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The contribution of psychological barriers in predicting the cognitive load among the university students' users of blackboard system

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Abstract

Psychological barriers are one of the most common problems facing individuals nowadays due to everyday life pressures. The current research aimed at identifying the extent to which psychological barriers contribute to predicting the perceived cognitive load of blackboard e-learning management system users. The research sample comprised (240) male and female among the University Students. The descriptive-analytical approach, specifically the predictive correlative research method was utilized to reveal the relationship between the research variables. The research main results revealed that there was a statistically significant correlative positive relationship between the psychological barriers and the cognitive load (intrinsic, extraneous, and the overall degree), and there was no statistically correlative relationship between psychological barriers and the Germane cognitive load. Besides, results concluded that the external psychological barriers were better at predicting the overall degree of the perceived cognitive load. Psychological barriers and cognitive load must be considered within the e-learning settings through making use of the results of the current study in developing training and counseling programs to reduce the students' psychological barriers and cognitive load levels.

Keywords: psychological barriers; cognitive load; Blackboard system

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1. Introduction

The world is currently facing many risks and disasters. Science and technology play significant roles in confronting challenges imposed by these risks. Coronavirus (COVID-19) represents one of the most recent risks today that increases unexpectedly. It forces officials and stakeholders to choose between either completely suspending the study or adapting electronic alternative methods. In this regard, most Saudi Arabia Universities have resorted to e-learning systems such as the blackboard system. The Blackboard System relies on presenting courses, assignments, tasks, and tests electronically. It depends also largely upon communicating with students through the virtual learning environments and applications downloaded via smartphones or computers. One of its main advantages is transcending barriers of time and place (Melhem et al., 2018; Hew et al., 2018; Sivo et al., 2018). The increasing complexity of the e-learning system created a new trend to study the students' cognitive load. Recently, cognitive load theory research has shifted from studying paper-based learning to investigate web-based learning (Van Merriënboer & Ayres, 2005); as it has expanded to apply the CLT (cognitive load theory) principles in complex e-learning environments to both individual and group learning (Kester et al., 2007). In this regard, Hollender et al. (2010) revealed that there is a need to incorporate the concepts of cognitive load theory (CLT) with the concepts of human-computer interaction. Unfortunately, Universities begin to use this type of education without adequate preparation and training for both students and professors

This educational paradigm affects the learners negatively especially if the content is presented in a way that may confuse the learners during the learning or evaluation process. Mautone & Mayer (2001) explained that when information and basic content synchronizes with a confusing presentation, the learners' attention distracts because they try to process difficult information, and hence this causes negative effects through increasing their cognitive load. Besides, Mayer (2014) emphasized that if education is linked to media that is not related to the content of the targeted task, this will distract students and limits their level of understanding. Therefore, Çakiroğlu & Aksoy (2017) emphasized the need to study the cognitive load in e-learning settings. Accordingly, despite the effectiveness and necessity of using technology in education, Hassan's (2016) study asserted that despite the technical progress and increased information that the world witnesses today affecting the nature of students' lives, it is not necessary to always play a positive role. He stated that this effect can take a negative path as the presence of the state of cognitive dissonance may hinder the student's ability to process information to determine its credibility, contributes to the student's knowledge load on the student.

Although e-learning has become the future direction for higher education some studies signified its relation to many psychological barriers that hinder the utilization of the facilities offered by e-learning. These barriers refer to a mental psychological process that obstacle the student from accomplishing his academic goal affecting his performance negatively. Al-Hammadi (2019) mentioned that e-learning involves some psychological critical issues that hinder a student from innovating, learning especially if there are problems as he sits alone without direct personal interactions. These barriers emerge in a form of rejection and lack of self-acceptance accompanying by certain psychological feelings like stress and negative emotion (Choucair, 2002). The e-learning experience is enjoyable and the learner feels enthusiasm and motivation, but this interest quickly disappears and is replaced by a feeling of frustration resulting from the learner's increased awareness of the gap between the expected results and what he can achieve. Consequently, every effective online education must consider the psychological dimensions and barriers (Al-Hammadi, 2019; Khokhlova et al., 2020). Through reviewing

the literature, the researchers found that e-learning is associated with some learners' psychological barriers which negatively affect the quality of the educational process and increase the cognitive load such as Technophobia (Nwabufo et al., 2013; Katageri & Kullarni, 2015; Gutiérrez-Santiuste & Gallego-Arrufat, 2016; Hong et al., 2017; Bishop et al., 2007).

The Blackboard e-learning management system refers to an integrated system that manages the educational process synchronously and asynchronously and provides a safe and easy way to use the learning environment. It helps the faculty members to present their courses and lectures through attaching multimedia (text, images, audio, video, and graphics). Through this system, learners meet to browse the content, according to their needs, and communicate with each other with multiple communication tools (e-mail, forums, ...) surpassing the boundaries of time and place, or through virtual classes from any type of smart device (Al-Sadhan, 2015). Although the significance of this learning environment, Çakiroğlu & Aksoy (2017) emphasized that in online learning systems there is a need for further future directions to outline the effects of such educational platforms on the types of cognitive loads. From this perspective, the researchers felt the necessity of e-learning at this time especially with suspending the study all over the world because of the spread of COVID-19.

This research derives its significance from being the first study that sheds light on the effect of psychological barriers in increasing the cognitive load within an electronic educational system in the Arab environment. It is considered a modest contribution to the mental health literature in the field of higher education as it will help in developing training and counseling programs to reduce the students' psychological barriers and cognitive load levels.

Therefore, the researchers aimed at identifying the differences between male and female students as well as the scientific and literary disciplines in both the psychological barriers and the perceived cognitive load, identifying the relationship between psychological hardiness and cognitive load of University students who use the Blackboard e-learning management system, and determining the extent to which psychological barriers contribute to predicting the perceived cognitive load of blackboard e-learning management system users. In accordance with the research objectives, the following hypotheses were developed:

H_1. There is no statistically significant difference between the means of male and female university students' scores in the psychological barriers scale and the cognitive load scale.

H_2. There is no statistically significant difference between the means of the scientific and literary disciplines university students' scores in each of the psychological barriers scale and the cognitive load scale.

H_3. There is no statistically significant correlative relationship between the scores of both the psychological barriers, its' dimensions, and the cognitive load of university students

H_4. The cognitive load cannot be predicted with the university student scores on the psychological barriers scale and its dimensions in a statistically significant manner

2. Literature Review

Psychological barriers refer to states generating from different stimuli and deposits in the individual's personality that hinder achieving his goals including psychological adjustment. These barriers may be external due to some social and mental pressures or internal barriers due to psychological stress from various states such as rumors in the individual's life. Aljawhari(2009) defined

barriers as things that stand between the individual and his goals either physically like a wall, socially like fear of blame, or psychologically like fear of failure. They are mental states negatively affecting the individual's life. They hinder him to be influenced by the surroundings and prevent performing certain actions (Choucair, 2002). Shaker(2015) pointed out that psychological barriers are a mental psychological phenomenon that affects players in training or competition. They hinder the player from achieving his goals and affect his performance negatively. Besides, Khokhlova et al. (2020) described these barriers as the factor that activate or inhibit the activity.

Related literature and previous studies demonstrated various psychological barriers that emerge in technological settings. These studies reported that low motivation of the student, low academic confidence, the low self-efficiency, resistance to change, technophobia, computer anxiety, lack of awareness and attitudes towards ICT, self-motivation, the perceived benefit, the perceived ease of use, the perceived complexity of web browsing, lack of attention, early evaluation, poor retention, loss of communication, distrust, emotion or excitement, rumor, non-acceptance, psychological pressure, self-doubt, specific opportunities, unconcerned, fear of making mistakes and fear of difficulty are among the students' psychological barriers (Alajmi, 2014; Gutiérrez-Santiuste and Gallego-Arrufat, 2016; Andersson and Grönlund. 2009; Song and Keller , 2001; Nwabufo et al., 2013; Ali, et al., 2018; Clabby and Blez,1985 ; Elsherif,1994 ; Choucair, 2002; Yan and Massanov, 2019).

Procedurally in the context of the current research, psychological barriers refer to the psychological and mental state that hinders the student from achieving his goals and academic mental health. This state results from negative psychological experiences and causes the students' negativity and sense of defeatism, lack of self-acceptance, influence by rumors, expecting failure, and fear of negative evaluation. Participants' psychological barriers are measured in this research by the results students obtained on the psychological barriers scale, prepared by the researchers with its two main dimensions the internal psychological barriers which the researchers defined procedurally as everything that hinders the individual internally from achieving adjustment and what he aspires academically that contain three sub-dimensions: lack of self-confidence, psychological rejection, and excessive emotional distress, and the external psychological barriers which refers to everything that hinders the individual externally from achieving what he aspires academically, containing three sub-dimensions: expecting failure, fear of negative evaluation, and realizing the rumors.

The cognitive load theory is concerned with interpreting the psychological and behavioral phenomena in the educational process. It is one of the influential theories in explaining the effect of educational content design on the learning process. Besides, it is concentrating on illustrating the relationship between the learners' cognitive construct, the educational content, and how learning occurs (Park et al., 2014). Vogel-Walcutt et al., (2011) indicated that the cognitive load theory provides some learning principles that can be utilized in monitoring the educational environment. They stated that this theory is based on the students' cognitive processes. Currie (2008) defined it as a multidimensional concept referring to the burden that a certain task overloads on the learner's cognitive system. While Na (2012) determined it as the total load that cognitive activities impose on the working memory while completing a certain task. Moreover, Qatami (2013) insisted that cognitive load is the total amount of mental activity during working memory processing in a certain time. Abd al-Hayy et al. (2019) outlined it as the amount of mental activity a student consumes while manipulating a specific academic topic, solving a problem, or performing a specific educational task. While Mahmoud et al., (2019) defined it as the overall effort performed by the learner to maintain information in the working memory when performing the educational activities. Procedurally within

the context of the current research, the researchers defined this concept as the psychological and mental state that hinders students from achieving their goals and academic adjustment in the e-learning environment. Participants' cognitive load is measured in this research by the results students obtained on the cognitive load scale (prepared by the researchers) with the following dimensions: lack of self-confidence, psychological rejection, excessive emotional distress, the expectation of failure, fear of negative evaluation, and awareness of rumors.

According to the cognitive load theory, processing new information occurs in three major patterns of cognitive load. The intrinsic cognitive load (ICL) or the real (core) load results from the number of information elements in a certain task and the interactions between them as the greater number of such elements, the higher level of the intrinsic cognitive load. It is necessary to understand the material and build a cognitive construct. The intrinsic cognitive load plays a significant role in providing all the necessary resources without exceeding the limits of the working memory capacity. It is an intrinsic process and hence cannot be isolated from the information that is learned. While the extraneous cognitive load (ECL), or the formalistic (non-real) load that is mainly generated through teaching patterns. It is an unnecessary load on the working memory caused by the educational conditions and the learning environment. Although this external cognitive load is not part of the information being learned, it is part of the learning environment representing indirect learning processes related to the educational quality. Whereas Germane cognitive load (GCL) or the good cognitive load is a burden required to generate meaningful learning, and a closely related cognitive burden refers to the mental effort that a person makes to process the information that is learned and linked to the existing cognitive structure. It represents the "good" knowledge load required to generate meaningful learning (Van Merrienboer & Ayres, 2005; Sweller et al., 2011; Korbach, et al., 2018; Lange &Costley, 2019).

According to the researchers' knowledge, no study dealt with the psychological barriers of the e-learning management system (Blackboard) and its effect on the students' cognitive load. Most studies dealing with these variables in e-learning educational settings in general, and which indicated that it is a new idea, and that motivated the researchers to conduct this research.

3. Methods

According to the current research objectives and hypothesis, the researchers utilized the descriptive-analytical approach using the predictive correlative research method. A total of 100 (60 female and 40 male) university students were chosen from the Prince Sattam bin Abdulaziz University students to verify the validity and reliability of the research tools to be applied to the basic study. While the basic research sample comprised (240) university students from the same university (100 female and 140 male, 132 literary disciplines, and 108 scientific disciplines). For data collection, the researchers utilized the psychological barriers scale and the cognitive load scale prepared by the researchers.

4. Results

4.1. The first hypothesis validation results: "*There are no statistically significant differences between the means of the scores of male and female university students in the research variables*": To verify this hypothesis, the researchers used a t-test *as indicated in* table (1)

Table (1): Arithmetic Mean, Standard Deviation, (t) Value and Its Significance for the Differences between the Mean Scores of Males and Females in the psychological barriers and the cognitive load (n=240)

Variables	Male(n=140)		Female(n=100)		t-value	Sig.
	Mean	Std.	Mean	Std.		
Internal psychological barriers	25.80	7.65	26.13	7.00	0.339	not significant
External psychological barriers	24.65	6.99	24.69	6.35	0.46	not significant
The total degree of psychological barriers	50.46	14.03	50.82	12.45	0.211	not significant
The intrinsic cognitive load	17.95	5.23	19.59	3.95	2.76	0.01
The extraneous cognitive load	16.90	5.26	19.00	3.67	3.63	0.01
The Germane cognitive load	15.12	4.56	14.31	3.83	1.50	not significant

Table (1) showed that there were no statistically significant differences between male and female university students in the psychological barriers scale and its dimensions, while there were statistically significant differences between male and female university students in the intrinsic cognitive load, the extraneous cognitive load, and the total degree in favor of female students, but there were no differences between male and female university students in the Garmane cognitive load.

4.2. The second hypothesis validation results: " There are no statistically significant differences between the means of the scientific and literary disciplines university students' scores in the psychological barriers scale and the cognitive load scale ": To validate this hypothesis, the researchers utilized a t-test as indicated in the following table (2).

Table (2): Arithmetic Mean, Standard Deviation, (t) value and Its Significance for the Differences between the Mean Scores of the Scientific and the Literary Disciplines in the Psychological Barriers and the Cognitive Load (n=240)

Variables	Literary Disciplines (n=137)		Scientific Disciplines (n=103)		t-value	Sig.
	Mean	Std.	Mean	Std.		
Internal psychological barriers	26.21	6.61	25.58	8.29	0.63	not significant
External psychological barriers	24.32	5.75	25.16	7.83	0.86	not significant
The total degree of psychological barriers	50.54	11.49	50.59	15.58	0.08	not significant
The intrinsic cognitive load	19.30	4.52	17.73	5.04	2.49	0.01
The extraneous cognitive load	18.54	4.32	16.74	5.15	2.86	0.01
The Germane cognitive load	14.69	4.07	14.91	4.57	0.38	not significant
The total degree of cognitive load	52.54	8.00	49.39	9.62	2.69	0.01

Table (2) clarified that there were no statistically significant differences between the scientific and literary disciplines in the psychological barriers scale and its dimensions, while there was a difference between them in the intrinsic, the extraneous cognitive load, and the overall degree of the cognitive load in favor of the literary disciplines. Moreover, there were no statistically significant differences between the scientific and literary disciplines in the Germane cognitive load.

4.3. The third hypothesis validation results: "There is no statistically significant correlative relationship between the scores of the psychological barriers, its' dimensions and the cognitive load of university

students": To validate this hypothesis, the researchers used Pearson correlation coefficients between the psychological barriers and the cognitive load, and table (3) illustrated the results obtained:

Table (3): Pearson Correlation Coefficients of the Psychological Barriers, Its dimensions, and the Cognitive Load of University Students

Psychological Barriers	Cognitive Load			
	Intrinsic	Extraneous	Germane	The Total Degree
The internal Psychological Barriers	**0.344	**.310	0.059	**0.337
The external Psychological Barriers	**0.358	**0.358	0.100	**0.436
The Total Degree of Psychological Barriers	**0.364	**0.351	0.083	**0.427

** Significant at the (0.01) Level

Table (3) revealed that there was a statistically significant positive correlative relationship between the psychological barriers, its dimensions, the intrinsic and extraneous cognitive load, and the overall degree of the cognitive load among university students, while as there was no statistically significant positive correlative relationship between psychological barriers, its dimensions, and the Germane cognitive load of university students.

4.4. *The Fourth hypothesis validation results:" The cognitive load cannot be predicted with the university student scores on the scale of the psychological barriers and their dimensions in a statistically significant manner ":* To validate this hypothesis, the researcher conducted multiple regression analyses using the stepwise method of selection. It is a method based on adding independent variables to the model one after the other. It includes building a complete model with all the independent variables and deleting the non-significant contributed variables one after the other. The results obtained using the previously mentioned method ended with the best model, which remained the second dimension the external psychological barriers and excluding the first dimension and the overall degree of psychological barriers due to their insignificant contribution to the dependent variable, and table (4) showed the results obtained:

Table (4): Results of Variance Analysis of the Contribution of the External Psychological Barriers in Predicting the Total degree of the Cognitive Load

Source of Variance	Sum of Squares	DF	Mean Squares	F	Sig.
Regression	2054.78	1	78.2054		
Residual	8748.552	238	36.759	55.899	0.01
Total	10803.333	238			

Table (4) illustrated that the fourth hypothesis stating that" The cognitive load cannot be predicted with the university student scores on the scale of the psychological barriers and their dimensions in a statistically significant manner" was refused as F=55.899 that was significant at 0.01 level.

Table (5): Results of Variance Analysis of the Contribution of the Psychological Barriers and its Dimensions in Predicting the Cognitive Load

Model	Beta	Regression Coefficient	t	Constant Variance	R	R2

Total Degree	0.436	0.436	7.477	7.715	0.436	0.190

Table (5) mentioned the Beta value and its significance indicating that the second dimension (the external psychological barriers) was the best in predicting the overall degree of cognitive load. T value for the regression coefficient was (477.7) for the second dimension reflecting that the relationship between the two variables was significant. In addition to that, it came in the first order in terms of correlation with the dependent variable (cognitive load). From the previous table, we can conclude the regression equation as follows:

$$y = a + bx$$

Where(y) is the value of the dependent variable (cognitive load), (x) is the value of the independent variable (psychological barriers), (b) the regression coefficient of the independent variable and the value of (a) is the constant regression= (7.715). So, the formula is as follows:

Predicted cognitive load (y) = 0.436 (the total degree of the second dimension) + 7.715

And because the external psychological barriers contained three sub-dimensions, the researchers conducted a simple linear regression analysis to identify the extent to which these three sub-dimensions contribute to predicting the cognitive load of university students, and table (6) presented the results obtained:

Table (6): Results of Regression Analysis of the Contribution of the Psychological Barriers and its Dimensions in Predicting the Cognitive Load

Model	Beta	Regression Coefficient	t	Constant Variance	R	R2
Predicting Failure	0.385	0.385	6.427	2.081	0.385	0.148
fear of negative evaluation	0.347	0.347	5.711	3.502	0.347	0.121
realizing rumours	0.403	0.403	6.801	2.132	0.403	0.163

Results revealed that the arrangement of the sub-dimensions of external psychological barriers in terms of their ability to predict the overall degree of the cognitive load was as follows: realizing rumors, fear of negative evaluation, and expecting failure. The researchers attribute this result because university students are affected by rumors more than others due to the availability of social media among them. They also feel fear of failure as they about to graduate, looking for a job, and head towards the future and that consequently affects their cognitive load. Moreover, the researchers attribute the students' failure of negative evaluation because the study sample is from the Bedouin community which cares about society and friends' perceptions and that affects their cognitive load.

5. Discussion

Regarding the significance of managing students' psychological barriers especially in the present circumstances to reveal the negative effects of cognitive load, the results indicated that there was a statistically significant relationship between the two variables and that psychological barriers degree can predict the cognitive load level. Concerning results of the first hypothesis as indicated in the table (1) which revealed that there were no statistically significant differences in psychological barriers according to the gender variable (male-female), the researchers attributed this to the fact that both male and female students live in similar circumstances and expose to the same life events. Moreover, university students are the most important sector in society because of their sensitivity to problems

and pressures they expose to. This result is consistent with the findings of Choucair (2002) and Abdul Samad (2002). While regarding the differences between genders in the cognitive load variable results differ partially with Sweller(1988); AlShamsi and Hassan (2011) in the absence of differences according to the gender variable, and also differ from the results of AlTikriti et al (2013), Al Dulaimi and Al-Jubaisi (2014) stating that there were statistically significant differences in the cognitive load according to gender in favor of male students. Besides, the researchers attributed the absence of gender differences in the Germane cognitive load to the consistency of the current research sample in terms of the intelligence level, the previous experience level, and the achievement level, in addition to the similarity in the curriculum and the teaching methods through which they learn. All these factors may lead to a similarity in the working memory capacity among the students and the cognitive load as well. This result is consistent with the results of Sweller (2002) indicating that capacity, duration, and information retention affects students' cognitive loads and leads to the inability to process information.

Furthermore, the researchers attributed the statistically significant differences between male and female students in the intrinsic and extraneous cognitive load in favor of female students because female students concern with other duties as marriage, motherhood, and face many challenges during their learning. They also have limited contact with their professors and all these factors increase their cognitive load. While males dedicate their effort to achieve academic assignments accurately and they have enough time to communicate with professors. Besides, the increase of the intrinsic and the extraneous cognitive load among female students may be due to the differences between male and female students in their thinking patterns as male thinks logically while female think emotionally. In this context, Abdellatif (2020) mentioned that males are distinguished by logical thinking and scientific method in problem-solving more than females and that the psychological states of the female in situations that require important decisions lead to a high level of anxiety and emotional stimulation which in turn affect their cognitive load among females than males.

Results of the second hypothesis as indicated in table (2) revealed that there were no statistically significant differences between the scientific and literary disciplines in the psychological barriers and its dimensions, while there was a difference between them in the intrinsic, the extraneous cognitive load, and the overall degree of the cognitive load in favor of the literary disciplines. Moreover, there were no statistically significant differences between the scientific and literary disciplines in the Germane cognitive load. The researchers interpreted this result in light of the definition presented by Choucair (2002) who defined it as mental states that reflect the negativity of the individual and which prevent him from being affected by what surrounds him and hinder him from carrying out certain actions. The emotional mechanisms of these barriers are intensive negative emotional experiences and attitudes such as shame, stress, feeling of guilt, fear and anxiety, less self-esteem, rejection, lack of acceptance, increased sensitivity towards the self, and being affected by what he knows about self.

Besides, the results of the hypothesis regarding the difference between the literary and scientific disciplines in the cognitive load are partially inconsistent with Sweller (1988), AlSahmsi and Hassan (2011), and AlTikriti et al (2013) in the absence of the statistically significant difference according to the variable of academic discipline. Results also differ from the results of El-Sabab's (2016) study which revealed that there was a statistically significant difference in the cognitive load according to the variable of discipline in favor of the scientific one. The researchers attributed this difference to the discipline nature, teaching methods, and curricula characteristics which can increase the students' cognitive load. In this regard, Sweller et al (1998) pointed out that the intrinsic cognitive load arises as

a result of the difficulty and complexity of the academic content. He stated that if the course material contains many elements and concepts or suffers from weakness in the content organization, the learner finds it difficult to address them simultaneously in the working memory that makes the subject difficult to understand. These differences may be also due to the educational techniques that learners need to participate in the learning activities and which are not directly related to the learners' cognitive schema (Palincsar, 2003). This load generates as a result of traditional teaching methods that focus on providing learners with the amount of important and unimportant information that needs to preserve without paying attention to the students' mental ability to process information, coding, and storing it appropriately. These methods make the learner just a recipient or listener (Bruning 2003).

In contrast, there was no difference between the scientific and literary disciplines in the Germane cognitive load because this kind of load is required for both disciplines as it leads to successful learning and interactions in light of the transition towards distance e-learning. In an e-learning setting, this load generates as a result of useful cognitive processing such as abstract ideas and others, which are strengthened through educational aids. Building new and complex cognitive schemes successfully helps learners to move between the stimuli presented and save useful information, which helps them to think logically and critically and judge the information presented to them objectively (Chipperfield 2006). So that this kind of load contributes to learning rather than hindering it as it requires learners to build new cognitive schemes which generate the Germane cognitive load (Al Zoubi 2018).

Concerning the third hypothesis which demonstrated that there was a statistically significant positive correlative relationship between the psychological barriers, its dimensions, the intrinsic and extraneous cognitive load, and the overall degree of the cognitive load among university students, while as there was no statistically significant positive correlative relationship between psychological barriers, its dimensions, and the Germane cognitive load of university students, the result is inconsistent with Katageri and Kallarni's (2015) study which indicated that psychological barriers in the e-learning environment increase the intrinsic and extraneous cognitive load. Furthermore, the intrinsic cognitive load is negatively related to self-confidence and positively related to anxiety (Lange et al. 2017). Other researchers revealed that emotions are a separate channel for processing information (Plass and Kaplan, 2016). So emotions and psychological factors are considered unnecessary cognitive load and negatively affecting the working memory. Besides storing and retrieving information are affected by emotions and that emotions directly affect memory (Plass & Kalyuga, 2019).

The researchers also see that psychological barriers are experiences and disincentives for mental flexibility that limit the students' ability to think and move towards their future as these barriers are obstacles to their thinking and capabilities. Hassan (2016) also mentioned that these barriers are reflected in academic achievement and reduced mental capacity, which in turn leads to a feeling of cognitive load. Regarding the results which stated that there was no statistically significant correlative relationship between the psychological barriers and the Germane cognitive load, the researchers attributed this to the fact that a good educational process design and planning can reduce resorting to the Germane cognitive load. Moreover, students also found some facilities that relieve their Germane cognitive load due to the novelty of the university experience and the sudden application. That psychological barrier doesn't lead to the Germane cognitive load.

Results also revealed that the arrangement of the sub-dimensions of external psychological barriers in terms of their ability to predict the overall degree of the cognitive load was as follows: realizing rumors, fear of negative evaluation, and expecting failure. The researchers attribute this result

because university students are affected by rumors more than others due to the availability of social media among them. They also feel fear of failure as they about to graduate, looking for a job, and head towards the future and that consequently affects their cognitive load. Moreover, the researchers attribute the students' failure of negative evaluation because the study sample is from the Bedouin community which cares about society and friends' perceptions and that affects their cognitive load.

6. Conclusion

With the necessity of using e-learning in the current period that associated with the spread of the Coronavirus and suspending the educational process in every country in the world, and in light of the conflicting results related to the cognitive load and e-learning, in addition to the emergence of the psychological barriers related to e-learning that may the cognitive load of University students who use the Blackboard E-learning Management System; the researches prompted to conduct this research to identify the extent to which psychological barriers degrees contribute to predicting the degrees of perceived cognitive load for blackboard e-learning management system users and the differences between genders and disciplines in these two variables.

7. Recommendations

- Further research should be conducted to contribute to the development of the Germane cognitive load among University students
- The necessity of employing the skills of dealing with the Blackboard system within the computer skills course and teaching it at the first levels of university students
- Providing students with the technical experiences necessary to develop their abilities to confront psychological barriers and the cognitive load through seminars, educational meetings, and workshops.
- Develop training and counseling programs to reduce the level of psychological barriers and the cognitive load for students during e-learning.
- Avoid providing redundant information during e-learning and consider the logical arrangement of learning activities and content from simple to complex and provide practical examples.
- Facilitating students' use of the Blackboard system by allowing the learner to control the presentation through pausing, accelerating, slowing, rewinding, and returning; to reduce the burden of knowledge on them.
- The necessity of synchronization between traditional and electronic education in the educational process.

Authors' Contributions:

Abdellatif. S. formulated the main study problem and was responsible for data collection, reviewing the literature, designing study tools, and interpreting the study results. Azmi. M. was responsible for reviewing the literature, conducting data statistical analysis, translating the article into English, and providing a conclusion.

Declaration of conflicting interests

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