Multimedia Learning Based Classroom Enhancing Pre-Service Students' Learning & Teachers' Performance

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المستخلص:

تهدف هذه الدراسة إلى استخدام الوسائط المتعددة في التعلم بالاعتماد على الفصول الدراسية بنحو مثير للاهتمام، ومن السهل أن ُتفهم من قبل الطلاب وتعمل على تبسيط الوقت للمعلمين في استحضار المواد التعليمية كما تساهم في حدوث عملية التعلم في أي مكان واي زمان عبر الانترنت. ان الهدف الرئيسي من هذه الدراسة هو تحسين أداء تعلم الطلاب اعتمادًا على تقنيات الوسائط المتعددة المتدفقة (SSAV وSLAV وIAV). وقد بلغ حجم العينة ثلاثمائة وعشرون (٣٢٠) ممن شاركوا في هذه الدراسة والذين تم اختيارهم بطريقة العينة العشوائية. وتعرض هذه الدراسة علاقات محددة بين تدفق الوسائط السمعية / البصرية (SSAV)، البث المباشر للوسائط السمعية / البصرية (SLAV) ووسيطة الصوت التفاعلي / فيديو (IAV). ومن اجل تفسير النتائج تم إنشاء نموذجاً لاختبارها وتفسيرها، والذي يشرح العلاقات الإيجابية بين SSAV وSLAV وIAV في تعزيز التعلم. وذلك باستخدام برنامج AMOS 18 (تحليل الهياكل) لتحليل البيانات واستخلاص النتائج، ووفقاً لعامل الارتباط الجيد لهذا النموذج فقد تم الحصول على نتائج لهذه الدراسة بنسب متفاوتة لكل تدفق وهي ٨٩٪ من SSAV، ٨٨٪ من AV الإنترنت، ٧٧٪ من IAV و٩٠٪ من SLAV، كما تشير نتائج هذه الدراسة إلى أن جميع الفرضيات مقبولة وأن الفرضية H1 هي فرضية أقوى من غيرها من الفرضيات HYPOTHESES.

Abstract:

This study aims to use multimedia learning based classroom that is interesting, easy to understand by students and streamline the time of teachers in bringing the teaching materials as well as feasible to be used in learning anywhere and anytime via online. The main objective of this study is to enhance students' learning performance depending on streaming multimedia techniques (SSAV, SLAV and IAV). The participants are three hundred and twenty (320) who have participated in this study. Specific relationships between streaming stored audio / video (SSAV), streaming live audio / video (SLAV) and interactive audio / video (IAV) are presented. A model, which explains the positive relationships between SSAV, SLAV and IAV on learning, is established and tested. Using AMOS 18 (Analysis of Moment Structures) program, it explains 89% of SSAV, 88% of Internet AV, 77% of IAV and 90% of SLAV, with good model fit. The findings indicate that all hypotheses are accepted and H1 is stronger than other HYPOTHESES.

Keywords—Internet Audio / Video, Streaming stored audio / video (SSAV), Streaming live audio / video (SLAV), Interactive audio / video (IAV)

1. INTRODUCTION

One of rapid development of technology is that utilizing of multimedia in learning [55]. The development of multimedia technology unlocks great potential in changing ways of learning and obtaining information [56]. The development of multimedia has opened the opportunity for teachers to develop the learning system in order to get optimal results. Similarly for pre-service students' learning, with multimedia learning will be easier to determine in what way and how to absorb the information delivered quickly and efficiently.

Multimedia systems should allow teachers and students (and also parents and administrators) to share worldwide experience and use the best possible teaching materials in each case. The goal should not be to suppress schools and teachers. Students should still continue to attend classes, listen to their teachers, and ask questions, experiment in laboratories and do homework. In addition they could enrich their education with new tools for better efficiency [50], [37], [57], [58].

However, researchers and practitioners would agree that Learning Objects are meant to enhance learning and to be reusable within a range of learning contexts. They are usually interactive digital resources illustrating one or more interrelated concepts. They are small in size, but contain enough content and context to make them pedagogically useful [48].

Metros elaborated further on her definition of Learning Objects: Instructors are comfortable incorporating audio/visual resources, readings, guest lectures, and other instructional activities into their traditional classes. Learning objects are the new and improved, digital version of these activities. If learning objects designed within a sound pedagogical framework, learning objects can be accessed from anywhere at any time. Instructors can create an engaging experience by using learning objects in an interactive context. ([36], pp. 8–9).

Acker made an analogy with the current success of the Apple Computer's iTunes store and Learning Objects in education. Just as Apple Computer's micro-pricing of songs in its iTunes Music Library intermediates a more user-centric value proposition than pre-packaged CDs, learning objects are better adapted to serve individualized delivery preferences of Faculty, focus the attention and fiscal resources of students more successfully than the textbook, and offer rich new ecologies of learning for both ([1], p. 2).

There are many QuickTime ‘widgets’ (small interactive tools) such as calendars, calculators, clocks, navigation banners etc. Most QuickTime Learning Objects would be best described as interactive video presentations. There are relatively few multimedia developers, and even less educational designers, who have explored the potential of interactive QuickTime. One exception is Deakin University. A 2001 report describes their experiences and benefits of utilizing QuickTime for authoring interactive multimedia Learning Objects:

By using QuickTime, the degree of expertise required to conduct a performance from multiple elements has been made as accessible as street theatre with lots of participants and yes when you build the show with multi-track theatrics, the audience will come! ([46], p. 12).

However, [16], [59] discussed that Multimedia material that delivers multimodal information is widely accepted by instructors as a supplementary aid for teaching and learning in various domains. Different formats of information such as onscreen text, illustrations, voice-overs, and sound effects are commonly presented to learners in multimedia learning environments. Simultaneously processing information encoded in different representational formats can be cognitively demanding [31]. The two most influential models proposed in the field of multimedia learning are the cognitive theory of multimedia learning ([31], [35]) and the integrated model of text and picture comprehension [44]. Those models propose a somewhat similar description of the processes and representations that emerge during the comprehension of illustrated documents, even though there are a number of differences between them.

Multimedia systems are more and more used in distance learning. Since these systems are often structured as a hypertext, they pose additional problems to the user due to the complexity of navigable paths. Therefore, the user had to learn both the structure of the hypertext and the provided contents. Three studies had been conducted to test the hypothesis that the level of usability of a system can affect the learning performance. The first two studies were aimed at evaluating the level of usability of a system developed as a multimedia distance learning course. An experiment was conducted to compare the learning performance of students using this system to that of other students using different educational tools. Results lend a preliminary support to the hypothesis that a difficult to use hypermedia system can negatively affect learning performance [40].

[2] indicated that choosing the appropriate multimedia for the learning modules or systems is critical to designing an efficient web based asynchronous learning systems or modules. In response to this need, a study was conducted to gauge the effectiveness of different multimedia combinations, namely: text; audio and synchronized text; audio, video and synchronized text, for procedural-based tasks to support web based learning for a senior-level Production, Planning and Control Course. Data were collected on performance, process and subjective measures. Analyses of these learning systems throw new light on the effectiveness of the different multimedia combinations to improve web-based learning of procedural tasks. The most salient finding of the study is that user performance is dependent on the type of multimedia combination and the type of learning task in terms of complexity. Interestingly, for low difficulty procedural tasks, the choice of multimedia is not critical for either performance or process efficiency. However, when the procedural tasks are complex, a combination of audio, video and synchronized text yields the best results both in terms of learning performance and process efficiency measured in terms of amount

of time spent viewing the modules and the module accessing frequency. Another important finding is that an easy-to-use system does not imply an efficient learning system. The study helps recommend design guidelines for the most appropriate type of multimedia to be used in designing web-based asynchronous learning systems for different levels of procedural tasks.

[10] compared the training effects of interactive multimedia devices and non-interactive media ones to see if there is any increase in cognitive tempo and learning accuracy. Samples included 60 females of first grade in control and experimental groups selected by cluster random sampling .Cognitive Tempo Test and Pearon Accuracy Tool Test were used.

Results showed there is a significant difference between two groups in learning speed but there were not any significant difference between two groups in learning accuracy and amount of memorized material.

[51] considered the interactive role of computerized instructional materials. He defines interaction as reciprocal relation of trainer and trainee and believes that the benefits of interactive instructional environments, among them interaction of the user and the computer, are:

It increases the collaborative learning skills.

It increases the conceptual procedures of students.

Interactive instructional environment increases the students' interest

Moreover, [28] mentions these reasons for the use of multimedia in classrooms:

Multimedia increases the students' motivation to participate in classroom activities.

They combine all the verbal skills of reading, writing, listening and speaking.

They allow teachers to recognize the different learning styles and the intelligence types

[3] evaluated the effectiveness of simulator and multimedia educational tools in India. Advanced Cardiac Life Support (ACLS) certified paramedic students in India were randomized to Simulation, Multimedia, or Reading for a 3-h ACLS refresher course. Simulation students received a lecture and 10 simulator cases. The Multimedia group viewed the American Heart Association (AHA) ACLS video and played a computer game. The Reading group independently read with an instructor present.

Students were tested prior to (pre-test), immediately after (post-test), and 3 weeks after (short-term retention test), their intervention. During each testing stage subjects completed a cognitive, multiple choice test and two cardiac arrest scenarios. Changes in exam performance were analyzed for significance.

A survey was conducted asking students' perceptions of their assigned modality. Results: One hundred and seventeen students were randomized to Simulation (n = 39), Multimedia (n = 38), and Reading (n = 40). Simulation demonstrated greater improvement managing cardiac arrest scenarios compared to both Multimedia and Reading on the post-test (9% versus 5% and 2%, respectively, $p < 0.05$) and Reading on the short-term retention test (6% versus −1%, $p < 0.05$). Multimedia showed significant improvement on cognitive, short-term retention testing compared to Simulation and Reading (5% versus 0% and 0%, respectively, $p < 0.05$). On the survey, 95% of Simulation and 84% of Multimedia indicated they enjoyed their modality. Simulation and multimedia educational tools were effective and may provide significant additive benefit compared to reading alone. Indian students enjoyed learning via these modalities.

Multimedia interactive modules brought new technology for learning. Such as using game-based learning systems in college education is neither an easy nor a simple task. The aim of such systems is to keep attention, teach students or assess their knowledge through a game. With the aim of keeping students' attention through a game, [24] showed the implementation of game-based learning systems with a pedagogical agent. They presented two models for assessing student's knowledge used by a pedagogical agent which is a part of the new class of Multimedia Interactive Modules for Learning – MIMLE. One of the models was used for activating the agent. It was realized as a window of Help option and built in accordance to Marcov decision process theory (MDP). The basic goal of this mode was to determine the minimal intervention of the agent towards making the right direction concerning the studying process based on simulation learning. With the second, long-term model, they have assessed student's knowledge in the game level that was used to decide students should pass on to the next level of learning or if they should stay on the same level.

Different researchers using different topics have been discussed multimedia influences on teaching and learning such as:

1. multimedia training for older adults [30];
2. multimedia blogging in physical education [29];
3. multimedia learning [21];
4. 3D visualization types in multimedia applications for science learning [12];
5. potential pedagogical benefits and drawbacks of multimedia use in the English language classroom equipped with interactive whiteboard technology [9];
6. the evolution of multimedia sound [5];
7. designing multimedia games for young children's taxonomic concept development [52], [53] ,[54];
8. Web-based synchronized multimedia lecture system design for teaching/learning Chinese as second language [18];
9. exploring the relationships between Web usability and

students' perceived learning in Web-based multimedia (WBMM) tutorials [48];

10. Collaborative spaces for GIS-based multimedia cartography in blended environments [47], and so on.

This paper will concentrated on the relationship between Internet audio / video (In. AV) and its categories via streaming stored audio / video (SSAV), streaming live audio / video (SLAV) and Interactive audio / video (IAV). This good relationship will contribute to enhance students' learning performance and enrich their knowledge, skills, and abilities. It helps to extract specific information that provide opportunities for reflective thinking and resulting in better retention / transfer and problem solving performance compared to learning from text-only books.

2. Related Work

[17] argued that the improvement of problem-solving abilities and other key skills requires 'emergent technologies' in order to design effective learning environments that provide opportunities for reflective thinking. However, this argument can be seen from different points of view. One approach focused on the improvement of students' technological literacy and advocated a new type of understanding of information and communication technology in educational settings. Another approach focused on the effective instructional design (ID) of multimedia environments as opposed to the technology itself. Obviously, these perspectives were not mutually exclusive as each may be considered within the context of ID.

Hannafin's article deals with the evaluation of a multimedia learning environment which had been developed and evaluated within the broader context of a research project on the learning-dependent progression of mental models in economics. To carry out formative evaluations, they had adapted a particular evaluation approach which allows and requires the implementation of specific evaluation instruments. The crucial questions of our evaluation studies were the efficacy of a multimedia-based realization of the cognitive apprenticeship (CA) approach; the diagnosis of mental model progression through the CA based instruction, and the effects of implemented meta-cognitive training. For the assessment of the learning-dependent progression of the mental models, they developed and used a special diagnostic instrument for causal diagrams, which were understood as reproductions of students' mental models. In order to be able to meet statements about the practicability of a multimedia based realization of CA, they measured the results of the tasks of learning during each different learning phase. Additionally, several motivational variables and persistent learning strategies were measured. Thisarticle specified the adapted evaluation instruments.

[38] reported that Malaysian government has embarked on an ambitious refashioning of the nation called Vision 2020 in pursuit of its goal of becoming a 'developed country'. A pivotal component of this 'vision' is the planning and provision of information technology (IT) infrastructure in a multi-billion dollar urban mega-project called the Multimedia Super Corridor (MSC).

The research on multimedia learning shows that humans learn better from a combination of image and text than they learn from text alone [31]. Mayer declared that learning from books that include both text and illustrations and from computer-based environments that include on-screen text, animations and narrations resulted in better retention/transfer and problem solving performance compared to learning from text-only books. Similarly, [35] created three different learning environments: text-only, text-plus-picture and animation-plus-narration. After the experimental study, results showed that text-pluspicture and animation-plus-narration conditions had a significant effect on success ([32]; Josh Lepawsky, 2005).

Animation is the popular of today's multimedia learning environments and many media designers seem to be convinced that animations are instructionally more powerful than static pictures [41].

Research in multimedia leaning has been growing during the past two decades due to the rapid development of educational technologies. Recent research has demonstrated that it is more unclear under which conditions adding an animation to a text will be beneficial for learning [45].

Although numerous studies had shown positive effects of multimedia instruction designed based on the theory of multimedia learning (e.g., [34]; [42]), many studies have also demonstrated exceptions to or concerns about factors affecting the results of multimedia instruction. For example, [8] reviewed the literature on hypermedia learning since 1998, and found that the results were mixed. Recently, a study conducted by [6] found modality but no redundancy effects in the learning of foreign language when the text and audio modes of information were presented together. [26] found that between audio–visual and audio only presentations, the latter was beneficial for older students with prior knowledge of the topic to be learned, but younger students with no prior knowledge learned better from the audio–visual form.

3. Research Background

According to [4], [60], [61] audio and video services can be divided into three broad categories: streaming stored audio/video, streaming live audio/video, and interactive audio/video [4]. Streaming means a user can listen to (or watch) the file after the downloading has started.

In the first category, streaming stored audio/video, the files are compressed and stored on a server. A client downloads the files through the Internet. This is sometimes referred to as on-demand

audio/video. Examples of stored audio files are songs, symphonies, books on tape, and famous lectures. Examples of stored video files are movies, TV shows, and music video clips.
Downloading these types of files from server can be different from downloading other types of files. Therefore, there are four approaches to download these types of files which are:
Using web server
A compressed audio/video file can be downloaded as a text file. The client (browser) can use the services of HTTP and used a GET message to download the file. The Web server can send the compressed file to the browser. The browser can then use a help application, normally called a media player, to play the file [4], [60], [61].
Using web server with a metafile
In this approach, the media player is directly connected to the Web server for downloading the audio/video file. The Web server stores two files: the actual audio/video file and a metafile that holds information about the audio/video file [4].
Using a media server
The problem with second approach is that the browser and media player both use the services of HTTP. HTTP is designed to run over TCP. This is appropriate for retrieving the metafile, but not for retrieving the audio/video file. The reason is that TCP retransmits a lost or demanded segment, which is counter to the philosophy of streaming. We need to dismiss TCP and its error control; we need to use UDP. However, HTTP, which accesses the Web server, and the Web server itself are designed for TCP; we need another server, a media server [4], [60], [61].
Using a media server and real-time streaming protocols (RTSP).
The Real-Time Streaming Protocol (RTSP) is a control protocol designed to add more functionalities to the streaming process.

Using RTSP, we can control the playing of audio/video. RTSP is an out-of-band control protocol that is similar to the second connection in FTP [4], [60], [61].

In the second category, Streaming live audio/video, a user listens to broadcast audio and video through the Internet. A good example of this type of application is the Internet radio. Some radio stations broadcast their programs only on the Internet; many broadcast them both on the Internet and on the air. Internet TV is not popular yet, but many people believe that TV stations will broadcast their programs on the Internet in the future.

In the third category, interactive audio/video, people use the Internet to interactively communicate with one another. A good example of this application is Internet telephony and Internet teleconferencing.

4. Objectives

1. To interact with the best way of streaming multimedia.
2. To study the important effects of multimedia on education.
3. To highlight the use of online multimedia through the Internet.
4. To extract the benefits of online multimedia in helping students and teachers.

5. Methodology

The method adopted for the present study was descriptive and statistical in nature. It provides a flexible framework for selecting materials and participants, defining criteria and measures, and implementing evaluation techniques. By adapting these different techniques, the proposed structure model for INTERNET AV aims to assess the relationship between interactive audio/video and Internet audio/video.

To assess the relationship between interactive audio/video and streaming live audio/video; relationship between interactive audio/video and streaming stored audio/video; relationship between streaming live audio/video and Internet audio/video;

relationship between streaming stored audio/video and Internet audio/video; relationship between a streaming live audio/video and streaming stored audio/video.

Different statistical techniques were used including instrument development, a confirmatory factor analysis (CFA), an exploratory analysis (Mean (M), Standard Deviation (SD), Principal Component Factor and Cronbach's alpha, (exploratory factor analysis (EFA) is used to determine how many latent variables would be used)), Construct Reliability, and a test of a structural model. Convergent validity and Discriminant validity were used in this research according to the recommendations of [11]and [23].

There are twenty-six observed (endogenous) variables, which are SSAV1 … SSAV8, SLAV1 … SLAV10 and IAV1 … IAV8 and there are three unobserved (exogenous) variables, which are SSAV, SLAV and IAV respectively.

To assess the fit of the model to the data, Chi-square per degrees of freedom, GFI, AGFI, CFI, RMSR, RMSEA, and MI were computed. If the model fits the data adequately, the t-values of the structural coefficients will be evaluated to test the research hypotheses. Figure 1 illustrates proposed INTERNET AV Model below.

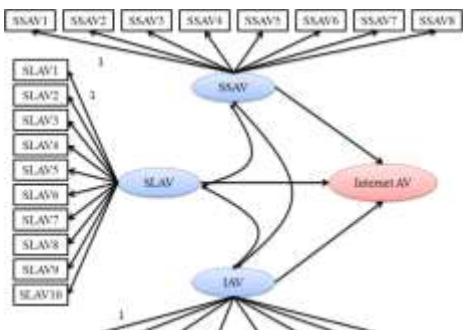

Fig1. INTERNET AV Model

Population and Sample

The difficulty of studying the whole population enforces the researchers to randomly, choose a sample of 320 of students.

Out of which 80 were of Basic English Language, 80 were of Basic Mathematics, 80 were of Basic Biology and 80 were of Basic Science.

Before this study, all of the participant had enough knowledge of Internet and Media Player and searched information using different engines (Google and Yahoo search engines).

Therefore, the total of usable responses was 320 which means there were not missing responses and whole the questionnaire for 320 participants was completed successfully.

Description of the tool used and construct measures

In this study, the data were collected via a questionnaire survey of Likert 5-point scale format (1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree). The design of the questionnaire follows the stages outlined by ([30]; [29]; [21]; [12]; [9]; [5]; [52]; [18]; [48]; [47]) in the case of multimedia.

Content validity was ensured through a comprehensive review of the literature and interviews with practitioners, i.e., the indicators in the questionnaire were based partially on previous studies. Interviews and discussions with practitioners and a number of experts in multimedia.

The items in the questionnaire were judged as relevant by 8 indicators for each of SSAV and IAV and 8 indicators for SLAV factors. Therefore, the total of observed variables is 26.

The interviews resulted in minor modifications to some words provided in some measurement items, which were finally accepted as possessing content validity. The refined measurement items were included in the final survey questionnaire administered to the target respondents.

Data Collection

Various difficulties are generally felt by the investigators whole collecting data. In the present study, the data was to be collected from four departments of basic class final year in Taiz University (TU) – Yemen Country.

Before approaching the subjects in various departments, the researchers first took permission from the chairmen of the respective departments for survey.

In order to collect the systematic data, it was essential to approach subjects and the investigators did the same. After contacting participants, the investigators explained the objectives of the study to them. The respondents were assured that the information provided by them would be kept strictly confidential.

The questionnaire was used for INTERNET AV and included three parts (for SLAV, SSAV and IAV) tests, which consisted of total twenty-six questions.

Then the investigators distributed the questionnaire among the participants. They were asked to go through the general instructions given on the top of them before filling the given entries.

Lastly, the participants were asked to read the statements carefully and requested to give their responses to every statements.

Doubts and confusions were cleared by the investigators as per the requirements of the participants.

The investigators also gave full freedom to the participants to ask the meaning of the words or sentences which were beyond their understanding.

Statistical Techniques Used

The analysis of data was done by using statistical techniques, which were chosen only after the investigators found them to be most appropriate and compatible for the collected data. This analysis was depended on the previous studies of ([30]; [29]; [21]; [12]; [9]; [5]; [52]; [18]; [48]; [47]),[22] and [23]. These statistical techniques were included instrument development, a confirmatory factor analysis (CFA), an exploratory analysis (Mean (M), Standard Deviation (SD), Principal Component Factor and Cronbach's alpha, (exploratory factor analysis (EFA) is used to determine how many latent variables would be used)), Construct Reliability, and a test of a structural model.

However, convergent validity was assessed by examining the significance of individual item loadings through t-tests. The overall fit of a hypothesized model can be tested by using the maximum likelihood Chi-square statistic provided in the Amos (a software package for SEM).

The output and other fit indices such as the ratio of Chi-square to degrees of freedom, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), root mean residual (RMR), the root mean square error of approximation (RMSEA), and The Tucker Lewis Index (TLI).

Discriminant validity was assessed by comparing the average variance extracted (AVE) to the squared correlation between constructs.

The AVE estimate is a complimentary measure to the measure of composite reliability ([11] ; [23]).

Research hypotheses

Based on the research framework (see figure1), the INTERNET AV model originally defined streaming live audio/video (SLAV), streaming stored audio/video (SSAV) and Interactive audio/video (IAV) as three main factors.

Many studies concentrated on efficiency, influences, ability, and achievement of using interactive computer technology, Internet, and attitudes towards multimedia ([30]; [29]; [21]; [12]; [9]; [5]; [52]; [18]; [48]; [47]).

It is therefore reasonable to expect that there is a positive relationship between interactive audio/video and Internet audio/video.

Positive relationship between interactive audio/video and streaming live audio/video.

Positive relationship between interactive audio/video and streaming stored audio/video.

Positive relationship between streaming live audio/video and Internet audio/video.

Positive relationship between streaming stored audio/video and Internet audio/video positive relationship between a streaming live audio/video and streaming stored audio/video. Thus, the researchers' hypotheses are:

H1: There is a positive relationship between interactive audio/video and Internet audio/video;

H2: There is a positive relationship between interactive audio/video and streaming live audio/video;

H3: There is a positive relationship between interactive audio/video and streaming stored audio/video;

H4: There is a positive relationship between streaming live audio/video and Internet audio/video;

H5: There is a positive relationship between streaming stored audio/video and Internet audio/video;

H6: There is a positive relationship between a streaming live audio/video and streaming stored audio/video.

Instruments

As mentioned above the questionnaire was composed of 26 questions concerning the INTERNET AV (Cronbach's Alpha α= 0.950).

6. Analysis and results

6.1 Coefficient alpha and reliability

Cronbach's alpha is used for evaluating reliability [22]. The Cronbach's alpha value for each measure is shown in Table 1. The reliability value for each construct was well above the value of 0.7, which is considered satisfactory for basic research ([39; [7]; [27]). Nevertheless, Cronbach's alpha has several disadvantages, one of them that Cronbach's alpha cannot be used to infer unidimensionality [14].

TABLE1. CRONBACH ALPHA VALUES FOR EACH FACTOR

	Measures	Cronbach alpha
Factor 1: streaming live audio / video (SLAV1, SLAV2, SLAV3, SLAV4, SLAV5, SLAV6, SLAV7, SLAV8, SLAV9, SLAV10)	SLAV	0.888
Factor 2: streaming stored audio /video (SSAV1, SSAV2, SSAV3, SSAV4, SSAV5, SSAV6, SSAV7, SSAV8)	SSAV	0.874
Factor 3: Interactive audio / video (IAV1, IAV2, IAV3, IAV4, IAV5, IAV6, IAV7, IAV8)	IAV	0.881

Construct reliability and variance extracted measures

Construct reliability means that a set of latent indicators of constructs are consistent in their measurement. In more formal terms, this reliability is the degree to which a set of two or more indicators share the measurement of a construct.

Highly reliable constructs are those in which the indicators are highly inter-correlated, indicating that they are all measuring the same latent construct. The range of values for reliability is between 0 and 1. Computations for each construct are shown in Table 2.

The reliability of the constructs of streaming live audio/video, streaming stored audio/video, and interactive audio/video were 0.978543, 0.966944, and 0.970596, respectively. All constructs exceeded the recommended level of 0.70 [15].

TABLE2. DESCRIPTIVE STATISTICS AND CONSTRUCT RELIABILITY FOR EACH CONSTRUCT

Measures	Mean[a]	S.D.[b]	Construct reliability[c]
SLAV (SLAV1, SLAV2, SLAV3, SLAV4, SLAV5, SLAV6, SLAV7, SLAV8, SLAV9, SLAV10)	21.6855	9.85122	0.978543
SSAV (SSAV1, SSAV2, SSAV3, SSAV4, SSAV5, SSAV6,	19.1532	8.63632	0.966944

SSAV7, SSAV8)			
IAV (IAV1, IAV2, IAV3, IAV4, IAV5, IAV6, IAV7, IAV8)	14.3952	7.45700	0.970596

a The mean scores of streaming live audio/video, streaming stored audio/video and interactive audio/video

b SD = standard deviation.

c Construct reliability = (sum of standardized loadings)^2/[(sum of standardized loadings)^2 + (sum of indicator measurement error)].

Results of hypothesis testing

The model's overall fit with the data was evaluated using common model goodness-of-fit measures estimated by AMOS 18 (Analysis of Moment Structures) program; it explained 89% of SSAV, 88% of Internet AV, 77% of IAV and 90% of SLAV, with good model fit see figure2 bellow. Overall, this model exhibited a reasonable fit with the data collected.

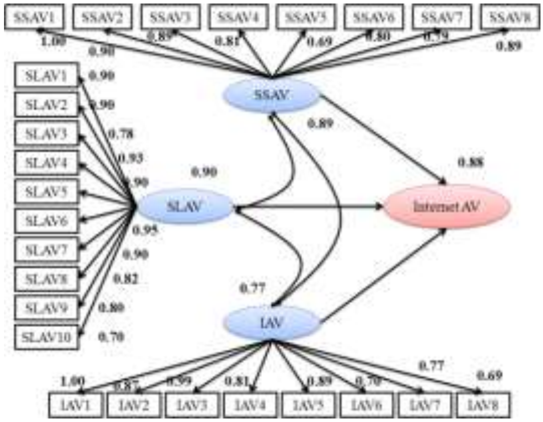

Fig2. INTERNET AV Unstandardized Model

Based on the data, the AMOS estimation of this model showed a value of 1.582 in the Chi-square to degree of freedom ratio, which is satisfactory with respect to the commonly recommended value of less than 2.0. We assessed the model fit using other common fit indices: goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), root mean square residual (RMSR), root mean square error of approximation (RMSEA), standardized residual, and modification index (MI). The model exhibited a fit value exceeding or close to the commonly recommended threshold for the respective indices, e.g., values of GFI=0.96, AGFI=0.910, RMR=0.044, CFI=0.932, TLI=0.945, RMESA=0.057, satisfactory with respect to the commonly recommended values.

The hypotheses also were tested as shown in Figure3. . As summarized in Table3, H1 was supported by the data, as indicated by a significant critical ratio (C.R. = 4.291). The C.R. is a t-value obtained by dividing the estimate of the covariance by its standard error. A value exceeding 1.96 represents a level of significance of 0.05.

This reflects that H1 was the most important determinant of INTERNET AV throughout this research. H2 was supported by this study (C.R. = 2.111 (H2)). In addition, H3, H4, H5 and H6 were significant (C.R. = 3.698 (H3), C.R. = 2.523 (H4), C.R. = 2.010 (H5) and C.R. = 4.010 (H6) respectively).

In sum, the tests of the structural model showed that the six hypotheses were fulfill in this research as shown in the table3 below.

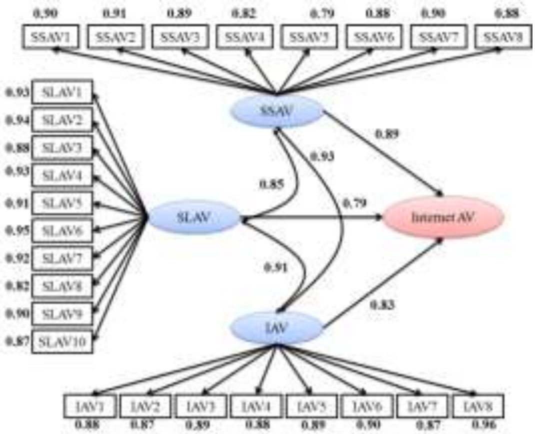

Fig3. INTERNET AV Standardized Model

Table3. Result of the structural equation modeling

Variables			Estimate	S.E.	C.R.
IntAV	<---	IAV	2.510235	.585	4.291
SLAV	<---	IAV	1.365817	.647	2.111
SSAV	<---	IAV	1.985826	.537	3.698
IntAV	<---	SLAV	1.475955	.585	2.523
IntAV	<---	SSAV	1.30047	.647	2.010
SSAV	<---	SLAV	2.15337	.537	4.010

Fit indices	Chi-square (v2 =230.368), p=0.184, df=212, v2 /

df=1.087
GFI=0.96, AGFI=0.910, RMR=0.044, CFI=0.932, TLI=0.945, RMESA=0.057

a S.E. is an estimate of the standard error of the covariance.
b C.R. is the critical ratio obtained by dividing the covariance estimate by its standard error.
c Values are critical ratios exceeding 1.96, at the 0.05 level of significance.

Calculated variance extracted (AVE)
Evidence of discriminant validity is provided by the AVE method. The AVE for the latent variables via SSAV, SLAV and IAV was 0.760688, 0.82041 and 0.7973, respectively. The results have demonstrated evidence of discriminant validity for the study constructs.

7. Discussion and Conclusion
This study tends to identify, within the framework of ([30]; [29]; [21]; [12]; [9]; [5]; [52]; [18]; [48]; [47]).
It has investigated the underlying relationships between Streaming Live Audio / Video, Streaming Stored Audio / Video, Interactive Audio / Video and Internet Audio / Video which support learning and teaching for basic class. All hypotheses postulated by the structural model are supported. As a result, H1 is stronger than other HYPOTHESIS in this study.

Having its stronger impact on listening and watching activities, it is emphasized that computer is required in basic class particularly for receiving knowledge through multimedia anywhere and anytime in academics and research. Using the Internet connection of many Journals and Magazines encourages

teachers of basic class and their students to interact with computer and Internet.
In addition, researchers may build on this model to identify and examine other factors that may influence learning to use computer such as the Multimedia skills, multimedia and mobile learning and e-learning, including the level of information technology in the organizations and computer resources.
The integration of these constructs into the model will help researchers to further grasp the factors influencing the development of electronic learning in the schools and universities.

Therefore, it is significant that multimedia as a technique or a tool of learning would be more widespread, and faculty members in higher education and basic class teachers would be supported with technical and technological equipments and the process would be institutionalized via the policies and strategies of Schools and Universities [13].

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