106.

<https://doi.org/10.1080/01587910802004860>.

Kim, T.D.; Yang, M.Y.; Bae, J.; Min, B.A.; Lee, I.; & Kim, J. (2017). *Escape from infinite freedom: Effects of constraining user freedom on the prevention of dropout in an online*

learning context. *Comput. Hum. Behav.*, 66, 217–231.

<https://doi.org/10.1016/j.chb.2016.09.019>.

Koksal, M. (2020). *The Rise of Online Learning*.

<https://www.forbes.com/sites/ilkerkoksal/2020/05/02/the-rise-of-online-learning/#7bfbcef672f3>.

Kong, Q. P., Wong, N.Y., and Lam, C.C. (2003). *Student engagement in mathematics: development of instrument and validation of construct*. *Mathematics Education Research Journal*, 15. <https://doi.org/10.1007/BF03217366>.

Lee, Jeongju; Song, Hae-Deok; Hong, Ah J. (2019). "Exploring Factors, and Indicators for Measuring Students' Sustainable Engagement in e-Learning." *Sustainability* 11, no. 4: 985. <https://doi.org/10.3390/su11040985>.

Lee, Youngju & Choi, Jaeho. (2011). *A review of online course dropout research: Implications for practice and future research*. *Educational Technology Research and Development*. 59. 593-618. 10.1007/s11423-010-9177-y. <https://doi.org/10.1007/s11423-010-9177-y>.

Leeds, E.; Campbell, S.; Baker, H. (2013). Ali, R.; Brawley, D.; Crisp, J. *The impact of student retention strategies: An empirical study*. *Int. J. Manag. Educ.* 7, 22–43. <https://doi.org/10.1504/IJMIE.2013.050812>.

Lutz, S. L., Guthrie, J. T., & Davis, M. H. (2006). *Scaffolding for engagement in elementary school reading instruction*. *The Journal of Educational Research*, 3-20.

Majeed, G. (2021). *Determine the Factors affecting the Students' achievement of Computer Department in the College of Basic Education, Baghdad, Iraq*. *Int. J. Agricult. Stat. Sci.*, 17(Supplement 1), 2267-2273, 2021. DocID: <https://connectjournals.com/03899.2021.17.226>

Molnar (Ed.), A., Huerta, L., Shafer, S., Barbour, M., Miron, G., & Gulsoino, C. (2015). *Virtual schools in the U.S. 2015: Politics, performance, policy, and research evidence*. Boulder, CO: National Education Policy Center.

Mosher, R.; McGowan, B. (1985). *Assessing Student Engagement in Secondary Schools: Alternative Conceptions, Strategies of Assessing, and Instruments*. pp. 1–44. Available online: <https://eric.ed.gov/?id=ED272812> (accessed on 16 January 2019).

Natriello, G. (1984). *Problems in the evaluation of students and student disengagement from secondary schools*. *J. Res. Dev. Educ.*, 17, 14–24.

Reschly, A.L., Christenson, S.L. (2012). *Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct*. In *Handbook of Research on Student Engagement*; Christenson, S.L., Reschly, A.L., Wylie, C., Eds.; Springer: New York, NY, USA, pp. 97–131. https://doi.org/10.1007/978-1-4614-2018-7_1.

Robinson, C.C.; Hullinger, H. (2008). *New benchmarks in higher education: Student engagement in online learning*. *J. Educ. Bus*, 84, 101–109. <https://doi.org/10.3200/JOEB.84.2.101-109>.

Roblyer, M. D., Davis, L., Mills, S. C., Marshall, J., & Pape, L. (2008). *Toward practical procedures for predicting and promoting success in virtual school students*. *The American Journal of Distance Education*, 90-109. <https://doi.org/10.1080/08923640802039040>.

Sinha , A. (2017). *A correlation Analysis Between The Academic Achievement and Psychometric Variables on Under Graduate Students in Non-Professional Courses of Higher Rducation*. *Int. J. Agricult. Stat. Sci.*, 13(1), 169-180,

Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). *What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement and achievement in school*. *Journal of Educational Psychology*, 82, 22 – 32. <https://doi.org/10.1037/0022-0663.82.1.22>.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2013). *Keeping pace with K-12 online and blended learning: An annual review of policy and practice*. Evergreen Education Group.