



# Multimedia based learning paradigm for School going children using 3D Animation

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**Abstract:** Multimedia based teaching and learning mechanism is being rapidly adopted and implemented in various schools of education. In this research, we explore and implement the use of Animation as tool for multimedia learning based on cognitive theory. To achieve this new dimension in cognitive learning, a 3D animated movie is produced using principles of multimedia learning that teaches young school going students along with teacher. The basic scientific concept is animated and shown as video and further elaborated by the teacher present in the room. A survey was then conducted in various school of Sindh province from classes V to VIII, where students were first taught the topic using conventional method with face to face teaching mode on blackboard. The Evaluation and validation was done using two dependent parameters of learning and retention of the knowledge by the student. The study concluded that using multimedia-based animation for teaching young students yielded much higher score values and students were able to understand and learn more through animated principles.

**Keywords:** Multimedia, Animation, Cognitive, Multimedia learning.

## I. INTRODUCTION

Learning is believed to be more effective when it is done through picture and content together than the text alone. The integration of content with pictures has recently been a topic of great interest among the researchers in education and technology. This unity has been termed as 'Multimedia learning'. For the most time in education, the words have been most dominant mode of teaching the students. However, recent advancements in the field of technology have guided instructors and practitioners to move towards use of technology in the classroom. Thus, headway illustration and pictorial methodology has been pursued in educating the children in schools, colleges and universities. This includes PC based design strategies such as computer graphics. Despite such developments, there is still need to work in presentation area which can facilitate learning more.[1]

Multimedia learning is an effective way of learning in modern times as it attracts attention of the learners and helps them develop their understanding related to particular subjects. The research supports this learning. One of the most important theories reflecting on how people learn through text and illustration is cognitive theory which holds that people retain verbal and visual information more than the learners do through words alone. [1]

The use of technology in instruction is fundamental since students are known as progressive and centered -learner. Students these days are very associated with technology in their everyday lives. They use Internet to look for data to help their education. They additionally look for different methods for cooperation and correspondence with their associates and teachers through social networking platforms for communication and learning purpose.

It has been a standard to observe how students usually utilize technology in their learning. In this manner, it is important to utilization of technology in teaching to improve student's learning experiences. Indeed, technology can be definitely impacted learning, there are teacher who don't have certainty to incorporate them in their educating. [2]

However, due to inexperienced and proper guideline providing to teachers in term of teaching methods, conventional and learner –centered environment for delivering their knowledge in form of interactive education and face to face teaching in class they are unable to transfer their knowledge successfully to students, resulting the students are failed to show the positive responses towards their studies.

Though, instructing is the art, fun and passion that build the relationship between the student and the teacher to promote education.

Further in term of Understanding and retaining are two major areas of learning. Retention refers to recalling the information presented in material and used for assessment. On other hand, retention checks one's ability to recognize the material learnt. Keeping this in view, retention tests are very significant in education. Multimedia learning which presents graphics to the learners is more helpful in recognizing the text as the graphics are held in cognition for long time. [3]

The animation assumes an important position in computer graphics and multimedia. It is used in terms of production, commercial advertisement and movies. For the last decade, animation has been used immensely in the field of entertainment, games, films, logical and design representations.

## II. LITRATURE REVIEW

### A. Multimedia Learning

Most of the people process the information on the basis of what they hear and see in term of learning. Multimedia learning describes, using words, picture, books and additionally including Audio and video presentations helps people to learn more.

Words can be either spoken or printed text, by picture statically graphics such as illustration, photos, charts and dynamically such as video, animation. If we using words and pictures putting together help people to learn this means, we are engaging them in multimedia instruction. We can greatly increase the performance of problem solving transfer tests by adding graphics with words for better learning. [3]

These particularly varied applications appear to share a typical assumption towards multimedia material enables people to learn more.

Generally, people individually appreciate multimedia resources, tools and interactive media and learning materials, additionally, they believe that Multimedia may help to learn more. (e.g., Elliot, Brown, and Silberberg, 1980; Bosco, 1986; Bryant, Brown, and Elliot, 1980; Terry, 1974; Moore, 1980 and Sewell 1980; [4] These opinions are distorted via the supporters of Multimedia equipment, programming software's, and administrations to publicity their products.

### B. The Cognitive Theory Of Multimedia Learning

The Cognitive theory illustrates how people gain from words and pictures in term of learning, generally people hold separate channel for processing verbal and visual material (double channels assumption), each channel can process just a little piece of amount of information and

material at time. However, effective learning occurs when learner actively engaged in cognitive process while learning.[1]

Therefore, the fundamental question raised How to use words and pictures to improving humans learning?

Regarding this fundamental question, it is important that multimedia lessons need to be designed and integrated on basis of nature of human learning. Using diverse developments does not mean that it changes the central idea of how people generally pay attention while processing the information during learning. Thus it is important to wisely designed the multimedia instructional applications, lessons that may help people learn more. [4]

Precisely, Multimedia instructional lessons, message that are self-possessed in light of how human mind functions will probably prompt significant learning than those that are most certainly not. [1]

The above proposed approach intents to providing opportunities for learners in term of effective learning, the previous studies introduced the number of idea, processes and recommendation regarding multimedia instructional designs, that can be integrating with prior knowledge for meaningful learning

### C. The Imortance Of Regional Language In Term Of Learning

The national language of Pakistan is Urdu, but officially, English is preferred. Besides this, there are as many as 72 active languages in the state, and the range of their speakers from a tiny amount i.e. 150 speakers up-to 61 million speakers including western Punjab. As we can see the speakers whose quantity completes one million speakers. The matter of the fact entails that only 14 of these languages are being spoken by 134 million speakers; however, 58 languages are being spoken by remaining 24 million speakers. Therefore, it should be noted that Urdu, national language, comes 4 in the queue of languages which is include in the target number of speakers. Conversely, it is astonishing that less than 7% population have Urdu as their first language. [5] In present scenario in the "Pakistan's public schools Urdu is the mode of instruction. However, in elite private school's mode of instruction is English. Additional 71 different native languages whereas Sindhi has an official part as mode of instruction in elementary schools in Sindh. Like Sindhi, Pashto is also utilized in public schools as instructing mode. [5]

Frequently, it is articulated that English is requirement for getting admission in government services. Nevertheless, unluckily there is no use of English languages in the government offices; it seems that in routine life the majority of the population – particularly outside the main cities – English in fact has no useful worth. As indicated by an interviewee, for the number of inhabitants in the Saraiki-talking zone of southern Punjab. In southern Punjab Urdu is recognized as a "foreign" language. However as for English, he said, their kids will not ever adopt English in their lives.

Hence, they will not be able to speak and read a book in English as well. [5]

#### *D. The Challenges And Towards Recommending Language Policy In Education*

There is presently overpowering proof that kids take advantages from their initial training through the mode of their mother tongue:

- Generally, children's nurture and development takes place in their own native language rather than second language because the first language let them understand better.
- The way in which youngster interact with each other, such as playing games, watching television programs and animated cartoons can be incorporated into the learning environment.
- Pupil feels comfortable to write and read more easily in language which they are already use on daily basis (native language). Making the associations between the sounds of language and symbol on composed page is inside the capacity of young kid when such sound is once which the kid hears around them constantly.
- If kids completely used to be familiar in their mother tongue first, then later they can be encouraged for learning second language as English or any foreign language is probably going to become very effective. Later on the second (foreign) language may can be introduced as medium of instruction.
- Children can be educated in school with natural language they used at home. This instruction mode may help to learn better.
- Parents mostly monitor the activities for their children at home not only, but also engaged with their kid's school training, contribution in their studies.

From the above discussion it may inferred that nations where indigenous linguistic and ethnic divisions encounters with high-levels of delicacy requires a serious attention of their language in educational policy.[5]

#### *E. The Importance Of Animation As Tool*

Computer animation is a general term that describes the moving objects onscreen. "The continuance of the visualization for any object with a certain level of speed. The eyes of the people we realize that the object is moving".[6]

The utilization of computer skill in educating children, it is much more significant in term of leaning these days because it may can upgrade the learning, understanding and retention rate, further it may save a considerable measure of time as well. The computer technology can be helpful to teacher while instructing using this technology no need to be instruct over and over again same thing. [7]

There are various variety of advanced technologies, innovation to make static graphics and dynamic graphics

such as animation. There are number of applications can be used to program such as Adobe flash is the basic tool to create animation similarly Maya, Autodesk 3ds Max, Houdini, Cinema 4D, Blender, Modo and ZBrush are other application to create animation. These application allow user to create animation, additionally enables animator to make amazing visual outcomes.[8]

In term of instructing to the children there are various technologies, innovation and creative tools for educating and learning that can be utilized as a medium for educating and for learning processes. This helps solving problem in term of learning.

A group of research. found Animated-media can support kids to adopt their "English vocabulary" and obtain greater average score than those who were appeared to perform normal test without animation program technique.[4]

Moreover, day by day life animation, (for example, everyday life aware of sound and dynamic materials) is a sound-related and (or) visual material which can attract in the consideration of students and enhance their enthusiasm for learning and fulfillment Subsequently everyday life animation might be a decent extra component of a passionate framework in multimedia learning materials[4]

One more output result from the study; the factors that affect learner's attitude towards to the usage of digital learning these days, the outcomes demonstrate that attitude towards using computerized learning have a key impact on students learning.[9]

Hence the animation can be used as learning tool in teaching because it promotes the student's retention rate and understanding in their studies.

### **III. OVERVIEW OF PROBLEM**

Instruction is the fundamental right of each individual. It assumes a noteworthy part in advancement of any country and is in charge of a headway towards achievement. The training of Sindh experiences numerous issues in term of learning. The Government of Sindh is in charge of giving free and mandatory instruction to the provincial and urban zones of Sindh. There are such a variety of defects in training framework that should be determined. Be that as it may, on the off chance that we see overall situation in term of learning and degree of consistency the training framework does not meet the worldwide models.

The primary issue is imbalance amongst public and private schooling areas of Sindh in showing strategies through various dialects, for example, English/Urdu and Sindhi. The Regional divergence is likewise another issue in instruction framework. Further Technical instruction has not been engaged in training strategy because of need Technological framework, and appropriate rules not gave in term of learning and degree of consistency. Be that as it may, the Technological hardware's and procedures are not completely encourage, the understudies and Teachers in

learning way. Also, Training and organizations are not palatable in many territories of Sindh.

Illiteracy is a major evident issue in Pakistan which requires reforms at micro and macro levels. However, this cannot be done by government alone. The mutual collaboration between government and non-government institutes along with individual efforts can help free Pakistan from illiteracy. Moreover, the youth who are the asset of the country need to be engaged in vocational and technical training.

Despite being diverse linguistically, Urdu and English assume most important position in schools in Pakistan. Urdu which is the first language of 6.8% of the population holds the status of medium of instruction in elite schools if English is not used. This puts Sindhi at risk which is not encouraged in learning. With such linguistic attitude, Sindhi is likely to lose its value and students would be deprived of getting education in their mother tongue which in turn will affect their creative and cognitive abilities.

Current arrangement of training is not powerful in term of learning and maintenance because of traditional instructing strategies. The crucial issue in current direction structure is not to have the ability to instruct the lesson to kids effectively so that the understudies/learners would have the ability to take in the subject successfully and a while later can review the topic in term of standard for reliability.

**A. Technology Acceptance Model (TAM)**

TAM is generally applied as to fitting hypothesis in information administration context. One of the ideas proposed in TAM is seen for its perceived usefulness (PU) by leaving upon its utilization for better and upgraded performance and pertinence, applicability. The other is perceived ease of use (PEOU) in which it is seen that the setting out upon it is very smooth and without any diligent work or the effort. With the utilization of applications, the two ideas can anticipate the people's attitude of mind also. Additionally, TAM didn't allow subjective handling of the intentions if any [10].

**B. Purposed Tam Model For The Research Study**

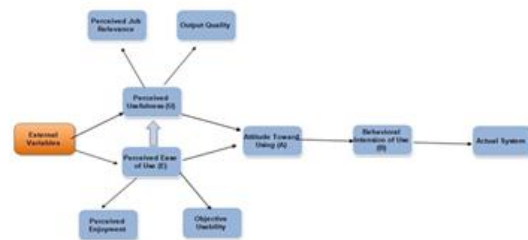
The table-1 comprises of Six distinct questions related with mode of teaching. These questions were taken from the questionnaire to design the TAM model. These questions are summarizing the purposed TAM model of this study.

*Table 1: Purposed TAM Model*

Questions	TAM Factors
I can remember all the things which were shown on Multimedia projector	Perceived ease of Use

The things discussed in topic through Multimedia activities were easy to understand	Perceived Usefulness
Teaching science subjects should be instructed through Multimedia animation	Object usability
I would like to prefer Multimedia for my study.	Perceived enjoyment
Multimedia learning helps me to enhance my knowledge and memory for longer time period.	Job relevance
Sound and the content of topic were clear and visible/audible to understand	Output Quality

Further it can be seen in figure-1. The purposed Research model developed by studying TAM-I, TAM-II and TAM-III, from these models we have selected the variable as indicated by the necessity and use of this investigation. The following variable as listed External variable, perceived Ease of use(E) this variable associated with two more variables; one is (perceived Enjoyment and Objective Usability) in model, furthermore two more variable linked with Perceived Usefulness(U)they are i.e.:(Perceived job Relevance and output Quality as purposed factors in model. Although reaming variables are listed Attitude towards Using (A), Behavioral Intention to Use (B) and Actual System Use.



*Figure 1: TAM purposed Model*

**C. Implementation of Animation As A Solution.**

The current trends in education offer different methodologies for educating the children. Technology is one such approach to facilitate learning. Though in advanced countries the use of technology into class can widely be seen, there is not more use of the same in underdeveloped

countries. Interactive multimedia is more common practice in educational context in present times. The research shows that interactive learning assists students more in learning process this kind of learning is capable of bringing technology into classroom situation. Multimedia learning is one such component related to technology which is an alternative to traditional learning. This is useful way to enhance learning process. Most studies support the technology innovation in context of schools. A group of researcher’s view that traditional learning can be replaced with technological integration

It is believed that animation media assist children in adopting English vocabulary and furthermore get higher standard score than the individuals who utilize the standard method of learning [11] [12]. The multimedia animation is developed for teaching the students belonging especially to primary level. It has a positive impact on learning. This, however, requires careful attention when it comes to development of materials and engaging students in specific learning [13].

**IV. METHODOLOGY**

This research is quantitative; it was conducted to understand/investigate the use of multimedia in teaching and learning process. Students of Class V to VIII were taken randomly as sample for conducting Survey. Both sources of data were used, for the primary data a survey questionnaire was developed to get the findings. SPSS V.20 was used to analysis and findings.

As per the requirement of research, various statistical tests were used. Reliability scale of the Cronbach’s Alpha was applied to measure the reliability and validity of the collected data. Descriptive Statistics was applied to find out the mean scores of the variable.

*A. Experiment/Design*

This study was conducted in the Urban and Rural areas of Sindh with 410 students from class V to VIII. There were two different learning environments were presented as mode of teaching, the first being traditional face to face lecturing mode on white board and second Multimedia learning mode. The scientific Principles were taken from science book of these classes which were the scientific procedure of photosynthesis, water cycle and solar system which were stimulated and a 3D animation was created of the entire process as shown in Figure 3.



Figure 2: Snapshots during Survey

In first module the lecture was given at white board on Multiple topics such as Photosynthesis, water cycle and solar system with explanation in each class from grade V to VIII, and in second module the same lectures were delivered on Multimedia projector with interactive interface and Multimedia activity based.



Figure 3: Screenshots of Animation of water cycle

**V. RESULTS**

*A. Theory-Based Mode (Face to Face)*

The results consist of two sections one is Theory based teaching mode and second is Multimedia based teaching mode.

The table-2 and table-3 reflects the reliability and mean scores statistics of Theory based teaching mode. There were 10 items in questionnaire related to mode of teaching. In table it can be seen the Mean score and Reliability statistics of Theory-based mode. Although, mean score calculated (3.165) along with the Reliability (.534) can be observed in tables respectively.

Table 2: Reliability Statistics

Cronbach's Alpha	Number of Items
.534	10



Table 3: Mean Score

Mean Score	Number of Items
3.165	10

B. Multimedia Based Mode

The table 4 consist the statistical data about the mean score and Reliability of Multimedia-based teaching mode. In table it can be seen that the Mean score is increased from (3.165) to (4.538) however, the Reliability also improved from the (.534) to (.726) correspondingly in table-4 and table-5.

Table 4: Reliability Statistics

Cronbach's Alpha	Number of Items
.726	10

Table 5: Mean Score

Mean Score	Number of Items
4.538	10

Furth more, the results are summarized in table-6. The table indicated the statistical information of both modes of teaching, face to face teaching and Multimedia teaching, on the basis of result it can be assumed that multimedia teaching helps learners more in learning. The similar way of generating statistically results also found in "2011 IEEE Global Engineering Education Conference (EDUCON) – "Learning Environments and Ecosystems in Engineering Education" April 4 - 6, 2010, Amman, Jordan by Nusir, S., Alsmadi, I., Al-Kabi, M., & Shardqah" [14].

Table 6: Summary of Statistics

Total Sample size (400)	Theory-Based Teaching mode	Multimedia-Based Teaching mode
Mean Score	3.165	4.538
Reliability	.534	.726

VI. CONCLUSION

There are some ways to increase retention rate among the learners. This can be done through interactive activities. With it, they will retain more knowledge and skills being taught to them. It has been observed that integration of multimedia presentation such as video, music, images can be an attractive way for the students to learn and improve their knowledge retention. The use of 3D animations leads to a better understanding in term of learning on various topics for primary level students.

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