MULTIMEDIA-INFLUENCE-ACHIEVEMENT MODEL (MIAM): PROPOSED NEW MODEL AS PREDICTIVE DETERMINANT OF ACADEMIC ACHIEVEMENT

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Abstract. The recent outbreak of the COVID-19 pandemic has led to an increasing demand for new technologies to transmit learning content and facilitate student learning. This article aimed at presenting a new technology adoption model that examines the influence of multimedia exposure on learning motivation, and eventual student academic achievement. The current study focus propels the application of multimedia in education to facilitate students' academic achievement. Using a sample of 354 students drawn from some secondary schools in Yaounde, data was collected through a questionnaire and analyzed using Structural Equation Modeling (SEM). The proposed new Multimedia-Influence-Achievement Model (MIAM) was tested and validated using SmartPLS 3.2.8 software. The analysis showed high factor loadings related to all the items indicating goodness of fit. The results showed that all six hypotheses expressed by the structural model were supported by the data. Multimedia exposure had a significant positive relationship with multimedia self-efficacy, attitude toward multimedia and learning motivation. Multimedia self-efficacy and attitude toward multimedia equally have significant positive relationship with learning motivation. Furthermore, the results proposed that learning motivation is a predictive determinant of student's academic achievement. In light of the above results, identification of facilitating conditions is a prerequisite to introduction of multimedia technology in the teaching and learning process.

Keywords: Multimedia, Acceptance model, Attitude, Achievement, Learning motivation

INTRODUCTION

Advancement in multimedia technology has brought modification in teaching methods and learning styles: traditional classrooms giving way to modern classrooms, physical classrooms given way to virtual classrooms, chalkboards giving way to electronic interactive boards, teacher centered environment giving way to student centered environment, introverts giving way to extroverts and collaborative activities encouraged. The multiplicity and flexibility of multimedia in education offers possibilities for new practices, which can foster better teaching and improved student academic achievement. The changing nature of technology is also creating a change in the category of technology users. From observation, single school community in developing countries can be identified with "digital savvy", "digital acquaintance" and "digital alien". The digital savvies have a good mastery and can demonstrate competency and practical knowledge in the application of the digital technologies. The digital acquaintance group is made of individuals exposed to the digital technologies but have little mastery of the functionalities of the digital technologies. On the other hand, the digital alien group is categorized as those digital natives and digital immigrants who have no mastery of the digital technologies, perhaps, because of ignorance and little or no access to digital technologies.

Many attempts have been made to assess the factors that influence an individual's urge to use a particular technology such as multimedia to facilitate the attainment of a specific educational objective. This has prompted the development of several research models. The Technology Acceptance Model (TAM) of Davis (1989), seen as an extension of the Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975), suggests that "Perceived Usefulness" and "Perceived Ease-of-Use" are key factors that will influence an individual decision on the use of a new technology. Using the TRA, Alsadoon (2018) established that faculty knowledge and experience of web applications and faculty perception of the usefulness of such applications were significant predictors of faculty intention to use web applications in teaching. The Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al (2003) integrates elements across eight other models and was found to outperform its spin-offs. In the application of TAM and UTAUT in his study, Mamdani (2019) found that there is a significant relationship between technology and generations, and concludes that each generation has its tendency to use the technologies of its age because that generation is more dominant over the technology of that age. Rogers (1995) Diffusion of Innovation Theory (DOI) examines how individuals and groups make decision on the adoption of an innovation. According to İşman, A. (2018) diffusion of innovation is a process of spreading an innovation over a social system using certain communication channels. The Theory of Planned Behavior (TPB) suggests that individuals make rational choices to engage (or not

engage) in the behavior of interest (Ajzen, 1991). The models invoked in this section have been used to explain the adoption and use of technology in different ways. These models all support the constructivist pedagogy, promotes student centered environment.

The advent of the new technologies has kept students enthusiastically involved in their studies in school, at home and any other calmed avenue they find themselves. Constructivist pedagogy is based on the assumption that learning occurs as learners are actively involved in the process of constructing their own knowledge. According to Neo et al (2007), this mode of learning is considered as a student-centered instructional model where students determine their own learning needs, set their own goals, monitor their own progress and determine how to reach the desired learning outcomes. Topolovčan and Matijević (2016) are of the opinion that the didactic strategies of constructivist learning are inquiry-based learning, problem-based learning, cooperative learning, play-based learning, learning by doing, and project-based learning.

The Multimedia-Influence-Achievement Model (MIAM) presented is an individualized model developed and related specifically to an educational context. It takes into consideration technocentric processes, with orientation toward mathetics processes. It supports the constructivist pedagogy of student-centered environment.

The rest of this paper is organized as follows: examination of literature on concepts of the model; presentation of hypotheses of the study; methodology, results, discussions, implications and conclusion.

RELATED LITERATURE REVIEW ON CONCEPTS OF THE MODEL

This section discusses concepts of the model. Each concept is examined and supported by previous research endeavors.

Multimedia exposure

According to Kingsley and Boone (2008), exposure to multimedia software has the potential to yield small but significant positive effects on student. Willington (2001) affirms that multimedia provides access to large quantities of information, give learners the power to explore and manipulate information, and enable individuals to construct their own "knowledge base". According to Martin and Klein (2008), the use of multimedia-based educational program is getting more popular in many areas of learning and training as it stimulates new ways in information delivery with the concerns of accessibility, reusability and individualization to fulfill the needs of different types of learners. Ulusoy (2011) points out that the multimedia learning environment provides an artistic interaction between the student and the lesson content." As reported by Santos et al. (2019), ICT literacy of students has a predominant influence on performance.

Student's multimedia self-efficacy

Technology acceptance theories and models aim to convey the concept of how users may understand and accept the new technology and how they may use it (Momani and Jasmous, 2017). Some authors (Venkatesh et al. 2003; Gu, Zhu, and Guo, 2013) have used Personal factor as an important determinant of individual attitude, perception and the desire to achieve a desired goal by operationalizing it to self-efficacy and personal innovativeness. Buabeng-Andoh (2012) clarifies that "self-efficacy is the confidence that an individual has in their ability to do the things that they strive to do". According to Marić, & Sakač, (2014) Self-efficacy theory suggests that an individuals' perceived capability for learning is a dominant factor which contributes to motivation for learning. They see students' perceived interest in content, perception of the usefulness of content for their personal development and internal satisfaction as personal factors, which are positive predictors of academic success.

Student's attitude toward multimedia

According to the Theory of Reasoned Action (TRA), attitude is the first determinant of individual intention to act. Myers (2010) posits that attitudes are feelings, often influenced by our beliefs that predispose our reactions to objects, people, and events. To Myers, our attitudes often predict our behavior. According to Abdullah et al (2015), students will show positive attitudes toward Information Technology due to exposure. In a study on students' attitudes toward multimedia, Ulusoy (2011) reports that students find usage of multimedia in lesson beneficial. Guillén-Gamez (2020) note that the teaching staff has the responsibility to train students in the digital technologies. However, the staff have an average

attitude towards the use of ICT, which conditions to a large extent the use they make of the ICT in the teaching learning process. They further note that the average attitude conditions hinder innovation in the teaching learning process.

Student's learning motivation and Academic achievement

Learning motivation is a form of cognitive and emotional arousal resulting from interaction between learners' characteristics and their surrounding environmental factors. Extrinsic and intrinsic motivation are two essential constructs of learning motivation (Zheng, Li and Zheng, 2017). As direct experience with technology increases over time, individuals have a better assessment of the benefits and costs associated with using that technology. TAM posits that perceived usefulness is the strongest predictor of an individual's intention to use an information technology (Olushola and Abiola 2017). The degree of need determines the perceived usefulness. Leow and Neo (2014) also emphasize that learning attitudes will change as the students realize that learning with multimedia elements was more flexible in exploring and constructing new knowledge. York, Gibson and Rankin (2015) define academic achievement as the attainment of learning objectives and acquiring desired skills and competencies. Senko (2016) clarifies that students' achievement goals represent their broad purpose or reason for engaging in a learning task. Wigfield and Cambria (2010) also note that Students' achievement task values, goal orientations, and interests are motivation-related constructs which concern students' purposes and reasons for doing achievement activities. Mbah (2010) notes that technologies facilitate information access, enhance study/reading habits, accelerate academic success by making information easily available and improve managerial and professional skills. Unal-Colak and Ozan (2012) are of the same view that multimedia is important in that it facilitates learning by using different communication and information channels. Riswanto and Aryani (2017) report that learning motivation has a significant correlation with students' academic achievement. They add that motivation that focuses on academics determines student achievement. In their study they found a high correlation of $r = 0.79$ between learning motivation and achievement of students in Microeconomics.

HYPOTHESIS DEVELOPMENT

This study was supported by the following hypotheses:

- There is a positive relationship between multimedia exposure and student's multimedia self-efficacy.
- There is a positive relationship between multimedia exposure and student's attitude toward multimedia.
- There is a positive relationship between multimedia exposure and student's learning motivation.
- There is a positive relationship between attitude toward multimedia and student's learning motivation.
- There is a positive relationship between multimedia self-efficacy and student's learning motivation.
- There is a positive relationship between learning motivation and student's academic achievement.

Conceptual model

To assess the influence of multimedia on academic achievement, using PLS-SEM, a conceptual model was necessary. This model consisted of constructs (latent variables) and their measurable manifest variables. The five latent variables in this study named as Multimedia Exposure (MEx), Attitude toward Multimedia (ATM), Multimedia Self-efficacy (MSE), Learning Motivation (LM) and Academic Achievement (AA) are explained by 16 manifest variables (see figure 2). The hypothesized relationship between the latent variables is shown on figure 1 below.

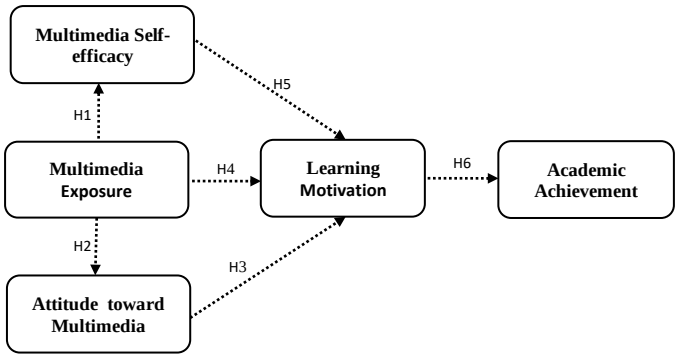

Figure 1. Model Concepts and Hypothesized relationships

METHODOLOGY

The target population of this study consisted of students in 4 secondary schools in Yaounde, where there is a well-developed multimedia infrastructure, and using multimedia is an explicit policy of the school. Data was collected from the research participants through questionnaire survey. Descriptive and inferential statistics followed relevant analysis and interpretation. Structural equation modeling (SEM) was adopted for inferential analysis. The validation of the proposed structural model was achieved using SmartPLS 3.2.8. The measurement model was first examined and later, the structural model was assessed.

Sample

The participating schools were purposely selected. A sample of 385 research participants was drawn from four classes in the participating schools. After data screening, a sample of 354 participants was retained. The choice of the classes was based on characteristics such as their maturity, ability to evoke and verbalize information, perceive and express their opinion on how multimedia is affecting learning in the classroom and other learning settings. This sample was made up of students in the fourth, fifth, sixth and seventh year of secondary school, corresponding respectively to 14, 15, 16 and 17 year-old students. Table 1 below shows characteristics of the sample.

Table 1. Characteristic of the sample.

DEMOGRAPHIC VARIABLES	N	%
Gender		
Male	177	50%
Female	177	50%
Total	**354**	**100%**
Age range (years)		
13-14	54	15,3%
15-16	174	49,2%
17+	126	35,6%
Total	**354**	**100%**

It can be seen from table 1 that the sample consisted of 50% males and 50% females. Out of the 354 respondents, the most represented age range is 15-16 year-old (49.2%), followed by 17+ years (35.6%). The least represented age range is 13-14 year-old (15.3%).

Instrument

The instrument used in the present survey was a questionnaire. The researchers developed some of the items and others adapted from previous studies. The constructs were measured with 16 items. Assessment of the variables was done through a 5-point Likert scale, with scores ranging from 1 (strongly disagreed) to 5 (strongly agreed). Evaluation of the constructs was done using the following factors after data screening:

- *Academic achievement (AA)* construct was evaluated using 3 factors, AA5: I have been able to solve most of my academic problems through the use of multimedia; AA6: My test marks have

improved because I use multimedia; AA7: I will have more improved results if I continue using multimedia

- *Learning motivation (LM)* construct was evaluated with 3 factors, LM5: Multimedia helps me understand most subjects; LM6: Multimedia gives quick access to my academic work and LM7: Using multimedia motivates me to learn. Items adapted from Neo, et al (2015).
- *Multimedia exposure (MEx)* construct was evaluated using 4 factors, MEx1: Most of my teachers use computers and Internet to teach; MEx2: My family members use multimedia at home; MEx4: I have access to the computer and Internet all the times and MEx6: I started using computers and Internet in my early years of primary (elementary) school.
- *Attitude toward multimedia (ATM)* construct was evaluated using 3 factors, AT2: In the absence of a teacher, I can learn a lot using multimedia; AT3: Multimedia have helped to improve my interest in learning and AT4: I like multimedia because today's students have wider knowledge because of the presence of multimedia. Items adapted from Mehra and Far (2013).
- *Multimedia Self-efficacy (MSE)* construct was evaluated using 3 factors, SE3: Using multimedia, I am always confident to do my assignments; SE4 I am very good in using multimedia for my studies and SE8, I will like to use multimedia always for my studies Items adapted from Gu, Guo (2013).

Reliability and validity of instrument

Initially, each construct had at least 5 factors to assess it. After data screening, only the most credible factors were used to assess the model. Cronbach Alpha was used to estimate the reliability of the instrument. The overall instrument had a Cronbach Alpha of 0.87. The Cronbach Apha values for the constructs were as follows: AA (α = 86), LM (α =86), MEx (α =89), ATM (α =86), and MSE (α =86). Further confirmatory analysis of reliability was assured through examination of composite reliability (CR). The composite reliabilities (see Table 4) of the constructs were above the cutoff point of 0.6 recommended by Gason, (2016) and Hair et al, (2017). The convergent validity was evaluated based on three criteria (1) all indicator factor loadings should be significant and exceed 0.7; (2) composite reliabilities should exceed 0.70; and (3) the average variance extracted (AVE) by each construct should be greater than the variance due to measurement error (AVE > 0.50). This is confirmed on Table 4 except for the MSE construct, where the AVE is below the threshold limit of 0.5.

RESULTS

The results are based on descriptive statistics and the evaluation of the model using PLS-SEM with SmartPLS version 3.2.8 software. Firstly, there is presentation of descriptive statistics. Secondly, there is an assessment of the measurement model (outer model). Thirdly, there is an assessment of the structural model (inner model). This evaluation enabled us to determine the validity and reliability of the measurement instrument.

Presentation of descriptive analysis

The following section presents the results of the descriptive data. Information on how students got exposure to multimedia is necessary to understand other parameters of the study.

Table 2. Descriptive statistics associated with multimedia exposure.

DEMOGRAPHIC VARIABLES	N	%
Where student started using multimedia		
At home	261	73.7%
At school	67	18.9%
At cybercafé	23	6.5%
At computer training center	3	0.8%
Total	**354**	**100%**
Where student has access to multimedia most of the times		
At home	59	16.7%
At school	254	71.8%
At cybercafé	33	9.3%
At computer training center	8	2.3%
Total	**354**	**100%**

When asked about their first-time exposure to multimedia, majority (73.7%) of the respondents revealed that their first contact with multimedia was at home. This is followed by 18.9% who reported that they first started using multimedia in school. Out of the 354 respondents, 23 (6.5%) reported that they started using multimedia at the cybercafé. An insignificant number (0.8%) indicated that they started using multimedia at computer training center.

To find out where students have access to multimedia most of the times, majority (71.8%) reported that this happens when they are in school. This is followed by 16.7% who indicated that they have more access to multimedia when they are at home. The statistics also revealed that 9.3% of the students have more access to multimedia at cybercafé while an insignificant number of students (2.3%) have more access to multimedia when at the computer training center.

Presentation of inferential analysis

The proposed model was assessed using Structural Equation Modeling (SEM) with Smart-PLS 3.2.7. A two-staged analytical process recommended by Anderson and Gerbing (1988) was used to assess the measurement and structural model. The assessment of the model in the sections below.

Measurement model assessment

There are two types of validity involved in the assessment of the measurement model: convergent and discriminant validity. Convergent validity includes manifest variable loadings, composite reliability (CR), and average variance extracted (AVE). The outer model also known as the measurement model estimations include the loadings onto the latent variables, with individual item reliability being assessed by examining the loadings. In this study, loadings of the factors were run several times to eliminate non-qualified indicator variables. For an indicator variable to qualify for inclusion, Hair et al. (2011) state that loadings higher than 0.5 are recommended. Within this study, the factor loadings revealed support for convergent validity. The factor loadings range from 0.566 to 0.918, with most loadings exceeding 0.70. All construct factor loadings exceeded the 0.50 cut-off point, giving reasons to conclude that the measures have convergent validity. The constructs were found to have adequate convergent validity based on their high composite reliability (> 0.70).

Discriminant validity explains the differences that exist in the manifest variable of one construct and that of other constructs in the model. This is observed where the cross loadings in the cross-loading value of the latent variable being greater than in other latent variables. In assessing discriminant validity, it is assumed that all the items should have higher loading on their corresponding construct than the cross loadings on the other constructs in the model. In this regard, the square root of AVE for all factors should be greater than all the correlations between that construct and other constructs (Kock, 2012). The values on the diagonal of table 3 are greater than the correlation with other constructs indicating that discriminant validity of the model was assured.

Table 3. Fornell-Larcker criterion test for discriminant validity.

CONSTRUCT	AA	ATM	LM	MEx	MSE
AA	**0.727**				
ATM	0.311	**0.748**			
LM	0.372	0.379	**0.757**		
MEx	0.414	0.414	0.414	**0.789**	
MSE	0.383	0.249	0.542	0.404	0.675

The outer model ensures the reliability of the indicator variables included. In addition to the factor loadings, composite reliability (CR) and average variance extracted (AVE) are used to assess the reliability of the model. It is recommended that composite reliability for each construct should exceed 0.70. The reliability of a construct is calculated by taking into account the correlation(s) among its underlying factors/constructs. If composite reliability value for an indicator is 0.7 (Nunnally, 1978), then that model has appropriate internal reliability. In the present study, the composite reliability lies between 0.72 and 0.87, indicating that the model meets appropriate internal reliability. The Average variance extracted (AVE) for each construct should be above the recommended cut-off 0.50 (Fornell and Larker, 1981). Most of the AVE values are observed to be above the 0.50 acceptable limit except multimedia self-efficacy with a value of 0.455. Table 4 below indicates values for indicator loadings, AVE and CR.

The assessment of discriminant validity was done using Fornell and Larker (1981). This explains the differences that exist between one construct and another.

Table 4. Validity and reliability test of the outer model.

LATENT VARIABLES	TYPE	INDICATORS	LOADINGS	AVE	CR
Academic Achievement (AA)	Reflective	AA5	0.682	0.528	0.770
		AA6	0.773		
		AA7	0.724		
Learning Motivation (LM)	Reflective	LM5	0.714	0.573	**0.801**
		LM6	0.786		
		LM7	0.769		
Multimedia Exposure (MEx)	Reflective	MEx1	0.918	0.623	0.867
		MEx2	0.763		
		MEx4	0.784		
		MEx6	0.671		
Attitude Toward Multimedia (ATM)	Reflective	AT2	0.658	0.560	0.790
		AT3	0.852		
		AT4	0.721		
Multimedia Self-efficacy (MSE)	Reflective	SE3	0.689	0.455	0.712
		SE4	0.755		
		SE8	0.566		

Structural model assessment

The inner model also known as the structural model represents the link between constructs. The regression coefficients (β) and R2 values are used to estimate the inner model. The relationships of the hypothesized model were examined based on the following criteria:

1) assessing path coefficients (β);
2) assessing path significant (p-value); and
3) variance explain (R2 values).

Observations of the path coefficient (β) from the inner model (figure 2) suggest that MEx has the strongest effect on ATM (0.412). This is followed by MEx (0.404) and MSE. The lowest effect (0.156) is observed in the relationship between MEx and LM. It is also observed from the inner model that the strongest effect on LM (0.428) is from MSE. This is followed by MSE (0.206) and LM. A positive relationship is observed between LM and AA. It is observed from the path coefficient that all the relationships are positive. The combined effect of LM, ATM, MSE and MEx play a great role in determining academic achievement.

In the current study, the p-values for the six variables fall below the threshold of 0.05, hence all are significant and supported. The R2 measure for MSE is 0.163. This means that the structural model explains 16.3 percent of the total variance in multimedia self-efficacy. The R2 measure for ATM is 0.172. This also means that the structural model explains 17.2 percent of the total variance in attitude. The R2 measure for LM is 0.375. This means that the structural model explains 37.5 percent of the total variance in learning motivation. R2 measure for AA is 0.138. This means that the structural model explains 13.8 percent of the total variance in academic achievement.

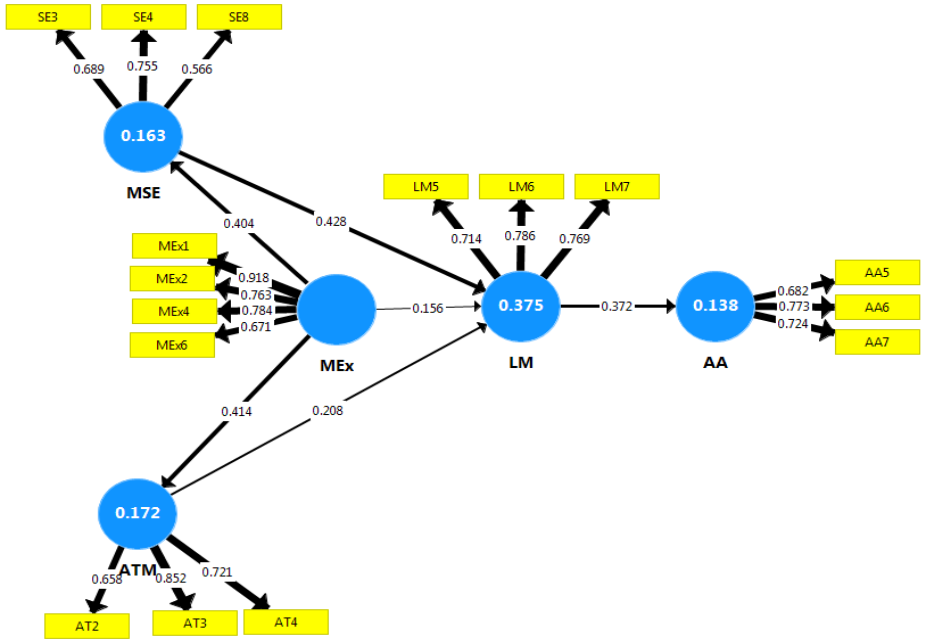

Figure 2. PLS-SEM Path Analysis

Hypothesis testing

Table 4 presents T-statistics, path coefficients and P-values. All the relationships (path coefficients) were found to be positive and significant with T-statistics, greater than the minimum limit of 1.96, hence supported. It can be observed from the table that all the hypothesized relationships were supported at $p < 0.05$. The strongest influence is observed in the hypothesized path between MSE and LM ($\beta = 0.428$) while the weakest influence is observed in the relationship between MEx and LM ($\beta = 0.156$). It is worth noting that all the relationship paths were positive.

Table 5. Structural model results.

HYPOTESIZED PATH	T-STATISTIC	PATH COEFFICIENT (β)	P VALUE	SUPPORTED?	REASON
ATM -> LM	4.250	0.208	0.000	Supported	P < 0.05
LM -> AA	7.466	0.372	0.000	Supported	P < 0.05
MEx -> ATM	8.038	0.414	0.000	Supported	P < 0.05
MEx -> LM	3.035	0.156	0.003	Supported	P < 0.05
MEx -> MSE	8.063	0.404	0.000	Supported	P < 0.05
MSE -> LM	9.380	0.428	0.000	Supported	P < 0.05

DISCUSSIONS

Prominent in the literature on the use and adoption of technology are TAM and UTAUT. These theories have been used to predict academic achievement in previous research studies (Alalwan et al 2019, Amadu et al 2018, Zheng, Li & Zheng 2017, Attuquayefio & Addo, 2014). According to Zheng, Li and Zheng (2017) few studies in the literature have explored the direct relationship between TAM factors and academic performance. Studies using UTAUT focus on the acceptance and use of technology in teaching and learning but do not demonstrate how UTAUT can be used to measure academic achievement. However, each of the few studies using TAM and UTAUT found strong evident for using technology to enhance the teaching and learning process. Both TAM and UTAUT emphasize on the consumption of technology and lay little or no emphasis on the consequences of consuming the technology. The proposed new MIAM, TAM and UTAUT are behavioral models with similarities and differences. While MIAM is more specific to education, TAM and UTAUT are generic models.

The MIAM model enlightens us on the understanding that some influential factors (exposure, attitude, self-efficacy and learning motivation) are facilitating conditions that will predict the use of

multimedia technology for academic achievement. MIAM identifies new constructs in the adoption and use of technology. A prerequisite to the appropriate adoption and use of technology lean on the understanding of the influential factors.

Association between MEx, and (MSE, ATM, LM)

Observation of the path coefficient (0.404) and p-value (P<0.05) between MEx and MSE showed a significant positive relationship between the two variables. The more students get exposed to multimedia technology, the more they develop self-efficacy. Students who are exposed to multimedia both at home and in school are likely to be efficiency in the use of multimedia than those who use them only in school. Similarly, students frequently exposed to multimedia technology are more likely to develop a positive attitude toward multimedia, hence the path coefficient (0.414) between MEx and ATM showed a positive and significant (P<0.05) relationship. Exposure to multimedia technology is a predictive determinant of students' attitude toward multimedia and multimedia self-efficacy. The path coefficient between MEx and LM is 0.156 (P<0.05), which is positive and significant. The more students get exposed to multimedia technology, the more they get motivated to learn.

It is demonstrated in the present study that exposure is a necessary determinant of self-efficacy, attitude and learning motivation.

Association between ATM and LM

The path coefficient between ATM and LM is 0.208 (P<0.05), which is positive and significant. This shows that students who develop positive attitudes towards the use of multimedia are more motivated in learning using the technology. Such students understand that multimedia will facilitate the acquisition of knowledge through various channels (auditory, visual and audio visual). Usun (2002:65) holds the opinion that it is important to determine student attitudes on the use of computers, because student attitudes have contributed to our understanding of why computers have enhanced achievement, performance and motivation. Ulusoy adds that when students use technology, there is a positive increase in students' attitude towards lesson.

Association between MSE, and LM

In the association between LM and MSE, it is noted that the most predictive factor in determing LM is MSE. The path coefficient (0.428) is found to be positive and significant (P <0.05). This could be explained by the fact that student with good skills in the use of multimedia technology are likely more advanced in searching and resolving problems related to their learning needs. The personal belief about individual capabilities to use a device enable them to a attain a defined level of performance. They can manipulate the device and easily rearch solutions to their academic problems. Their learning motivation is propel by their ability to effectively use multimedia for learning. Zheng, Li and Zheng (2017) had presented similar results in their study. Students with high self-efficacy are more likely to demonstrate assured self-confident and high level of performance on a task. Self-efficacy plays an important role in predicting academic performance of students in multimedia learning settings.

Association between LM and AA

The correlation between LM and AA 0.372 (P < 0.05). This shows a significant positive relationship between the two variables. When students perceive that multimedia technology is a more facilitating condition for their academic achievement, they will develop positive attitude towards adopting the technology. It was revealed in this study that students motivated to perceive multimedia as useful for learning find their academic achievement improving. Duker, et al (2018) in their study reported that computer gives students lots of information to understand certain topics better and hence improve their academic achievement. Students with high learning motivation are more likely to have better academic performance. Riswanto and Aryani (2017) also report that there is a significant correlation between learning motivation and students' academic achievement. Motivation that focuses on academics determines student achievement.

The Multimedia-Influence-Achievement Model (MIAM)

This model is proposed to examine multimedia-related influence on academic achievement. In this paper, we examined the influence of multimedia on learning motivation, which in turn determines academic achievement. Figure 3 below presents the proposed new MIAM. The model illustrates intensity

of the relationship between constructs examined in the study. Based on the results of the study, thicker arrows show that a strong influence is likely going to exist between the two constructs. From the diagram we can identify three types of relationships existing here. We have the first category of factors that will trigger high tendency to use multimedia for academic achievement (MEx □ ATM), (MEx□ MSE), (MSE□ LM), and (LM□ AA); the second category of factors cause a moderate affinity for using multimedia for academic achievement (ATM□ LM); a third category of factors observed in the results will cause a low affinity for using multimedia for academic achievement (MEx□ LM).

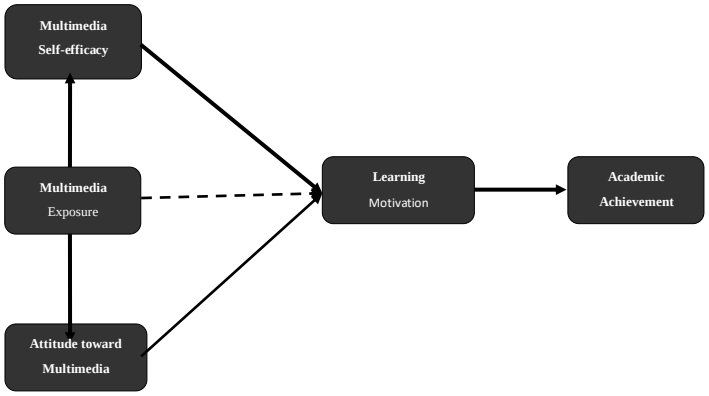

Figure 3. The proposed new model (MIAM)

CONCLUSION AND IMPLICATIONS

The main goal of this study was to establish a relationship between factors influencing student's academic achievement. A proposed new model, (MIAM) was developed. This paper presents MIAM as a predictive determinant of the relevance of multimedia in the classroom to improve information acquisition and hence academic achievement. It emerged from the study that Multimedia Self-efficacy, Multimedia Exposure and Attitude toward Multimedia have a strong relationship with Learning Motivation. The strongest relationship is observed between Multimedia Self-efficacy and Learning Motivation. It follows that Multimedia Exposure has a strong relationship with Attitude toward multimedia and Multimedia Self-efficacy. The results conclude that Learning Motivation has a significant influence on academic achievement. These findings suggest that introducing multimedia in teaching and learning, without paying attention to students' attitude toward multimedia, and student's self-efficacy could lead to less rewarding outcomes (academic achievement). The model brings us to the understanding that student use of multimedia is a predictive determinant of academic achievement. It is evident from the results that experience with multimedia technology would be effective at increasing student academic achievement. In the recent years schools and individual have been making huge investment to bring information technology closer to staff and students. Investment in multimedia technology may not lead to satisfying outcomes if schools do not scale and prioritize factors that will make students develop intention to use the technology.

This paper makes an empirical contribution to the literature on the adoption of educational technology. It focuses on the technological and pedagogical processes that would predict academic achievement. This study contributes in the identification of facilitating conditions for the adoption of multimedia technology to predict academic achievement. Studies involving the use of structural equation modeling in education are limited and this study makes a significant contribution in the area. For multimedia to have an impact on students' achievement, schools should put in place multimedia equipment and follow up for practice. Technological innovation entails a huge investment. Motivation for their use should be encouraged to attain the desired goals of the institution. Engaging students to work with multimedia is motivating and has the capability to promote learner-centered classroom environment.

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