

Review Article

The Importance of Multimedia in Information Revolution

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Abstract: This paper describes the crucial role of Multimedia in our lives, one of the most important new technologies that we use daily. This paper explains the role and the effect of using Multimedia in education, business and learning. Consequently, this paper is evaluated and developed by using articles, online journals and primary data collection tools for gathering valuable information about the importance of Multimedia. In modern world, technological advancement leads to discover the powerful application of Multimedia. Internet and Social media have significant contribution to improve Multimedia. As the unstructured data in form of images and pictures are increasing at a rapid speed, Multimedia is helpful to convert the data into information. This paper is going to help people to expand their knowledge and information about Multimedia and its strong influences on business and education. The paper shows how technological innovation can be used by external stakeholders to direct and promote innovation in business.

Keywords: Multimedia, Unstructured data, innovation, education, information, technology.

INTRODUCTION

The Importance of Multimedia in Information Revolution

In today's world, technology has its utmost importance. The application of technological tools and systems has significant values in the contemporary world. Multimedia is one of the primary creations of technological advancements. The usage of Multimedia is enormous in business, academic, healthcare, communication, and many other fields.

According to Curtis [1], multimedia is a combination of media such as the internet, text, graphics, videos, animation, and sound in an integrated way. Until 90's, the application of multimedia was limited due to lack of resources and limited availability of the expensive resources. However, with the initiation of powerful computers hardware, software, and the internet multimedia started flourishing [2].

The Applications of Multimedia

The primary objective of science is to identify a problem and provide solution by knowing the problem

in details. Researchers and scientists are continuously putting their efforts for the improvements of human life. Problem findings and resolution is a circular process. After an issue is solved, it triggers other circumstances which need to be considered. For instance, before the internet arrived, managing paper documents was a huge task. With the arrival of the internet, direct and in-person discussion was primarily being considered as a medium of communication. However, by using the internet, any person can talk to any other person at any time from any place. Educators are also using this technology to share their knowledge. Video recordings are considered as a documentation of tacit and explicit knowledge.

The objective of the product development process is to generate an idea to provide an alternative approach or solution [3]. The brainstorming stage helps to identify the problem and idea generation is the following stage, where some possible solutions are analyzed. In this case, the application of multimedia in different domains can create new solutions.

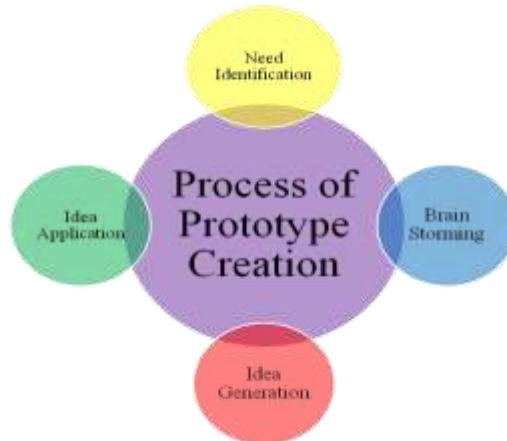


Fig-1: Prototype Creation Process

The need identification process requires to detect a problem or a process which can be improved [4]. The technological advancement drives human beings to generate, store the data, and utilize it for different purpose. For example, when some medical students study about brain surgery, they can watch a video to learn the details. They can also gain opinions

and views from other doctors in the internet at anytime from anywhere. Moreover, online websites, journal, and publications are also available to gain knowledge about brain surgery. Students are not dependent only on the class discussion any more. The creation of knowledge and communicate the knowledge to others have become very easy now.



Fig-2: The Effect of Multimedia in Information Revolution in Four Sectors

Education

According to Tepperman [5], the usage of information technology will increase our knowledge and it will have a significant impact in our lives. The information revolution has enormous influence in developing and expanding the business opportunities across industries around the world [6,7]. The information revolution motivates the development of personal computers, telecommuting system and the internet [8]. Research shows, the information revolution also plays critical role in developing biotechnology, healthcare, transportation, and business domains [9-12].

This paper explains the advantages and the challenges to multimedia in four specific domains –

Education, Telecommunication, Healthcare, and Social Media. As shown in Figure 3, the application of multimedia in education is useful for both educators and students [13]. The students can learn multimedia application while learning a lesson, presenting a topic, and designing a lesson to present. Moreover, educators can also use multimedia to express their knowledge in an effective and interesting manner instead of traditional monotonous teaching style. They also give students the valuable learning opportunity while showing a video on a specific topic or discussing an article which is published in a webpage. Thus, the critical thinking abilities of the students will be enhanced.

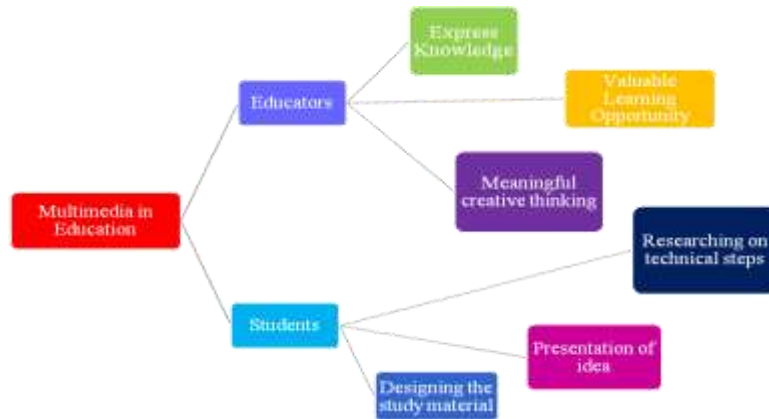


Fig-3: The Usage of Multimedia in Education

According to Ruark [14], the computer software, hardware, and the internet bring a revolution to the education system. Technology provides the easy access to the teachers and students to share, access, download, and upload educational information in a short period of time [15]. Technologies have improved the value of education by strengthening languages, techniques, and skills [16,17]. The traditional teaching method has improved by using the technology. Students and teachers are both agree the benefits of online teaching and documentation [18]. Technologies such as Enterprise Management Software and Classroom Administration, Enterprise Management Software and Classroom Administration, Instructional Software and Digital/Online Content, Student Information Systems and Data Warehouses, Interactive Whiteboards and LCD Projectors, Sound Enhancement, Smart Cards,

Global Positioning Systems, and Digital cameras have enhanced and modified the overall learning system [19,20].

Telecommunication

According to Bennett-Bealer [21], the primary purpose of telecommunication is to transmitting signals over long distances. However, with the advent of technology, telecommunication is now being used with electrical signals. It facilitates people to communicate with each other irrespective of geographic boundaries [22]. Due to technological growth in communication domain, telecommunication has now become a major contributor in the economy of many countries. The telecommunication market is growing bigger as time passes [23].

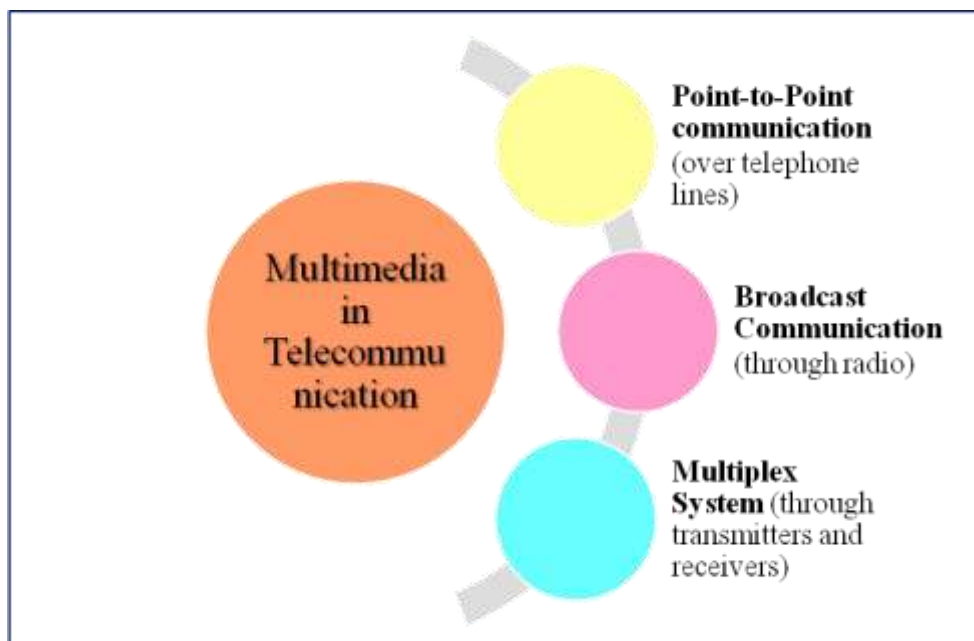


Fig-4: The Usage of Multimedia in Telecommunication

Social Media

The Social media is the globally available open forum to connect with people using the internet. It allows people to share thoughts, exchange views, and create connection by sharing photos, videos, texts, and documents. Therefore, it generates an enormous amount

of data and information [24]. Social media is not limited to a communication forum anymore. It has created a huge business opportunity [21]. For example, Facebook, Twitter, WhatsApp, and LinkedIn they are all multi-billion social and professional communication forum.



Fig-5: The Benefits of Social Media

As shown in Figure 5, social media have many usages. First of all, it is being used as a platform to reach out to prospective buyers. By posting advertisements online, organizations grab quick attention of the potential buyers. Moreover, social media are popular as a media of sharing views, files, music, and videos. From a communication media to establish a personal network, it has turned as a discussion forum where people openly share their thoughts [25]. Additionally, social media helped students in sharing, learning, and exchanging knowledge among each other. Finally, social media is also useful in identifying criminals by their criminal activities and evidences [26].

Healthcare

Figure 5 shows the primary benefits of applying multimedia in healthcare industry. According to Yang, Song, and Zhong [27], the application of

multimedia is necessary to create a medical monitoring sensor. Medical practitioner will attach this sensor to patient who needs to be monitored. On a specific screen, the medical practitioner can check the health status of the patient. The personal wireless devices such as smartphones, and laptops along with medical monitoring sensors will be seamlessly connected with wide-area backbone network [27]. Interactive data, conversational video, and electrocardiography (ECG) monitoring are considered as advantages of implementing multimedia. Moreover, the upcoming “wireless e-health technologies” is considered as a primary advantage of multimedia in healthcare [28]. The innovation of m-health is not possible without mobile telecommunications and multimedia technologies. Telecare provides the medical supports to the patients in need. Telemedicine technologies give access to clinical information of a patient to the medical practitioner.

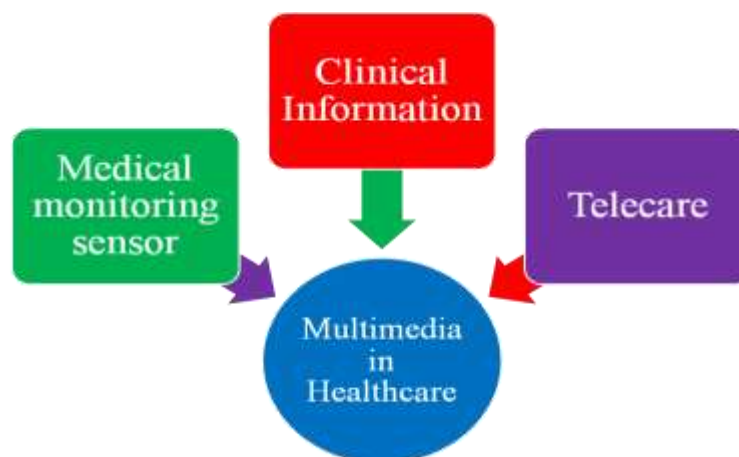


Fig-6: The Application of multimedia in healthcare

By applying multimedia technologies, the clinical information of patients is immediately and readily available to the medical practitioners. Technologies are immensely helpful to reduce the paperwork and provide the accurate medical supports to the patients in need.

Benefit

The primary benefit of multimedia is to enhance the availability of data, contents, information, and knowledge. According to Wang [29], multimedia helps to reduce the deficiencies in the traditional educational methods by increasing the practical exposures. Students learn to apply and utilize their knowledge using multimedia. The incorporation of several media and dynamic graphical presentation is more effective than a single media to the students, especially students with disabilities [30]. Moreover, modern multimedia based content can be easily stored in different devices such as high capacity hard disks, flash drives, and even in cloud based platforms [30]. This increases the availability, storability, and accessibility of the contents. Additionally, the multimedia based contents are environment friendly. People can select the multimedia content based on their real-time requirements without increasing paper based knowledge [31].

Challenges

At first, the availability of data that can be converted and represented using multimedia is a primary challenge. The data should be accurately replicated through the multimedia [32]. Besides, the contents of the multimedia files must be updated and maintained by skilled individuals. The academic contents are browsed by millions of students so these must be updated correctly periodically. Moreover, people should be open to accept technological advanced devices by removing traditional systems and methods. Internet is another priority to access to different types of

materials online. On the other hand, people should be careful what exactly they would like to learn using multimedia. Before making it available online, the content of the multimedia should be verified by the experts whether it is relevant or not [33]. Any wrong information or manipulation of data can be harmful the data users. Therefore, the accuracy of data and information is vital. It should be verified by authentic people before sharing it online. Additionally, the data analysis should be done by trained people. The incorrect application of the educational data mining method, medical data analysis, business information analysis will result in incorrect results. Therefore, data should be analyzed perfectly to predict the future in best possible manner. The seamless network connectivity is another vital challenge. The connection quality has major impact on the availability of the multimedia based contents [34].

RESEARCH METHODOLOGY

As mentioned by Groves [35], the objective of a research is to recommend and describe practical and theoretical advances. There are different types of research methodologies like tests, surveys, content analysis, phenomenological methods, focus groups, exploratory, qualitative, evaluation research, and so on [36]. Knowledge detection in a database is the process to find patterns in data [37]. Custom-made web-based learning system offers personalized academic resources [38].

The literature review has created a theoretical foundation of this paper. A theoretical foundation is critical for the explanation of models [39]. This theoretical insights highlights the requirement of a structured data [40]. Thus, a combined research designs and methods are applied in this research. By applying the Grounded theory, thoughts are engendered by reviewing behavioral patterns [41]. For example, student behavior to learn study materials by going

through different videos and blogs from different websites was noted. Ethnography is the another research process which is about observing socio-cultural variances [42]. Additionally, a collection of different journals and articles are studied which are available at the University of Bridgeport digital library, JSTOR, Google Scholar, Science Direct, and ProQuest. The literature review is essential for advancing our current knowledge [43]. The literature review-centric approach follows three phases: 1) Brainstorming, 2) Narrowing down and 3) Evaluation. Next, the Action Research method is being followed by creating a sample database.

Data Sources

Multimedia based learning system is implemented in many universities. Several multimedia based educational tools such as Camtasia, QuickTime Players for screen casting; iMovie, Adobe Premiere Pro for video editing; Pixlr, Photoshop for Photo Editing; and Prezi, Doceri, Box etc. lecture based tools are now enhancing the learning outcomes in different schools and universities. Additionally, wikis, blogs and podcasts are powerful information sharing tools which are being used in different universities. Multimedia based educational tools fosters collaborative and democratized learning methods by providing easily available and accessible study materials from anywhere at any time [44].

Multimedia based environments provide open, flexible, and distance education to the students. The concept of virtual university is impossible without multimedia based technology [45]. Research shows, multimedia based educational tools are gladly accepted and easily accessible by first year students as they are tech-savvy [46]. Although qualitatively and quantitatively usages are different, technology based tools are also accepted by engineering and non-engineering students for socializing and gathering knowledge [47].

Related Study

Multimedia is a technological revolutionary application. This advanced technology is significant to alter the traditional teaching methodology. It facilitates the traditional teacher-centered model to the learner-centered model which is beneficial not only for the students but also for the autonomy for learning [48]. This way, it increases the rapid growth of higher education. Research shows, multimedia plays significant role in developing children's learning potentiality. The usage of multimedia technologies like video, audio and graphics are immensely beneficial for the three to five year old students [49]. Even children are easily adaptive to this new learning method.

Research shows, multimedia delivers a high-quality independent learning tool which is better than conventional educational methods [50].

In business, multimedia application has received immense attention with the advantages in the internet and World Wide Web (www). By real-time image communication, video conferencing, and graphical videos, business communication has improved a lot which includes commerce, health care, community service, education, manufacturing, and so on [51]. Multimedia reduces the limitations of text-based information and enhances the graphics-based visualization of information which helps in organizational decision making [52]. Moreover, a target based application of multimedia is more effective and informative during training and marketing training [53].

Multimedia has also improved the reach and application of social media. A vast amount of multimedia based information is now available on web-based sharing and community services like Flickr and YouTube [54]. It empowers individual contributors to share knowledge and information in different formats of data such as metadata. The combination of social media, information technology, and multimedia tools, improved the openness and transparency of knowledge and information [55].

A multimedia interface is essential in healthcare domain. A multimedia interface includes text, graphics, and speech which is easy to understand by receivers [56]. The work of physicians and medical staff can be facilitated by the immediate availability of patients' information by using mobile technologies, Radio Frequency Identification (RFID) tools, and multimedia streaming [57]. Moreover, multimedia based devices are useful for seamless health related data collection of high-priority patients [58]. Big data based devices are significant in collecting and analyzing electronic medical information [59]. Additionally, multimedia based images are of higher quality which expedites the decision making in healthcare [60].

RESULTS & FINDINGS

The concept of applying technological advancements to improve the human life is significant. The technological tools improved the information revolution to a great deal. The primary objective of information revolution is to collect, store, and analyze data to extract the information out of it. By using technology, information is available and accessible easily [61]. According to Goldin and Katz [62], the technology has the power to convert the educational system online using advanced tools and systems.

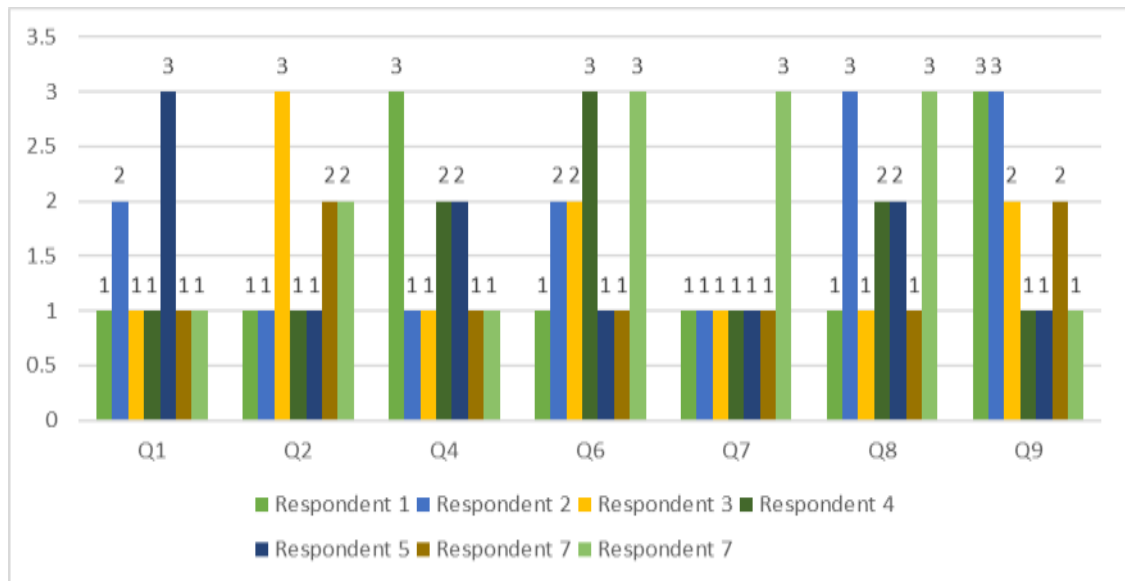


Fig-7: Analysis of survey responses from students

In Figure 7, the analysis of the five respondents is shown graphically. Out of seven students, eight members accepted that multimedia has multiple benefits and confirmed that it is helpful in education purpose and communication purpose. Five students agree that social media helps in sharing educational information. For example, sharing information about universities, educational groups, forums, blogs, and videos are helpful for students. Four students believe that multimedia based contents are important in healthcare to simplify the explanation of different medical process, terms, and as a reference. Four respondents agree that education is one of the major subjects for discussion in social media. As per three respondents’ multimedia contents are effective in sharing knowledge especially in the absence of physical presence. However, two respondents believe that physical presence is still important in education sector. Almost every respondent believe that communication has changed significantly due to the usage of the internet. Around two respondents agree that storing and analyzing data can be tedious. Thus, there should be a limitation of historical data. They also mentioned as the data increased, irrelevant data also increase. Thus, only relevant data for a specific limit needs to be stored and analyzed. Three respondents believe that without multimedia, people can still communicate with each other even today.

Future Direction

The application of multimedia has multiple benefits. The benefits in macro economy are also significant. Technological advancements are necessary for a country’s growth and development. For some less economically developed countries, technological benefits are not being considered and implemented due

to lack of monetary support and skilled human resources. Thus, the development of the country and the community is not up to the mark [63].

The application of multimedia is helpful for various purposes. In future, the multimedia will alter the learning methods by implementing a practical based approach. The students will learn by themselves about any concept by going through content based multimedia. Therefore, the learning will be collaborative and collective approach.

Moreover, the multimedia will be stored and updated periodically. The maintenance and storage of knowledge will be different. Students will learn the basic concepts from anywhere at any time. The knowledge will be easily available as an open source. This open sourced knowledge will be beneficial to improve human life. Even the strong network of social media will be a helpful tool for educators [64]. The better education will be helpful to create a better business world [65].

Additionally, multimedia technology opens up a new dimension of telecommunication network and services. Virtual meeting services and multimedia based automatic phone calls are able to manage integrated and non-integrated network to ensure a smooth communication system [66]. Multimedia and telecommunications technologies introduced and enhanced “web-based instruction”[67].

CONCLUSION

The research study is conducted in order to describe the benefits of using technology in the educational system. This study reveals the high impact

of social media and the internet to spread the knowledge throughout the world. With the constant increase in information revolution, human beings are impacted in positive and negative way. Moreover, the advantages of multimedia cannot be ignored anymore. The combination of different types of media has increased the public reach to a great deal. Human beings need to be careful and educated to choose the advantages over disadvantages. Therefore, this study plays a key role in improving the overall effectiveness of the multimedia in people's lives globally.

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Appendix A

This survey is a part of an academic project to find out how multimedia can be beneficial in managing information revolution. Thank you to all the participants for their time and sharing honest feedback. This academic project aims to provide information about the importance of multimedia in managing information revolution in specific domains in order to maximize the benefits of using multimedia.

1. Do you think social media helps in your study?

1. Yes
2. No
3. Not Sure

Comments –

2. Is multimedia-based contents important in healthcare?

1. Yes
2. No
3. May be

Comments –

3. What do you like most about online contents?

4. Do you think education on social media is important?

1. Yes
2. No
3. Not sure

5. What kind of educational application do you use?

6. How much effective are multimedia contents in sharing knowledge?

1. Very likely
2. Moderately likely
3. Slightly likely
4. Not at all likely

7. Is communication changing by internet-based applications?

1. Yes
2. No
3. Not sure

8. Do you think we should store and analyze historical data?

1. Yes
2. No
3. Not sure

9. If multimedia is not available today, how likely would you communicate to others

1. Very likely
2. Moderately likely
3. Slightly likely
4. Not at all likely

10. How can be social media disruptive?

11. if you have any suggestions about this project, please provide your remarks below: