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An experimental study of impact of the technology acceptances model (TAM) factors on the use of Moodle platform by students - Case study: "Technological institute from Ouargla university" -

دراسة تجريبية حول أثر محددات نموذج قبول التكنولوجيا (TAM) على إستخدام منصة موودل من قبل الطلاب الجامعيين

دراسة حالة – طلاب المعهد التكنولوجي بجامعة ورقلة –

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ABSTRACT-

The emergence of covid-19 forced all Algerian universities to accelerate the adoption of e-learning through digital platforms to complete educational programs. In this study, we focused on Moodle platform in Ouargla University with a sample of (98) Management

students. then we rely on the factors of the Technology Acceptance Model as a basic theory. To prove the hypotheses validity according to (TAM) theory, statistical tests were relied upon by calculating the arithmetic mean and standard deviation, in addition to a package of statistical tools. Spss 22.0. The results showed that the impact of

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TAM's factors (perceived usefulness and intention towards usage) to use Moodle platform by students depends on the main and external factors, and statistical positive and strong relationship between these factors.

Key words:
Technology Acceptance Model, TAM, Moodle, platform, E-learning
JEL classification: A20, O32.

الملخص -

أجبر ظهور وباء كوفيد19 جميع الجامعات الجزائرية على إعتماد التعلم عن بعد من خلال المنصات الرقمية لإتمام البرامج التعليمية، وخصصنا هاته الورقة البحثية حول منصة Moodle المعتمدة من قبل جميع الجامعات الجزائرية. أجرينا الدراسة الميدانية على مستوى جامعة ورقلة لعينة من (98) طالب ليسانس مناجمنت واستخدمنا أداة الإستبيان الإفتراضي لتجميع البيانات ولإثبات صحة الفرضيات تم الإعتماد على الإختبارات الإحصائية من خلال حساب المتوسط الحسابي والانحراف المعياري، بالإضافة إلى حزمة من الأدوات الإحصائية Spss وأظهرت نتائج التحليل أن تحديد تأثير عوامل النموذج (TAM) (نية الاستخدام والإستفادة المتوقعة من الإستخدام) يعتمد على العوامل الرئيسية والخارجية، وأن العلاقة ذات دلالة إحصائية التأثرية كانت قوية وموجبة بين هذه العوامل.

الكلمات المفتاحية -

نموذج قبول التقنية، TAM، منصة موودل، تعليم عن بعد،Moodle

الترتيب: A20, O32

1. Introduction :

After the reforms carried out in recent years, which have been marked by a widespread incursion of information and communication technologies (ICT) in university pedagogy **(William, 2004)**, most importantly the effective contribution of **ICT** to changes in teaching from a professors, perspective and learning from students "view of e-learning" **(Radcliffe, 2002).** In this context, it seems essential to focus on the real benefits of **ICT** on this discipline (M**argaryan, 2008**). According to (**Rogers, 2004)** one of the main advantages of the use **ICT** by student is access to information (easy access, diversified, decentralized, free, regardless of place and often free.

Before we get acquainted with the tools used, we decided to restrict the concept of e-learning to: online training, conducting online courses, virtual learning, distance learning, and the virtual section), means ways to receive knowledge through electronic media, so students who learn through e-learning platform can obtain course materials in various formats (text, image, audio, ...etc.), and they can interact with their colleagues and lecturers individually and at the same time via message boards, forums, chat rooms, video conferences, ….etc. This can be done wherever there is an Internet connection **(Trombley,** 2002).

With the arrival of COVID19 pandemic which affected education systems around the world, leading to almost total closures schools, universities, and colleges. Algeria is not an exception many universities were not fully their program, so they prepared for courses online how named "E-learning" **(Guessar, 2020).** Algerian universities have not multiple teaching tools and relied on "open platforms" or "Google's "services, but one of the most used tools that have been relied upon in pedagogical education was the platform "Moodle". **(abdelaziz, 2005**) and al, mentioned that the curriculum program Moodle is one of the programs Managing educational sites called LMCS, and through This program can be

created by any teacher, to design Easily own a site, and in a few minutes.

Our approach opts to observe the **TAM**'s factors affecting the use of Moodle platform by student from Technological institute in Ouargla university.
For this purpose, we will rely on the acceptance theory of (TAM) technology as a measurement model for testing the hypotheses that we will trait a problematic: **What is the TAM's factors impact on using the Moodle platform by students from Ouargla University ?**

I -Theoretical Background:

1- E-learning

1.1 Use ICT or Integration ICT in teaching:

According to **(Rao, 2014)** professor who use ICT in classroom, and technological tools helped him to detail lessons and encouraged students to train in the technology field; he justified his continued reliance on technology as the necessity to unify the common language, between student and professor, in the sense of their participation in the use instead of talking theoretically, about the benefits of use and presented a paradox between using only as a desire and relying on it as follows:

Table n° (1-1): Use ICT VS integrate ICT

Using technology	Technology integration
Technology usage is random, arbitrary & often an afterthought	Technology usage is planned & purposeful
Technology is rare or sporadically used in classroom	Technology is routine part of the classroom environment
Technology is used purely for the sake of using technology	Technology is used to support curricular &Learning goals
Technology is used to instruct students on content	Technology is used to engage students with content

Source : https://todaystechedatwha.wordpress.com

1.2- Integration of ICT in teaching:

The process of using information and communication technology, in education includes two parts: first, ICT for education, and the second, we mean ICT in the education organization, to the development of information directed to teaching / learning. **(Syed.N, 2013).**

1.3- E-learning platforms:

With the technological developments taking place in various fields, education would remain far from these changes, and electronic learning became one of the most important tools used in educational applications of the latest technologies **(Bui, 2020**).

(Sangrà, 2012)& **al** have defined it as: "E-learning is a means of teaching and learning that fully or partly indicates the educational model used, based on the utilization of electronic media and devices as instrument to promote training availability, communication and interaction, and that helps in accepting new methods to understand and establish learning"**.** E-learning integrates a set of components: Learning Management Systems (LMS) **(Embi, 2010).**

1.4- Learning Management System (LMS):

Learning Management System is a software application based on the web and its purpose to give the opportunity to deal with learning content, it also allows student interaction, provides assessment tools for teachers, reports of learning progress, and gives students the opportunity to learn via course instructions, interactions, exchange of knowledge, and take exams and tests online. **(Nasser, 2011).**

1.5- Electronic curriculum:

According to **(salem, 2006)** :" electronic course, or the so-called digital lectures, allows communication between students and professors, as it provides multiple ways for students to interact with lessons through a wide variety of sciences and easy access to various sources of knowledge in a few second".

1.6- Moodle system for managing electronic courses:

Growing up in the Australian outback in the late 1970s, Moodle's Founder "**Martin Dougiamas"**, studied at Curtin University, where his experience with Web CT prompted him to investigate an alternative method of online teaching, he registered the word 'Moodle' an abbreviation of "***Modular Object-Oriented Dynamic Learning Environment*** as a trademark and explained his choice of name in a forum post some years later. **(site, 2020).**

According to **(Omar., 2015**) ; "Moodle is the first online journal of distance education, and it is one of the (LMS) that was developed in 2001 and it based on the principle of learning at different levels, whether educational or economic institutions". As electronic information, sources in academic institutions, it become very important to professors and students who share in the fact, **(Al-Khathami, 2010).**

This platform has been adopted by KASDI MERBAH OURGLA university as tool for teaching online and its due to the Corona pandemic, it was necessary to continue teaching since March 2020, it sign up 44 091 Student,1162 teachers and 11 282 courses had placed on the Moodle platform **(Département, 2021).**

1.7 - E-learning in Algeria, mandatory by the State:

According to a report prepared by the Ministry of Higher Education and Scientific Research in August 2020 the number of undergraduates:

Table N°(1-2) : E-learning in Algeria

N	Field of study	Numbers
1	Bachlor	940.000
2	Master	450.000
3	High school	27.000
4	ENS	19.200
5	Medical sciences	75.000
6	Veterinary sciences	3.100
	TOTAL	**1.514.300**

Source: Ministry of High Education 2020

In accordance with the framework protocol conducted by the Ministry the current health situation requires a paradigm shift in the practice and organization of educational work:

1 - Maintain the organization by distance education (courses and educational programs) to complete the program 2019/2020,
2 - Provide students with internet spaces and computer tools in strict compliance with physical distance requirements.
3- Students can access and use the teaching resources of the University in their state of residence even if they are enrolled elsewhere.
4- For the 2020-2021, courses will be offered online through institutional educational platforms, television broadcasts and other media. **(Ministere, 2020).**

2- The Technology Acceptance Model (TAM):

2.1- Definition: This theory was developed by (**Davis**, **1985**) & al; according to them "TAM is one of the most model used in many studies based on measuring of the use and acceptance of new technology information's as an important contribution in the field of ICT and Management Systems". This model examines a few factors affecting technology acceptance, about innovations, and of course

they have been tested in several areas, whether health, food, educational .... et**c. (Kim, 2016).**

According to (**David, 1989**) **& al**: "TAM consistently explains a substantial proportion of the variance in usage intentions and behavior, and compares favorably with alternative models such Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB)".

As shown in Figure (2-1), TAM model **(David, 1989).**

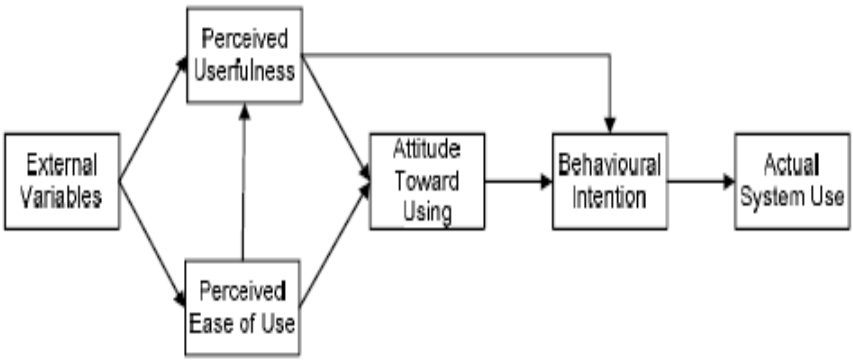
firstly

- the behavioral intent (BI) of accepting this technology,
- the attitude (A)towards the usability of this technology

secondly, the internal determinants which are mainly:

- the expected benefit Perceptibility (U)
- Ease of use II (E).
- It defines behavioral intent (BI).
- (PEOU) the extent to which a person believes that using a specific system would be free of effort,
- (PU) the extent to which a person believes that using a specific system would enhance his performance, and external variables. **(David, 1989).**

Fig (2-1) shows the model proposed by David 1989:



Source: David, 1989

2.2 - Literature Review:

1- **V. Rachel titled 2018** "Acceptance of learning management system among undergraduate computer science students using extended technology acceptance model (ETAM)" this study examined the degree of acceptance of (48) students specializing in automated media for the LMS system and used the (ETAM). It is achieved to study the relationship between the ease of perception and the expected benefit, and the results of the study prove that relationship between the influencing factors is very strong. Party to students, the automated media of the existing technology.

2- **Boštjan Šumak** & al **2011**.titled "Factors affecting acceptance and use of Moodle", this study examined the factors that have an impact on (235) students' perceptions about the use and acceptance of Moodle. Results have revealed two main factors: behavioral intentions and attitudes toward using Moodle. Perceived usefulness was found as the strongest and the most important predictor of attitudes toward using Moodle.

3- **Ayman Ahmed AlQudah, 2014**. titled "Accepting Moodle By Academic Staff at the University of Jordan", this study examine the acceptance of university academic staff in using Moodle as their supplementary method of teaching the results indicate that the perceived ease of use (PEOU) is a more significant barrier in adopting Moodle. this means the instructors are more likely to use Moodle if they believe it is simple to use.

4- **Moakofhi Kago Moakofhi, 2019** titled "Using Technology Acceptance Model to Predict Lecturers' Acceptance of Moodle: Case of Botswana University of Agriculture and Natural Resources**"** this study Examine data from (50) BUAN lecturers the results revealed that participants perceived Moodle easy to use hence consider that it will be useful in their working environment, the results shows possibility of acceptance of Moodle by BUAN lecturers.

3- Research model and hypothesis:

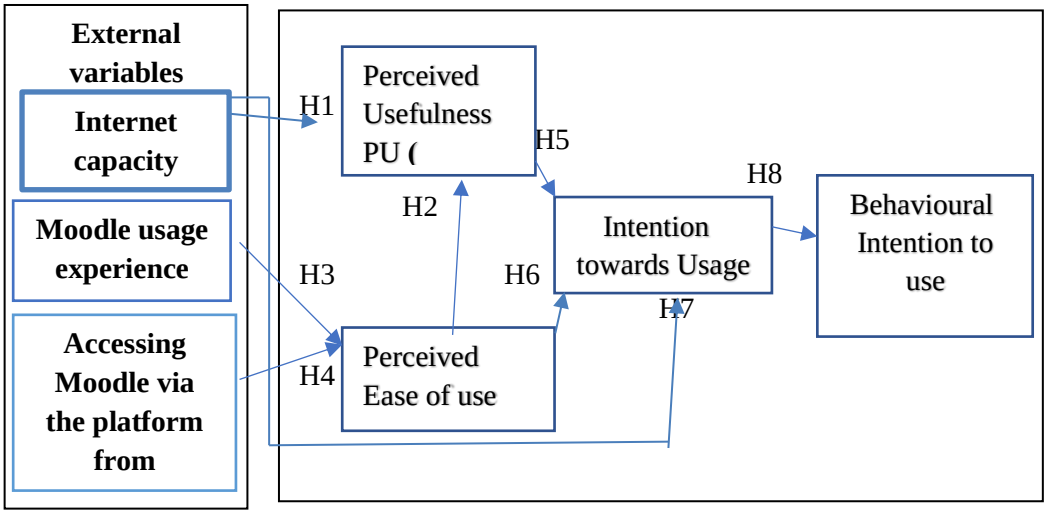
The main purpose of this study is empirically verifying the validity of the hypotheses used within the TAM model through the extent to which the Moodle is used, it adopt the TAM model to measure factors' impact, and we focus on the external factors (access to lectures, access to platform, experience of using the platform) whose affect on benefit perception and ease of use of the platform.

Accordingly, the following hypotheses can be formulated:

- ✓ **H1**- Internet capacity has a significant effect on the perceived benefit when students use Moodle.
- ✓ **H2**- Ease of use has a significant effect on perceived benefit when students use Moodle.
- ✓ **H3**- Moodle usage experience has a significant impact on the perceived ease of use Moodle by student.
- ✓ **H4**- Accessing Moodle via university website has a significant effect on perceived ease this tool by students.
- ✓ **H5**- The perceived benefit has a significant effect on the intention to use the Moodle platform by students.
- ✓ **H6**- Ease of use has a significant affect the intent to use of the Moodle platform by students.
- ✓ **H7**- Internet capacity has a significant effect on the intention to use the Moodle platform by student.
- ✓ **H8**- the Intention towards usage has a significant effect on the behavioral intention to use le Moodle platform by student.

So, we obtain the following study structure:

Figure (3-2) Research Model (TAM)



Source; Building by researcher

4-Research Method:

4.1- Questionnaire design:

According to what was listed earlier in the literature reviews and definitions to limit the concepts and inference the (10) hypotheses, we create a questioner to collect the experimental data for this study. It consists of three sections. section one it contains demographic information, and second section is about accepting the Moodle platform.

4.2- Data collection:

Study is experimental, and we have relied on a questioner tool (Google form) to collect data. It was distributed to students for (1st and 2nd year management), with a total of 115 students, and we recovered 98 cards then we took the full answers.

4.3- Analyses and discuss:

The number of questioners distributed, retrieved and capable of processing consisted in:

Table (4-1): Statistics of the distributed and retrieved questioner

Data	students	Percentage
Distributed questionner	115	100%
Recovered questionner	115	100%
Valid questionner	98	85.21%

Source: building by researcher

From the table (4-1), percentage of valid questioners was 85.21%, which is a very acceptable rate, as the percentage of canceled questioner was 14.79%. This reflects students who answered neutral.
It should be noted that the three-point **Likert scale** was adopted, and due to its use in many previous studies in this field, students were asked to give their degree of approval for each of the phrases contained on the "**triple Liker**t" scale as follows: "**Agree (03 pts)** given It has **3** grades; **Neutral**, given degrees; one score is given for expressing disagreement (**non agree)".**

4.4 - Measuring the validity and reliability of the study instrument:

We use a coefficient "Cronbach's Alpha" (α), which takes the value from (0 - 1), which expresses the stability ratio that shows the percentage of students and who repeat the same answer if they are re-questioned in the same circumstances. In general, the following table shows the test results.

Table (4-2): Results of the Cronbach Alpha Labs test for the study questioner

Cronbach Alpha	Students
Cronbach Alpha's student	97.2%
Number of contents	24

Source: Prepared by the researcher based on the statistical analysis of the questionnaire results using the SPSS program

The Cronbach alpha values for the study dimensions were: 97.2% which is an acceptable value for measuring the reliability of accuracy, with regard to testing the validity of their content, consistency was calculated; The results indicated that there is a significant correlation between each dependent and independent variable, and this indicates the possibility of measuring these paragraphs of variables.

-The first part: a study of the personnel characteristics:

Table n° (4-3): Results of the Cronbach Alpha Labs test for the study questioner

Data			**Student result**		
N	**Variables**	**Category**	**N**	**Frequency**	**Percentage**
01	Gender	Male	98	38	38%
		Female	98	60	62%
02	University residence	Internal boarding	98	57	59%
		External boarding	98	41	42%
03	Academic year	1st year	98	41	42%
		2 nd year	98	57	59%

Source: Prepared by the researcher based on the statistical analysis of the questioner results using the SPSS program

Through the results obtained when testing the previous three variables, we note that the ratios are intermediate between [38 .62] Results for both the arithmetic mean and the standard deviation of the variables it is detailed in the appendices.

5 - Discuss and results:

Results detailing in the table n°01 in supplements, show the arithmetic mean and standard deviation the results all of them was positive and we can arrange them from strongest to moderate in strength as follows:

Perceived ease of use

1- Accessing Moodle via the platform from university web site
2- The experience of using
3- Internet capacity
4- Behavioral intention to use
5- Attitude towards use
6- Perceived benefit

And when we did the T-test we found:

- ***Testing the hypothesis regarding Perceived usefulness (benefit of use)***:
  - **H1**- Internet capacity has a significant effect on the perceived benefit when students use Moodle.
  - **H2**- Ease of use has a significant effect on perceived benefit when students use Moodle.

5- Regression analysis of this effect relationship between external factor (Internet capacity) and (ease of use) was high and a degree of correlation was according to Pearson's modulus we find perceived benefit was 0.778, 0.766. that prove a strong correlation between these factors. Tabular value was **0.000< α** (sig= 0.05) for the two independent variables so the effect was at a significant level 0.000, and the result of T-test was T 8.026, T 6.654, that means the capacity of internet has positive high impact on benefits of use whom compared with the ease of use.

6- This result is agreeing with the study in developed in literature review **Moakofhi Kago Moakofhi**, 2019 titled "*Using Technology Acceptance Model to Predict Lecturers' Acceptance of Moodle: Case of Botswana University of Agriculture and Natural Resources".*

- ***Test hypotheses examining factors affecting ease of use hypothesis:***

- **H3**- Moodle usage experience has a significant impact on the perceived ease of use Moodle by students.

- **H4-** Access to Moodle via university website has a significant effect on perceived ease this tool by students.

7- Regression analysis of this effect relationship between external factor (Moodle usage experience and Accessing Moodle via the platform from university web) was high and degree of correlation was according to Pearson's modulus 0.786, 0.682, that means a strong correlation between factors. Tabular value was **0.000< α** (sig= 0.05) for the two independent variables, so the effect was at a significant level 0.000, and result of T-test was T 12.646, T 11.602, both of two factors have high positive effect and usage experience has positive impact on Perceived ease of use compared with Access to Moodle via the platform from university website.

8- This result is agreeing with the third study in developed in literature review by **Ayman Ahmed AlQudah.2014**. titled "*Accepting Moodle By Academic Staff at the University of Jordan: Applying and Extending Tam in Technical Support factors*".

➢ ***Test hypotheses examining factors affecting ease of use hypothesis:***

- **H5-** The perceived benefit has a significant effect on the intention to use the Moodle platform by students.
- **H6-** Ease of use has a significant affect the intent to use of the Moodle platform by students.
- **H7-** Internet capacity has a significant effect on the intention to use the Moodle platform by student.

9- Regression analysis of this effect relationship between external factor (Internet capacity, Ease of use and perceived benefit) was high and degree of correlation was according to Pearson's modulus 0.674, 0.713 and 0.792 that means a strong correlation between factor; tabular value was **0.000< α** (sig= 0.05) for the two independent variables and so the effect was at a significant level 0.000, and the result of T-test was T 8.174 , T 8.852 and T11.205 so all of factors have high positive effect, perceived benefit has

positive high impact on intent to use compared with Ease of use Moodle platform and Internet capacity.
This result is agreeing with the fourth study in developed in literature review by **Boštjan Šumak & al** 2011.titled "*Factors Affecting Acceptance and Use of Moodle: An Empirical Study Based on TAM".*

➢ ***Test hypotheses examining factors affecting behavioral intention to use le Moodle platform use hypothesis:***

- H8- the Intention towards usage has a significant effect on the behavioral intention to use le Moodle platform by student.

10- The degree of correlation of the factor (***behavioral intention to use***) was according to Pearson's modulus 0.729; tabular value was 0.000< α (sig= 0.05) for the independent variable and so the effect was a significant level 0.000, and the result of T-test was T 7.058 the factor the Intention towards usage has high positive effect, so the Intention towards usage has positive high impact on intention to use le Moodle platform**.**
This result is agreeing with a study in developed in literature review by "**V. Rachel** titled "*Acceptance of learning management system among undergraduate computer science students using extended technology acceptance model (ETAM)2018".*

6 - Results:

1- Personal criteria related to accepting Moodle platform for remote study student was an important tool to using the platform and according to the results whose shows the possibility of continuing to adopt Moodle platform and encourage students who are not registered on the platform to join it.
2- The ease of use of Moodle platform revealed the number of students committed to the lessons through the timing of entry and exit to the platform, as well as the number of their interaction with the lessons and files placed in their reach with the possibility of downloading them from the platform.

3- Student respondents possessing competences for using the platform and achieving the expected benefits on they use can complete the required tasks without obtaining assistance.

4- From the statistical results, we notice many students benefiting from the platform is mostly students (interne broad), despite the problem of digital network disruption, but sharing files among students was fast compared to external students who attended Wi-Fi services, but their communication with their colleagues was slow and this confirms the hypothesis Intention towards use.

5- Corona pandemic, affected the country, many students were unable to join the institute and were satisfied with reading their courses on the platform, but sometimes it was mandatory to add some tools for more explanation, and this was not possible to put on the platform, which deprived students of access to informations, and this is what made students with professors use an additional means of communication represented by creating groups on social media sites to facilitate the delivery of information to absent students, but these tools are not considered official and the platform remains the official tool in force by the university and provided for by the Ministry of Higher Education

6- When conducting the examinations, a majority of professors relied on the courses placed on the platform as well as the use of the latter in the interrogations, which negatively affected the students who did not use the platform well, which led to their lower results in the exams.

7 - Conclusion:

At the present time, which is considered the extension of the last year, Algerian universities will continue to rely on E-learning and use Moodle platform, it's despite the presence of a huge amount to study this topic in various disciplines, the use of TAM is very rare in this topic, especially in Algerian literatures so our goal through it is to show the effect of externals TAM's factor on a perceived benefit from using Moodle by students. for that we developed 08 hypotheses where we set to analyses the influential relationship between the

three external factors and the four internal factors, and between them.

We concluded that the platform reached satisfying the expectations of students and allowed them to complete their academic curriculum and accordingly, the use of this tool will continue to the second academic university season.

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Supplément

Table n°01 Arithmetic mean and standard deviations

Contents	N	Arithmetic mean	standard deviations	Arr	Eval	Direction
I find it easy to access the Moodle platform	98	2.3776	.90263	1	agree	High level
I can easily interact with the Moodle platform	98	2.3571	.91099	2	agree	High level
Access to the platform does not require prior experience in using the Internet	98	2.3469	.88635	3	agree	High level
Interacting with the Moodle platform does not require much mental effort	98	2.2245	.90281	4	agree	High level
I can access the platform from all digital equipment	98	2.1939	.91559	5	agree	High level
perceived ease of use	**98**	**2.3000**	**.75614**			**High level**
The Moodle platform enables me to download all the lectures	98	2.1837	.94538	1	agree	High level
The Moodle platform enables me to communicate with the professor	98	1.9898	.93605	3	agree	High level
Lessons are always on the Moodle platform, allowing browsing at any time	98	2.0408	.92968	2	agree	High level
Perceived benefit	**98**	**2.0714**	**.79120**			**High level**
I can access the platform Moodle only if 4g is available	98	2.1122	.94031	1	agree	High level
The presence of the platform on the university website makes the login process slow	98	2.1020	.95777	2	agree	High level
Downloading videos and lectures takes time, so many students have access to a common time, and this makes interaction take time	98	2.0918	.95342	3	agree	High level
Attitude towards use	**98**	**2.1020**	**.80578**			**High level**

Using the Moodle platform keeps me in touch with my colleagues	98	2.1224	.93351	3	agree	High level
Contents	N	Arithmetic mean	standard deviations	Arr	Eval	Direction
The Moodle platform is on the university website, which keeps me using it	98	2.1837	.93442	2	agree	High level
If I upload an account on the Moodle platform, I will continue browsing	98	2.3061	.90141	1	agree	High level
Behavioral intention to use	**98**	**2.2041**	**.79320**			**High level**
The integration of the Moodle platform within the university website made access to it conditional on the availability of WIFI	98	2.2653	.92559	3	agree	High level
Although there is an application for download, but I use the university website	98	2.2959	.92178	1	agree	High level
The platform allows me to log in consecutively	98	2.2347	.91720	4	agree	High level
Having the platform on site makes uploading of lectures a long process	98	2.2755	.90566	2	agree	High level
Accessing Moodle via the platform from university web site	**98**	**2.2679**	**.81089**			**High level**
The Moodle platform allow to get the lessons	98	2.2449	.93126	2	agree	High level
Lessons are placed continuously by professors according to the lessons program	98	2.2755	.93919	1	agree	High level
course format is adequate for all students	98	2.1735	.90844	3	agree	High level
Internet capacity	**98**	**2.2313**	**.84735**			**High level**
Accessing the Moodle platform requires at least 4G internet, preferably Wi-Fi	98	2.2347	.93941	3	agree	High level
Accessing the Moodle platform through the university's website makes the process slow	98	2.2857	.91944	1	agree	High level
I can access the platform with any	98	2.2653	.90304	2	agree	High

electronic device. It is sufficient to connect to the Internet						level
Contents	N	Arithmetic mean	standard deviations	Arr	Eval	Direction
The experience of using	**98**	**2.2619**	**.84035**			**HL**
Using the platform made me feel like I was in a classroom with my colleagues	**98**	2.2347	.93941	**3**	**agree**	High level
The non-user Moodle platform were not able to access the lessons until they resorted to their colleagues who used the platform	**98**	2.2857	.91944	**1**	**agree**	High level
Non-user Moodle prevented them from sending answers about the applications developed to the professors	**98**	**2.2653**	.90304	**2**	**agree**	High level

Source: Prepared by the researcher based on the statistical analysis of the questionnaire results using the SPSS program