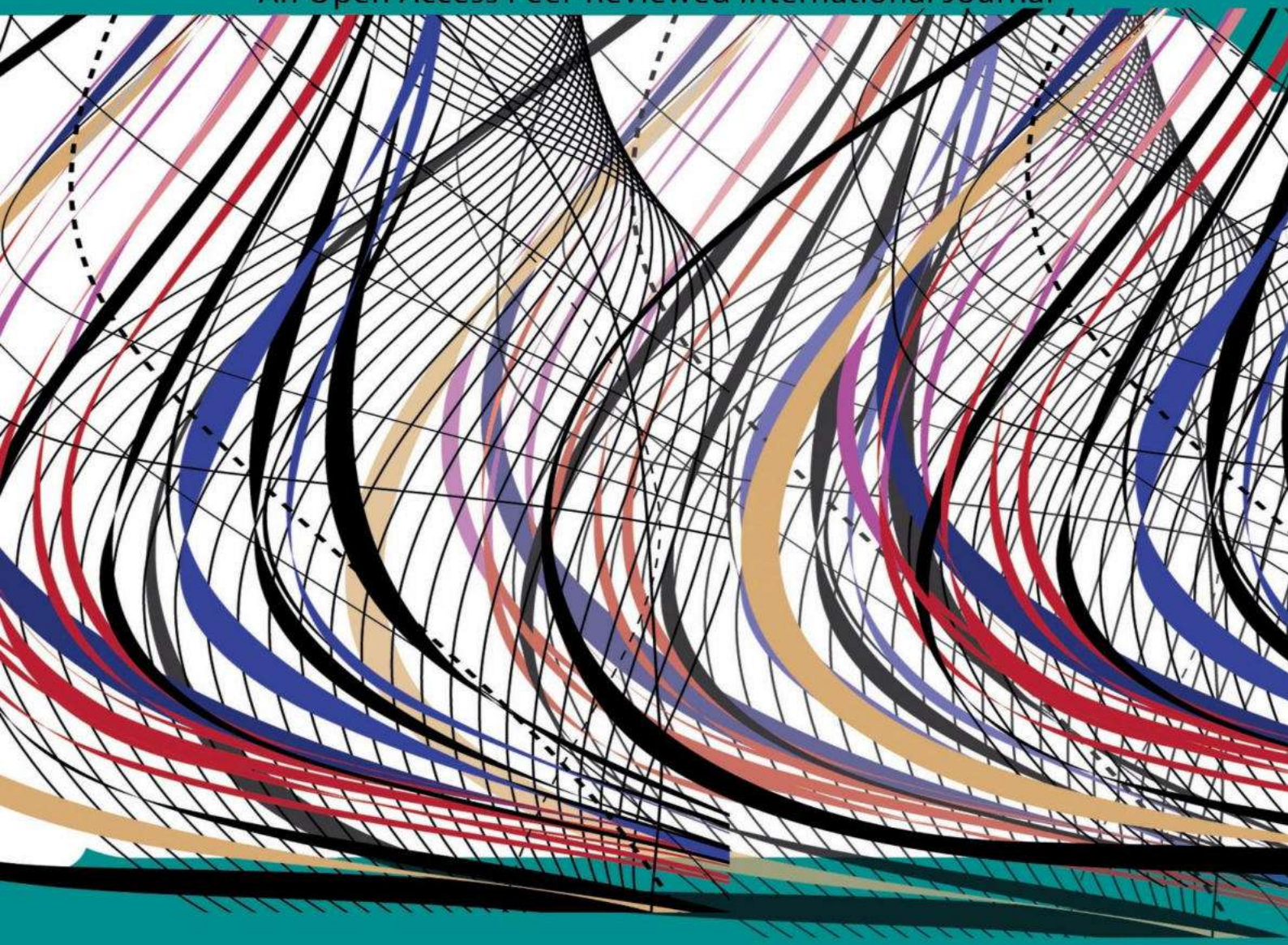
ISSN : 2454-1311

International Journal of Advanced Engineering, Management and Science

Journal CrossRef DOI: 10.22161/ijaems

(IJAEMS)

An Open Access Peer-Reviewed International Journal



Vol-8, Issue-8 | Aug 2022

Issue DOI: 10.22161/ijaems.88

INFOGAIN PUBLICATION

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International Journal of Advanced Engineering, Management and Science

(ISSN: 2454-1311)

DOI: 10.22161/ijaems

Vol-8, Issue-8

August, 2022

Publisher

Infogain Publication

Email: ijaems.editor@gmail.com ; editor@ijaems.com

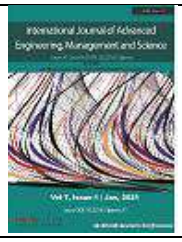
Web: www.ijaems.com

Editorial Board/ Reviewer Board

Vol-8, Issue-8, August, 2022

(DOI: 10.22161/ijaems.88)

International Journal of Advanced Engineering, Management and Science (IJAEMS)
Peer-Reviewed Journal
ISSN: 2454-1311 | Vol-8, Issue-8; Aug, 2022
Journal Home Page: https://ijaems.com/
Article DOI: https://dx.doi.org/10.22161/ijaems.88.1



Evaluation of relationship generated between concrete fiber properties and permeability

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Received: 15 Jul 2022; Received in revised form: 09 Aug 2022; Accepted: 15 Aug 2022; Available online: 23 Aug 2022

Abstract**—** *The research aims to Evaluation of a relationship generated between concrete fiber properties and permeability. All concrete samples were examined in Baghdad, Iraq, where 8 samples for beams were collected distributed on cutting and flexural tests, and 16 samples were collected for the cylinder distributed on compression and tensile strength tests.*

The study found that fibrous concrete reduces permeability and thus reduces water bleeding, as some types of fibers produce greater impact and resistance to abrasion and fracture in concrete. In general, fibers do not increase the flexural strength of concrete, so they cannot replace structural or resistive rebar, some fibers reduce the strength of concrete.

This can be explained from the general concept of the mechanism of action of the fibers inside the manufactured concrete, which, when exposed to stresses, works to form connecting bridges through the internal cracks in the concrete, which may contribute to creating additional resistance after the cracks occur.

Keywords**— Fibers, Permeability, beams, flexural, tension.**

I. INTRODUCTION

The fibers have the ability to improve concrete's resistance to shear, tensile, bending, impact and shrinkage It also works to reduce the widening of cracks and redistribute them, but the fibers do not greatly affect the pressure resistance, and the most important function of the fibers is that it increases the value of the durability criterion of the material to a very large extent [1,2].

Thus, it transforms the fracture mechanics of concrete from Dangerous Failure Sudden to Failure Ductile The significant and effective effect of the fibers in resisting shear forces and increasing the parameters of Toughness is evident. Fiber concrete is widely used in roads and airports [3].

Fiber concrete is a type of concrete that is used during manufacturing to improve cracking and cracking resistance in which fibers with refractive behavior are added, preferably steel, glass or plastic fibers [4,5,6].

The fibers are incorporated into the cement stone or with concrete, and it increases the tensile strength as Concrete mainly determines the bearing behavior of concrete [7,8].

Concrete in its hardened state appears as a rocky material with high pressure resistance

It has the property of plasticity, which allows it to be formed in any required architectural form Concrete with steel is the most common and widely used construction material in our modern age, due to its ease, presence and the relative cheapness of its constituent materials, as well as the ease and licenses of its manufacture Concrete in combination with other materials to form Sections Composite [9,10,11].

It is also used in crust ceilings and the connection areas between the beam and the column in tires and fibers are also used in concrete pipes and precast companies and in concrete elements subjected to shear and impact forces in spite of fibers increase the resistance to tensile strength [12,13].

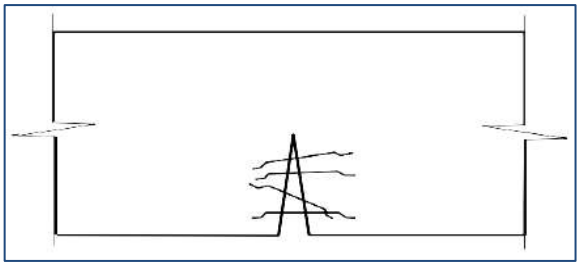


Fig.1- Role of fiber in reducing widening of cracks

The fibers are commonly used in concrete to control plastic shrinkage cracking and to dry out shrinkage cracking. They also reduce the permeability of concrete and thus reduce water bleeding some types of fibers produce a greater impact and resistance to abrasion and fracture in concrete In general, fibers do not increase the bending strength of concrete, so they cannot replace resistant or structural steel [14,15].

Some fibers reduce the strength of concrete as the amount of fibers added to the concrete mix is measured as a percentage of the total volume of the compound (concrete and fibers) called part volume. Fragment size usually ranges from 0.1 to 3% and the aspect ratio is calculated by dividing the length of the fiber by its diameter [16].

II. METHODOLOGY

Samples were collected from private laboratories in Iraq, Baghdad, for the case of beams, four types were made (80 cm x 17 cm x 17 cm) where the first type consisted of concrete beams Simple, as for the second type, it consists of pieces with a mixture of concrete and reinforcing Polymer fibers (carbon) by 900 grams per cubic meter of concrete, as for the third type

The beam was composed of concrete and the proportion of steel reinforcement was entirely dependent on the load that was being applied.

The fourth type was completely similar to the third type but differed in terms of adding an enhancement Fibers.

The cylinder samples are cast even in harsh conditions, and the molds used should retain their original shape and dimensions, the concrete mold should be held without any leakage, before placing the concrete mixture inside the mold, the inside of the mold should be properly lubricated to facilitate the removal of the solid cylinder.

The mixed concrete is placed in the molds in layers not less than 5 cm deep, the number of lines in each layer during compaction should not be less than 30, the pressure should reach the basic layers allowing most of the air spaces to escape, the samples are stored unobstructed in a place with A relative humidity of at least 90% at a temperature of 27° ± 2° C for 24 hours, after which time samples are taken and immersed in clean, clear water until the test age is reached.

III. RESULTS

T	Fine	Coarse
Fineness modulus	1.71	5.50
MD mm	2.36	12.5
Dry specific mass g/cm³	2.63	2.77
Apparent specific mass g/cm³	2.40	2.72
Bulk density kg/m³	1620	1470

Fig.1- aggregate characteristics

Eight samples were examined for beams at the age of 90 days, and they were divided into 2 samples for cement and 2 samples for fibres flexure.

As for tension , it was also divided into two groups, which included the steel group with cement and the cement, fibres , steel and 90-days test as shown in figure below

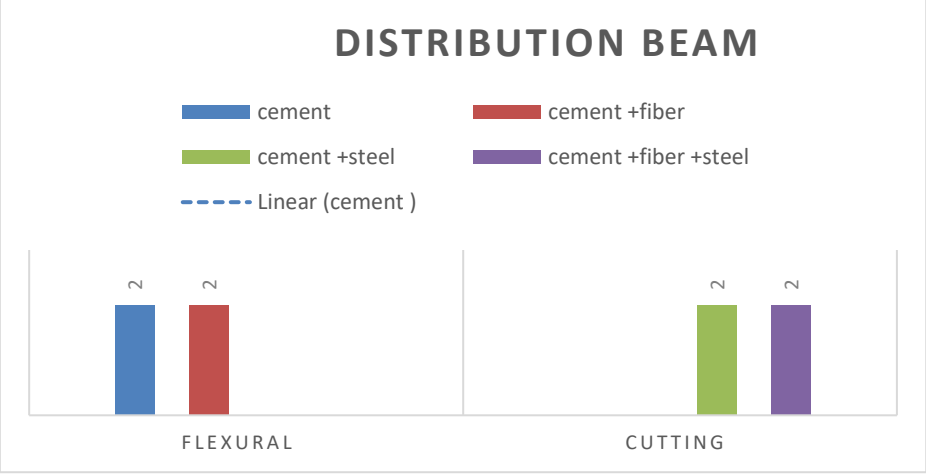


Fig.2- Distribution of sample according to beam

As for the cylinder test, it was 28 and 90 days old, and it was divided into two types, compression test and the Tension test, divided into 16 samples consisting of cement and fiber as shown in table 1

Table 1- distribution of sample in cylinder

Test cylinder				
Type of test	Compression		Tension	
Composite	Cement	Cement with fiber	Cement	Cement with fiber
28	2	2	2	2
90	2	2	2	2

Table 2- results on fresh concrete of compression and tension (cylinder)

Age and type of test	A/C	Slump (cm)		Content of air (%)	
	A/C	Cement	Cement with fiber	Cement	Cement with fiber
28 DAYS CY compression/ tension	0.79	19	7	2.4	2.3
28 CY compression/ tension	0.60	14	11	2.1	2.2
90 DAYS CY tension	0.79	18	11	2.2	2.3
90 CY tension	0.60	15	14	1.9	1.7

Table 3- results on fresh concrete of beam

Age and type of test	A/C	Slump (cm)		Content of air (%)	
	A/C	Cement	Cement with fiber	Cement	Cement with fiber
90 DAYS flexural	0.79	15	9	1.9	2.1
	0.60	12	11	2	2.4
90 cutting	0.79	18	11	2.5	2.5
	0.60	17	14	2.1	2.2

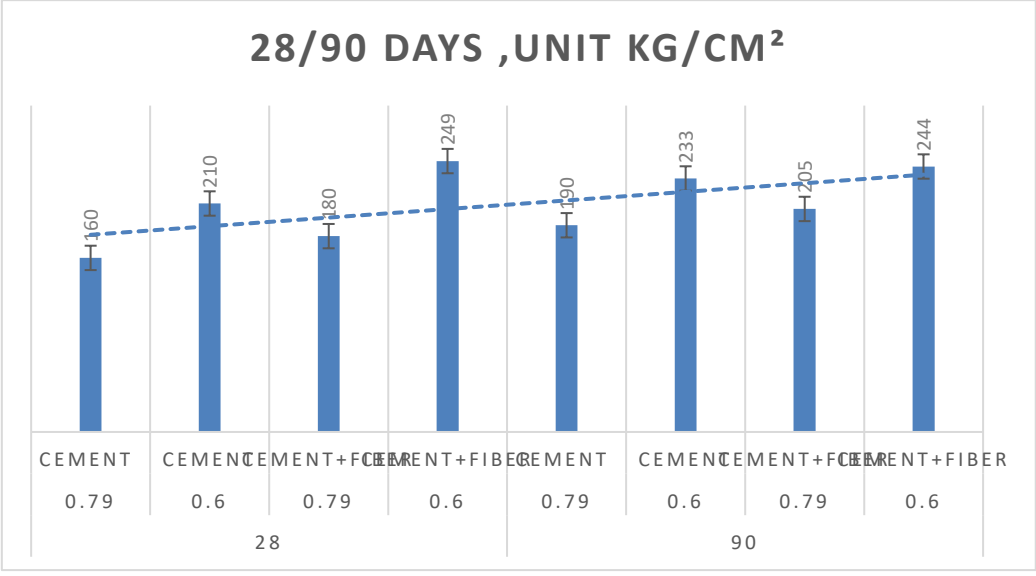


Fig.3- Results of compression in 28 days and 90 days

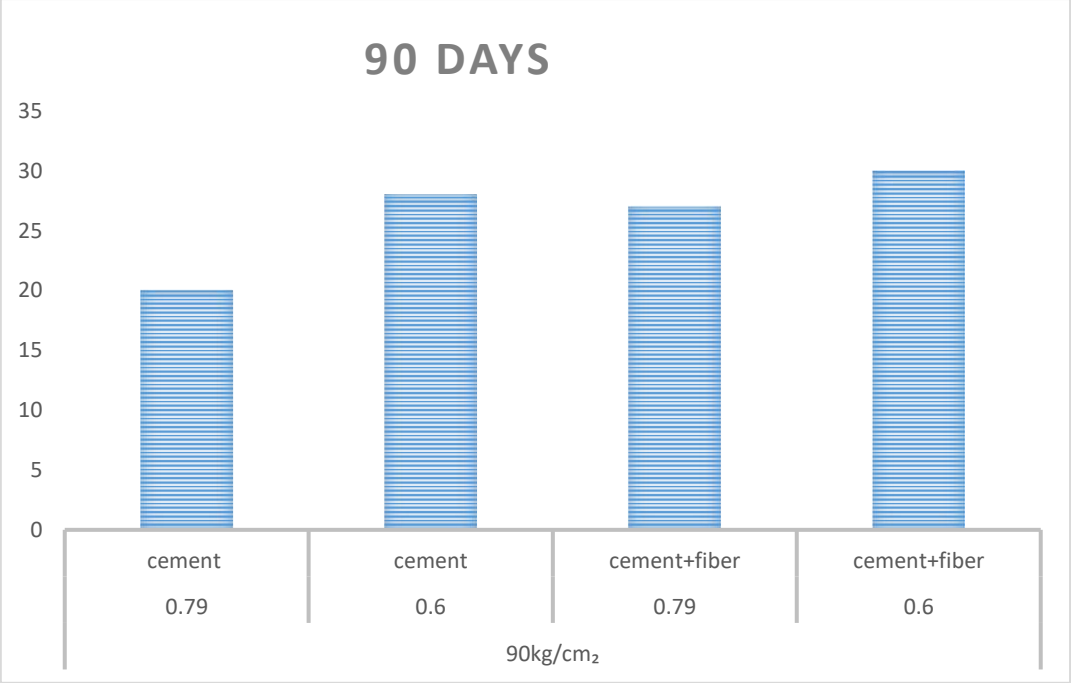


Fig.4- Result of flexural in beam

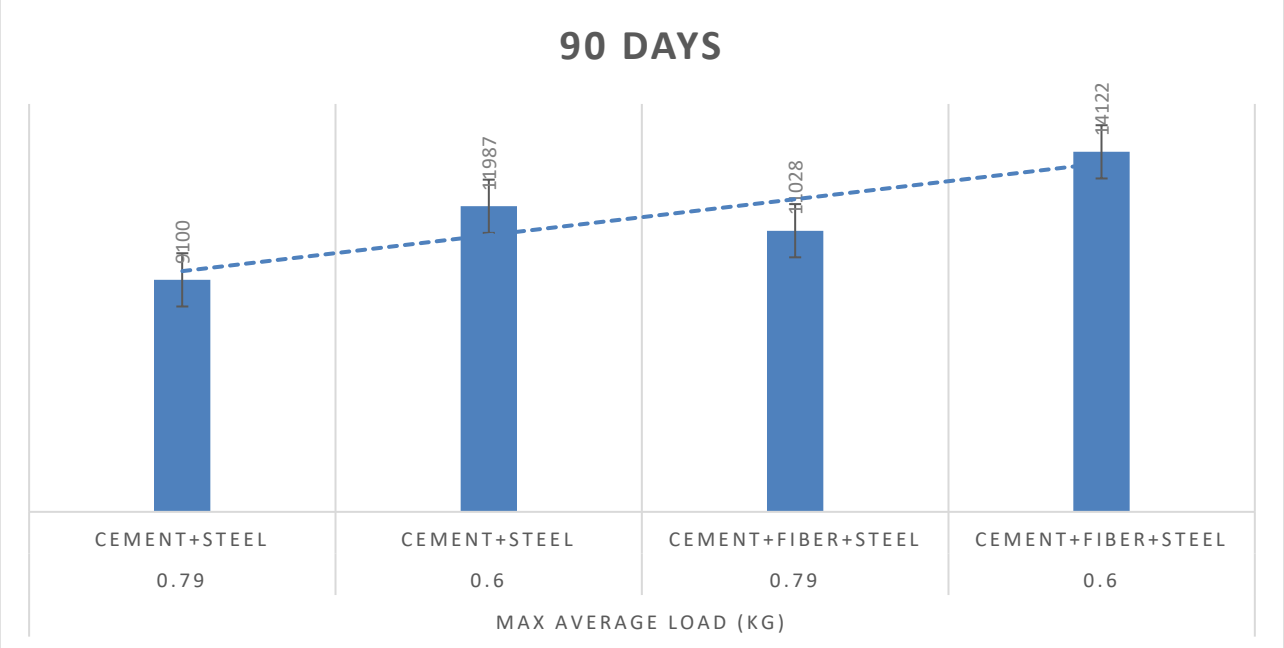
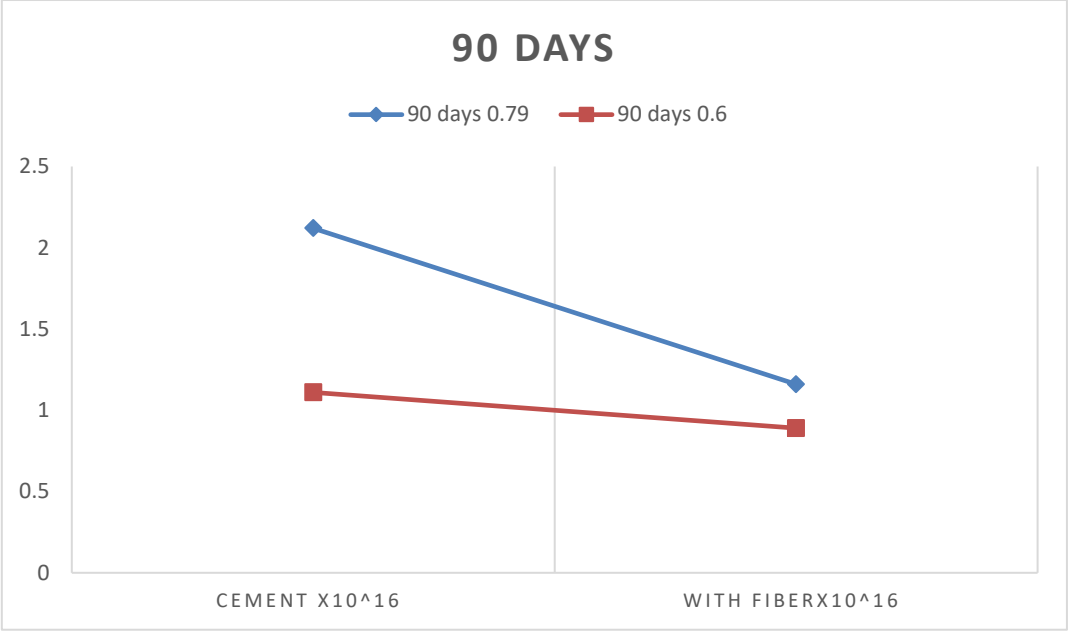


Fig.5-Results of the shear resistance test in beams.

Table 4. Permeability test results.



A/C= 0.79, 0.60

IV. DISCUSSION

The research aims to Evaluation of concrete generated between fiber properties and permeability Through Table 2, which shows the results of fresh concrete from comperission and tension, we find that the slump level at 0.79 was higher than 0.6 at 28 days and 90 days for cement , but when adding fibers, we notice the clear effect it adds to the samples, as the process becomes inverted from In terms of influence, the slump level becomes higher at 0.6

Precipitation test is widely used in the workplace and all over the world, and this test does not measure the workability of concrete, but it is very useful in detecting changes in the materials involved in the formation of concrete from time to time, for example, the increase in moisture content in the aggregate or Changing the gradation of the aggregate, such as a decrease in the amount of sand in the mixture, leads to an increase in precipitation. The high or low precipitation gives a direct warning to the person supervising the mixing process and enables him to correct the mixing ratios immediately.

In the examination of compression at the age of 28 and 90 days, realistic results were found and achieved to the purpose.

The sample consisting of cement with fiber at A/C 0.6 was 249 at the age of 28 days.

As for the samples at the age of 90 days, the highest value was found in the sample of cement with Fiber is also 244 kg/cm²

Analysis of the test results Air permeability The decrease in permeability in the presence of fibers was evident. The samples that have a ratio of 0.79A / C decreased 50% of the permeability coefficient of 0.60, the decrease of 0.79 A / C can be attributed to the least amount of cementitious materials that facilitate the formation of empty spaces.

V. CONCLUSION

The ability of the fibers to reduce the formation of capillary bleeding within the concrete mixture, and also for the reasons that reduced the porosity with the presence of fibers in the concrete. It was also found by comparing the results with each other that the samples produced from concrete with smaller pressure resistance recorded lower values of permeability than their counterpart with higher resistance similar to what happened in the results of porosity and water absorption.

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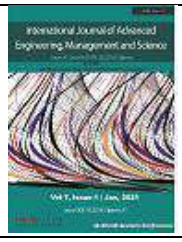
ISSN: 2454-1311 | Vol-8, Issue-8; Aug, 2022
Journal Home Page: https://ijaems.com/
Article DOI: https://dx.doi.org/10.22161/ijaems.88.2



Factors to Consider in Developing Student Academic Performance with Prediction using Technology Acceptance Method (TAM)

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Received: 31 Jul 2022; Received in revised form: 20 Aug 2022; Accepted: 25 Aug 2022; Available online: 31 Aug 2022

Abstract**—** *Adaptive Online Learning was one of the solutions of Higher Educational Institutions (HEIs) to have continuous education during pandemic. Innovative technological platform such as Learning Management System (LMS) served as a ground for compiling student requirements submission vital for identifying how well a student meets the standard course requirements. With the aid of predictive analytics included in LMS student can easily monitored their grades and submission, having a positive sign of inclusion to graduation on given time frame. While LMS was highly accepted in the Philippine Educational System, factors to consider in developing student academic performance with prediction was left unexplored. Thus, this study aimed to determine the software factors (trust, context, compatibility, security, complexity) and access method (devices used to access LMS, internet speed) significance to students' attitude towards using the system through modified TAM among college students at higher educational institutions. The results showed that performance usefulness was influence by perceived ease of use while behavioral intention to use also show significant influence to attitude towards using the system.*

Keywords**—** ***adaptive learning, student academic performance, predictive analytics.***

I. INTRODUCTION

Philippine Higher Education Institutions (HEIs) mandated the use of online learning to provide continuous learning during the time of Pandemic (Panergayo & Mansujeto, 2021), it uses technology such as google classroom, TV broadcasts, and learning management system (Tria, 2020) for the delivery and management of educational programs, it offers flexibility and interactivity (Wenceslao & Felisa, 2021). Adoption and Adaptation in Online Learning is measured through identifying both educators and students readiness, (Estira, 2020), through this method of escalation, Educational Institution is with Philippine Higher Educational Institution mission "no one should be left behind" (Ancheta & Ancheta, 2020).

The sudden shift of traditional face to face classes to digital learning impacted every student efficacy in learning and studying. Lopez (2021) and Magulod (2019) suggested in their study that school teachers or staff must present new strategies such as student monitoring system and suitable learning spaces to enhance student's potential and motivate student to engage in learning. Barrot (2021) and Tus (2021) showed in their study that to avoid mental health stress among students, consultation to classmates was made either by seeking for list of requirements to pass or assignment to made, consultation to teachers afterwards to identify which among requirements are already submitted or not yet done. Zheng (2017) suggest that eSchoolBag (an integrated intelligent teaching and learning platform) should contain an accountable learning performance portfolio which shows justification on student learning outcomes. Empaynado-Porto (2020) stated that infusion of technology to educational system should be done with respect to stakeholders' preferences such as software and hardware resources. Likewise Oluyinka(2019) believes that barriers in e-Learning such as technical resources should not be a hindrance in learning.

While several researches was done to identify adoption of e-Learning Technology in the Philippines (Garcia, 2017) (Empaynado-Porto, 2020) (Sepillo, 2020) (Bokolo, 2020) (Ferran, 2021) and its implication to student academic performance (Patimo, 2021) (Alipio, 2020) (Taculod, 2020) (Digal, 2019) with implementation of TAM (Amazona, 2019), factors to consider in developing student academic performance with prediction was understated. Hence, there is a need to investigate this emerging information system adoption to fully understand the users' attitude towards using the system. By doing so, it could help decision-makers to effectively design, develop, and adopt information system with predictions in educational institution concerned with ease of monitoring student academic progress for both students and professors.

To answer this research gap, this study aimed to investigate factors to consider in developing student academic performance with predictive analytics using Technology Acceptance Model (TAM) as lens, through a survey conducted among different college students in a higher education institution in the Philippines. Thus, this study is important not only to the researchers and practitioners in the Philippines but also in other developing countries worldwide.

Big data and data analytics in educational institution has the power to transform an institution strategically, in terms of (1) academic analytics, where student can track their progress, (2) enrollment analytics, (3) tracking online resources (Spear, 2019). There are seven (7) analytics that can be applied in education: (1) educational data mining, (2) intelligent curriculum and adaptive content, (3) Assisting management decisions, (4) adaptive learning, (5) innovation in pedagogical approaches, (6) providing learners resource relevant to profiling and learning, and (7) alternative to end course assessment (Junior, 2019).

The study of Adejo (2017) investigated learning analytics and its potential in higher education and suggest strategies how data mining can produce useful and informed decision making for administrator, educators and students. Likewise, Agasisti (2017) presented how traditional analytics can be transformed into analytics and classify it into three categories: (1) educational data mining, (2) learning analytics, and (3) academic analytics. Sohail (2018) presented learning analytics framework key performance indicators (KPI) in order to identifies strategic goals leading to educational process effectiveness. With different innovation in collecting data for decision making, Miller (2020) presented how learning analytics greatly innovate higher education K-12 institutions, as an evident, Orong (2020), uses predictive analytics to determine predictors student attrition in Philippines Higher Education Institution while Benablo (2018) also uses it to identify the effects of students inclination to social media and academic student performance among Filipino students.

Technology Acceptance Model (TAM) is the most widely used model to measure acceptance of various technology (Sprenger, 2021) (Alyoussef, 2021). The model was composed of six (6) distinct related constructs: perceived ease of use, performance usefulness, attitude towards system used, behavioral intention to use, external variables and actual system usage (Castro & Hernandez, 2019). Model adaptation was widely used to understand the influence and relationships among different factors such as human, behavior, innovation affecting individual use of technology (Lazim & .al, 2021) (Rafique, Almagrabi, Shamim, Fozia, & Bashir, 2019) (Guner & Acaturk, 2020). Figure 1 presents two essential factors including perceived ease of use and perceived usefulness which is influential to behavioral intention of users to actual system usage.

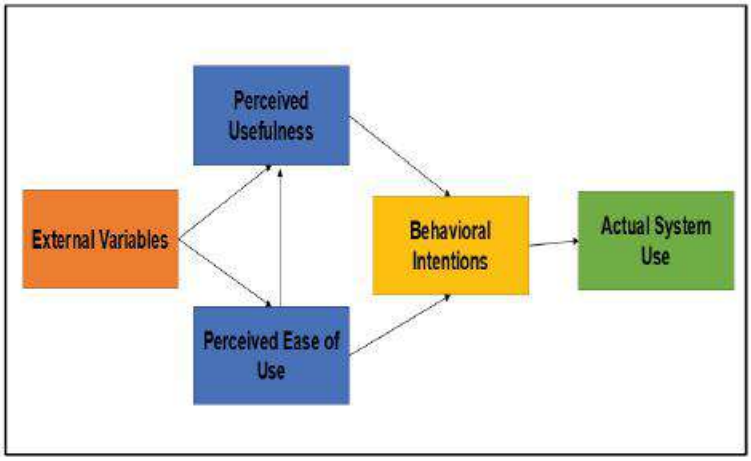

Fig.1. Technology Acceptance Model

Methodologies, presentation data analysis and its corresponding discussion and conclusion, and future directions are presented in the following section of this study.

II. METHODS

In this study, TAM was divided into four aspects: perceived ease of use, performance usefulness, behavioral intention to use and attitude towards system use, influences by software factors (trust, context, security, compatibility and complexity) and access factors (devices use, internet speed).

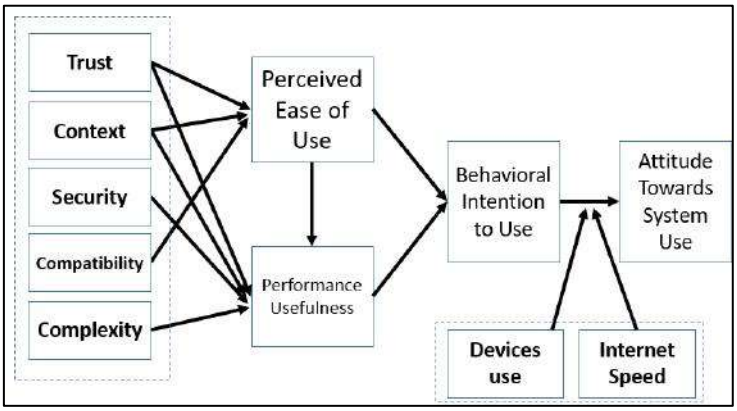

Fig.2. TAM model adapted from Granic (2019) with modification

The survey instrument employed in this study was constructs based on previous studies of Weng (2019), Amazona (2019) and Orong (2018) and adapted to the context of this study, items in the questionnaire were measured using a 5-point Likert type. To ensure validity of adapted questionnaire, the researcher presented it to IT experts who have experience in doing plug-in applications, educators who are currently using LMS, experts in research and statistics.

The researcher conducted the survey with the aid of google forms which lasted for two months in order to solicit high turnover of accomplished questionnaires. The questionnaire survey link was send through respondents Gmail, Facebook Messenger and Group Chats. Survey questionnaire was divided into four (4) parts: (1) Introduction, where purpose and importance of the study are stated, (2) data privacy statement, which discuss ethical consideration to data collected from respondents, to where it will be used and how disposal will be made after, (3) respondent demographic profile, and (4) technological acceptance model question.

For the analysis and interpretation of data, the following statistical tools were applied: (1) frequency distribution to identify respondents demographic profile (age, gender, device used in accessing LMS, internet speed and number of years using LMS. (2) reliability analysis to identify Cronbach Alpha of each variable used in the questionnaire (3) weighted mean to describes respondents profile and TAM variables in frequency basis. (4) Pearson r moment correlation to determine the relationships between variables, and (5) regression analysis was used to understand the relationship between dependent and independent variables (Table 1) . The study examines the relationship of devices used by stakeholders and its corresponding internet speed to perceived ease of use, perceived usefulness, attitude towards using and behavioral intention to use.

Table 1. Variables

Variables	Items
Devices Used	1
Internet Speed	1
Perceived Ease of Use (PEU)	4
Performance Usefulness (PU)	4
Behavioral Intention to Use (BI)	4
Attitude Toward System Use (ATU)	4

Trust	4
Context	4
Security	6
Compatibility	4
Complexity	5

The relationship examined to explore the coefficients and difference among variables presented in Table 1 are:

H1 *Trust has positive influence to perceived ease of use*
H2 *Context has positive influence to perceived ease of use*
H3 *Compatibility has positive influence to perceived ease of use*
H4 *Trust has positive influence to performance usefulness*
H5 *Context has positive influence to performance usefulness*
H6 *Security has positive influence to performance usefulness*
H7 *Complexity has positive influence to performance usefulness*
H8 *Perceived ease of use has positive influence to performance usefulness*
H9 *Perceived ease of use has positive influence to behavioral intention to use*
H10 *Performance usefulness has positive influence to behavioral intention to use*
H11 *Behavioral intention to use has positive influence to attitude towards system use*
H12 *Devices used affects attitude towards system use*
H13 *Internet speed affects attitude towards system use*

III. RESULTS AND DISCUSSION

This study involves two hundred seventy (275) respondents in higher educational institution in the Philippines. Table 2 presents the demographic profile of the students. The respondents are 115 female and 158 male, 2 of them prefer not to say their gender. The respondents have experience in using LMS with the aid of different devices available.

Table 2. Respondents Profile

		Frequency
Gender	Female	115
	Male	158
	Prefer not to say	2
	Total	**275**
Age	18 - 20 years old	101
	21 - 23 old	132
	21 - 23 years old	12
	24 - 26 years old	25
	27 - 30 years old	4
	above 30 years old	1
	Total	**275**
Number of Years using Moodle	1 year	40
	2 years	106
	3 years	44
	4 years	46
	5 years	39
	Total	**275**

		Frequency
Device Used in Accessing LMS	Laptop, Desktop	1
	Laptop, Desktop, Tablet	1
	Laptop, Desktop, Mobile	12
	Laptop, Desktop, Mobile,iPad	8
	Mobile	53
	Laptop, Mobile	83
	Laptop,iPad, Mobile	3
	Desktop, Mobile	27
	Desktop	15
	Laptop	57
	Laptop, Tablet, Mobile	9
	Tablet, Mobile	2
	Laptop, Desktop,iPad	4
	Total	**275**
Internet Speed	More than 50Mbps	16
	21-50Mbps	54
	11-20 Mbps	58
	6-10 Mbps	52
	1-5 Mbps	65
	Below 1Mbps	30
	Total	**275**

Descriptive statistics of variables used in the study was presented in Table 3. Most of the Devices used by the students are Laptop and Mobile (Table 1). Internet speed used mostly by the students is from 11-20 Mbps (Table 1). Item lists mostly got a value of 1 as minimum value (strongly disagree) and 5 (strongly agree) as maximum rating. Based on the result of mean score an interpretation of agree was obtained in the value of 3.50.

Table 3. Descriptive Statistics

Items	Variable	Min	Max	Mean
1	Device Used	1.0	20.0	11.72
2	Internet Speed	1.0	6.0	3.68
3	Performance Usefulness	1.0	5.0	3.85
4		1.0	5.0	3.79
5		1.0	5.0	3.67
6		1.0	5.0	4.13
7	Perceived Ease of Use	1.0	5.0	3.92
8		1.0	5.0	4.03
9		2.0	5.0	3.91
10		1.0	5.0	3.95
11	Attitude Towards System Use	2.0	5.0	4.03
12		1.0	5.0	3.90
13		2.0	5.0	3.96
14		2.0	5.0	4.04
15	Behavioral Intention to Use	1.0	5.0	3.90
16		2.0	5.0	3.92
17		1.0	5.0	3.72
18		1.0	5.0	4.08
19	Trust	2.0	5.0	3.99
20		1.0	5.0	4.11
21		2.0	5.0	4.20
22		1.0	5.0	4.14
23	Context	2.0	5.0	4.11
24		1.0	5.0	4.16
25		2.0	5.0	4.17
26		1.0	5.0	4.20
27	Security	1.0	5.0	3.79
28		1.0	5.0	3.99
29		1.0	5.0	3.99
30		1.0	5.0	3.67
31		2.0	5.0	3.98
32		1.0	5.0	3.94
33	Compatibility	1.0	5.0	3.97
34		1.0	5.0	3.98
35		1.0	5.0	3.89

36		2.0	5.0	4.01
37	Complexity	1.0	5.0	3.84
38		2.0	5.0	3.92
39		1.0	5.0	3.89
40		1.0	5.0	4.10
41		1.0	5.0	4.05

Cronbach's alpha (alpha reliability) and reliability test was applied to identify questionnaire consistency. Based on the results presented in Table 4, all the indicators had a higher coefficient value which denotes Cronbach's alpha is in acceptable range.

Table 4. Reliability Analysis Results

Variables	Cronbach's Alpha	Number of Items
Device Used	.974	1
Internet Speed	.959	1
Performance Usefulness 1	.955	4
Perceived Ease of Use	.955	4
Attitude Towards System Use	.954	4
Behavioral Intention to Use	.955	4
Trust	.955	4
Context	.954	4
Security	.955	6
Compatibility	.954	4
Complexity	.954	5

Table 5 presents the correlation matrix between the variables in the study. Result shows that based on the formulated hypothesis, majority relations tested positive influence effect with each other at the level 0.01 and 0.05 levels.

Table 5. Correlation Matrix

	PU	PEU	BI	ATSU	T	Co	S	Cm	Cp	DU	IS
Performance Usefulness (PU)	1										
Perceived Ease of Use (PEU)	.520**	1									
Behavioral Intention to Use (BI)	.515**	.446**	1								
Attitude Towards System Use (ATSU)	.449**	.495**	.583**	1							
Trust (T)	.505**	.411**	.588**	.578**	1						
Context (Co)	.443**	.404**	.575**	.674**	.631**	1					
Security (S)	.413**	.389**	.504**	.561**	.509**	.587**	1				
Compatibility (Cm)	.434**	.524**	.590**	.592**	.582**	.668**	.656**	1			
Complexity (Cx)	.470**	.429**	.559**	.558**	.515**	.629**	.552**	.604**	1		
Device Used (DU)	.104	.120*	.164**	.135*	.137*	.144*	.156**	.079	.129*	1	
Internet Speed (IS)	.204**	.097	.140*	.229**	.212**	.128*	.029	.036	.097	.041	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6 presents the regression analysis of the hypothesis of the study. As presented, the correlation results of trust, context, and compatibility showed high significant value of 0.00. The R^2 value of trust (32.90%), context

(36.6%), and compatibility (40.20%) with a p-value of 0.000 indicates that the selected software factors are fitted to perceived ease of use. Hence, hypothesis H1, H2, and H3 indicates that software factors such as trust, context and compatibility are highly influential to perceived ease of use.

Table 6. Multiple Regression Analysis of Trust, Context, Compatibility to Perceived Ease of Use

Model		Unstandardized Coefficients		Standardized Coefficients	t	R Square	p-value
		B	Std. Error	Beta			
Perceived Ease of Use	(Constant)	0.63	0.25		2.60		
	Trust	.021	.090	.020	.284	.329	0.00**
	Context	.066	.092	.061	.693	.366	0.00**
	Compatibility	.118	.086	.113	1.291	.402	0.00**

**means high significant at < 0.05 level

Regression Analysis of trust, context, security and complexity to performance usefulness is presented in Table 7. The result shows significant value of 0.00 indicating significance level of influences of trust, context, security and complexity to performance usefulness. The R^2 value of trust (27.00%), context (24.10%), security (30.10%) and complexity (30.30%) also indicates that the selected software factors are fitted to the performance usefulness and therefore necessary for the development of information system. Hence, H4, H5, H6 and H7 denotes positive influences the attitude of users in system use.

Table 7. Multiple Regression Analysis of Trust, Context, Security and Complexity to Performance Usefulness

Model		Unstandardized Coefficients		Standardized Coefficients	t	R square	p-Value
		B	Std. Error	Beta			
Performance Usefulness	(Constant)	1.234	.273		4.587		
	Trust	.167	.097	.148	1.722	.270	0.00**
	Context	.150	.100	.134	1.497	.241	0.00**
	Security	.111	.090	.099	1.123	.301	0.00**
	Complexity	.134	.090	.124	1.472	.303	0.00**

**means high significant at < 0.05 level

Table 8 present the regression analysis of perceived ease of use and performance usefulness. The R^2 value of 26.09% of performance usefulness and its p-value .0000 was less than .05, which reached significant level indicates that performance usefulness is influential to perceived ease of use. Same influential results was seen on the work of Weng (2019) and Orong (2018). With the given estimated parameters, hypothesis H8 denotes an influential significance.

Table 8. Regression Analysis of Perceived Ease of Use to Performance Usefulness

Model		Unstandardized Coefficients		Standardized Coefficients	t	R Square	p-Value
		B	Std. Error	Beta			
Perceived Ease of use	(Constant)	1.786	0.233		6.403		
	Performance Usefulness	.128	.080	.127	1.668	0.260977	0.00**

** means high significant at <0.05 level

Multiple regression analysis of performance usefulness and perceived ease of use to behavioral intention to use was presented in Table 9. Results shows that R^2 value of performance usefulness (29.9%) and perceived ease of use (37.79%) with a p-value of 0.000 with positive value of t value indicates significant influence level to behavioral intention to use. The result shows that perceived ease of use is most influential to performance usefulness. With the

given parameters, H9 and H10 denotes significance influence to the development of information system.

Table 9. Multiple Regression Analysis of Performance Usefulness and Perceived Ease of Use to Behavioral Intention to Use

Model		Unstandardized Coefficients		Standardized Coefficients	t	R Square	p-Value
		B	Std. Error	Beta			
Behavioral Intention to Use	(Constant)	1.370	0.242		5.735		
	Performance Usefulness	.147	.081	.153	1.924	.299	0.00**
	Perceived Ease of Use	0.18236	0.06481	0.19117274	3.102595	0.37796	0.00**

** means high significant at <0.05 level

Results in Table 10 shows that behavioral intention to use has R^2 value of 50.90% with a p-value of 0.00 which indicates significant influence to attitude towards system used. Hence, H11 denotes significance influence.

Table 10. Regression Analysis of Behavioral Intention to use and Attitude Towards System Use.

Model		Unstandardized Coefficients		Standardized Coefficients	t	R Square	p-Value
		B	Std. Error	Beta			
Attitude Towards System Used	(Constant)	0.890	0.190		4.630		
	Behavioral Intention to Use	0.197	0.063	0.205	3.108	0.509	0.00**

** means high significant at <0.05 level

Table 11 present the effects of device used and internet speed to attitude towards using the system. The R^2 value of device used value 11.00% was relatively small with a p-Value of .102 show negative effect. Internet speed R^2 value of 34.00% with a p-Value of 0.33 also shows negative effect. Hence, H12 and H13 does not show positive effect.

Table 11. Multiple Regression Analysis of Attitude Towards System use to Devices used and Internet Speed

Model		Unstandardized Coefficients		Standardized Coefficients	t	R Square	p-Value
		B	Std. Error	Beta			
Attitude Towards System Use	(Constant)	3.385	0.198		17.118		
	Device Used	0.022	0.014	0.097	1.638	.011	.102
	Internet Speed	0.091	0.031	0.173	2.929	.034	.033

** means high significant at <0.05 level

Table 12 display the summary of hypothesis testing conducted. The results shows that devices used and internet speed had no positive effect on attitude towards system used. The rest of the factors tested resulted in a positive effect on each other.

Table 12. Summary of Findings

	Hypothesis	**p-Value**	**Result**
H1	Trust has positive influence to perceived ease of use	0.00	Significant
H2	Context has positive influence to perceived ease of use	0.00	Significant
H3	Compatibility has positive influence to perceived ease of use	0.00	Significant

H4	Trust has positive influence to performance usefulness	0.00	Significant
H5	Context has positive influence to performance usefulness	0.00	Significant
H6	Security has positive influence to performance usefulness	0.00	Significant
H7	Complexity has positive influence to performance usefulness	0.00	Significant
H8	Perceived ease of use has positive influence to performance usefulness	0.00	Significant
H9	Perceived ease of use has positive influence to behavioral intention to use	0.00	Significant
H10	Performance usefulness has positive influence to behavioral intention to use	0.00	Significant
H11	Behavioral intention to use has positive influence to attitude towards system use	0.00	Significant
H12	Devices used affects attitude towards system use	0.12	Not Significant
H13	Internet speed affects attitude towards system use	0.33	Not Significant

This study involves user acceptance of student academic performance with predictions. The study confirms that H1, H2, H3, H4, H5, H6, H7, H8 ,H9, H10 and H11 have a significant positive influence on the attitude towards information system used. The result of this study was consistent to the prior study explaining the positive effects of perceived ease of use, performance usefulness, attitude towards system used and behavioral intention to use (Amazona,2019) (Orong, 2019) (Orong, 2018) (Weng, 2019).

While H12 and H13 do not have significant value to the acceptance of information system, this is with relevance to the function of LMS which runs on minimal specification of mobile devices (Empanaynado-Porto, 2020) but have contradictory findings to study of Garcia (2017). Thus, respondent thinks that any information system added on the LMS should be working when integration took place.

This study contributes to theory of providing the factors influential to the acceptance of information system with prediction in the context of developing countries. The study used technology acceptance model with other factors to understand the influence of access factors and software factors to the development of information system comprehensively. The study can be used for future investigation to widen understanding on the adoption of predictive analytics relevant to student academic learnings.

The findings of this study can assist educators in improving the teaching and learning activities which can results better progress for every student. Also, it can aid decision makers in developing guidelines and procedures to institutionalize educational planning, design and development of more educational technologies that broadly helps students to achieve their desired outcomes.

IV. CONCLUSION

This study presents the role of the essential factors affecting the user acceptance of student academic performance with predictions. The results shows that performance usefulness, perceived ease of use, behavioral intention to use, attitude towards systems used, trust, context, compatibility, security and complexity are significant to adoption of student academic performance with prediction. However, devices used and internet speed with association to attitude towards system use is insignificant. Hence, this study confirms the role of significance of the factors on the acceptance of student academic performance with predictions among students in higher educational institution.

With this study contributes to the investigation of the factors affecting the adoption of information system with predictions, limitations that needs further study are recommended. This work only used TAM as a lens to understand user acceptance, future work may include framework development concerned with identifying software quality and its effectiveness. Also, this study is conducted only to assess acceptance within higher education. Hence, this work is not generalized to the context of Philippine educational system, and results might not be applicable due to differences in context, culture and IT infrastructure.

V. FUTURE DIRECTIONS

Based on the research results and conclusions, the following are proposed suggestions:

The results indicates that identification of external factors would be a great help in predicting what should be included

in building the student academic performance predictive analytics information system. Stakeholders' attitude towards using the developed system should not rely to the advancement of technology in creation but rather cater the minimum technology specification, this enable usage equity. Considering the differences of resources and capability of teachers and students, their insights and knowledge to what context, compatibility and complexity could be a great help for higher number of system usage. Quality software can be achieved through considering teacher and students as part of the development team in creating the system.

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