

# Impact of Multimedia Use in Online GIT Classes

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**Abstract:** Online education has become one of the most sought after education modes in recent years. The online learning environment is evolving and its main focus is to reach students at distant location. Graphic Information technology (GIT) program offered by a large public university in the Southwestern United States also offers multiple online classes for its students. The main aim of this study is to find the impact of multimedia on online GIT classes. The study tries to find out students' preferred mode of learning, shortcomings they found in the mode, and their choice of multimedia for online classes. This study also looks into the faculty's preferred mode and choice of multimedia. All the data is collected through electronic surveys designed separately for each group. The collected data helps in understanding the impact multimedia has on students' learning.

## INTRODUCTION

Technological development has touched every aspect of human life. Education has also been impacted by technological progress. Online education has been one of the most popular modes of education. It has helped in reaching students at distant locations; students with limited time and money. Thus it provides a cost-effective solution for all. Even though it has lots of advantages, its impact on student learning is unclear. Online classes lack active learning, communication, and interaction. Multimedia is a popular tool to fill the gap, and to create a suitable learning environment.

## Need for the Project

The Graphic Information Technology (GIT) program prepares students for a world that is highly dominated by ever changing technology. This stream has a proper balance of creativity and technology, and thus helps in creating individuals with high technical knowledge and flair for creativity. Like other educational streams, this major is also impacted greatly by online classes. Online education has changed the way education has been perceived for a long time. It has made education easily accessible, simple, and 24/7 available. Many techniques are employed to make online learning experience enjoyable and effective for students.

Multimedia is one of many techniques used by teachers for online education.

Students pay a lot of money on education and online classes. It becomes necessary to have proper systems in place to improve, enhance, and promote learning through online classes. Every student has a different way of learning, and in online classes it becomes difficult to gauge if the teacher is able to cater to the needs of all enrolled students. Multimedia can help in filling the gaps. Multimedia presents the same information in many different ways, and thus it becomes easy for the learners to focus on the representation they find most useful (Jean Francois Rouet).

Multimedia is extensively used in GIT classes, both in person and online classes. This not only enhances the learning experience of the students, but also helps in improving their understanding of available technologies. It gives them a chance to get hands-on experience with new technologies.

## Significance of Project

The purpose of this study is to determine impact of multimedia on online GIT classes. Online education has become very popular and one of the best modes of education for full time working students, distantly located students, and continuing education students. Technological development has helped tremendously in speeding the learning process for online classes. This study will help in gauging how positively or negatively multimedia has influenced students and faculty. It will serve as a guide for faculty for future adoption of multimedia in online classes.

## Statement of the Problem

1. The goal of this study is to determine impact of multimedia use on online GIT classes
2. What is online education?
3. What gap do students feel between in-person classes and online classes?
4. What are the methods employed for making online education effective?
5. What is Cognitive Load Theory, and why is it chosen for theoretical framework?
6. What are some multimedia options used by faculty?
7. What is the most effective option as per faculty?
8. What is the most effective option as per student?

9. Is the multimedia use helping in improving the students' experience?

### **Limitations of Project**

This project includes GIT online classes of fall semester 2015 for the data collection. The data is limited and is collected over a short period of time.

## **REVIEW OF RELATED LITERATURE**

### **What is Online Education?**

Before understanding online education, we must understand distance education. Distance education is defined as: "Institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (Simonson, 2003). Online education is a type of distance learning, it provides an opportunity to the students to take courses without attending a brick and mortar school or university (Price). According to education expert Dr. Sabri Bebawi, "a course of study must offer two-way communication between teacher and learner and fall under the oversight of an educational institution" (Price).

"Online learning allows participants to collapse time and space" (Cole, 2000). Online education thus provides a break to the students, who are not comfortable in the traditional classroom environment. It is an easy way to grasp knowledge at one's convenience. The convenience factor is the reason that has made online education quite popular around the world. Education is closely linked with learning, and it becomes very important to understand the way human learns.

### **How do we learn?**

A student goes to university/college to learn and to acquire knowledge, but is there a process involved that enables the learning? Learning is a continuous process, and can also happen subconsciously. We learn through our experiences, and the process of learning starts much earlier before a student is enrolled in a school. There are broadly two types of learning:

1. **Observational Learning:** Learning that is obtained through observing or watching others. A child learns a lot through this type of learning.
2. **Associative Learning:** Learning that is obtained through establishing connections between events. Conditioning is the method employed to learn by association. There are two types of conditioning: Classical and Operant.
  - I. **Classical Conditioning:** This type of conditioning method teaches association between two different stimuli.

- II. **Operant Conditioning:** This type of conditioning method teaches association between behavior and consequences.

We consciously and subconsciously apply these methods to learn. Learning style of each student can be different, but the basic applied principle remains the same. Is there a difference in learning in in person class and an online class? Does the difference just lie in the mode of teaching or does it have more dimensions to it? The next section will help in making the demarcation clear.

### **Difference Between Online Education and In Person classes**

Technological development has touched every part of our life from transportation systems to communication systems, and from health systems to education systems. Effect of technology in education can be seen through the number of online classes available for courses in a university or in a school. Enrollment in online classes is increasing rapidly every year. "According to the United State Department in K12 public school sector, students enrolled in technology based distance learning increased by 65% in the years 2002-03 and 2004-05, and in 2004 2.3 million students took at least one online class. This number was increased to 3.2 million in fall of 2005"(Chakraborty Misha, 2015). These numbers are increasing every year and thus show the popularity of online classes.

There is a big difference between online education and in person classes. Online classes provide flexibility, convenience, cost effectiveness, and accessibility to the students. It provides an opportunity for the students to access learning material anytime and anywhere. Also, online classes equip students with technological related knowledge, and at the same time the technology used is reachable and understandable to all skill sets. The difference does not end at the way these classes are conducted, but extends to the learning differences and environment these two modes of education creates. "Online education has a big drawback of reduced interaction between students and facilitator" (Alagoz, 2013). Chen et al (2010) proposed, "that no communication technology can replace the physical presence and serendipitous moments of learning such as the spontaneous." (Chakraborty Misha, 2015). In-person classes not only provide a continuous interaction with the instructor, but also with other classmates. This helps the student to learn subconsciously through observing other classmates. Second difference between online classes and in-person classes is engagement while learning, and it becomes very difficult in an environment where learners and instructors are physically away from each other. In an in-person class the instructor through modulation of speech, eye contact, and body language

can help a student to engage in a particular boring content, but it becomes next to impossible to do the same in an online class.

### **Use of Multimedia in Online Education**

Multimedia concept became popular in 1950's. This method combines at least two media formats such as text and video or audio at one time to get at a more complete effect. This is not limited to educational effect only (Heinich, Molenda, Russel, & Smaldino, 1996). Another definition is: "Media providing multi sensory experiences, such as sound, visuals, animation and interaction with the media" (Porter, 2004). "Multimedia instruction refers to instruction involving words and pictures that are intended to foster learning" (Richard E Mayer, 2001). According to Richard. E. Mayer, people learn better with combination of words and pictures rather than just words. A speech can be monotonous if the speaker has not included any slides with pictures or videos in it, and this can lead to disinterest among the audience. Similarly, it becomes hard for students to gather information by mere words. Therefore, a lot of teachers who incorporate multimedia based instruction in their lectures.

Different people have different definition of multimedia instruction. For some, it is a presentation with combination of text, graphics, animation, and sound. For some, watching a video on television can be a multimedia experience. PowerPoint presentation followed by instruction by the teacher can be multimedia instruction for some. Regular chalk and talk can be multimedia instruction for some, and reading a book with graphics can be multimedia instruction too! The definition will vary with the expectation of an individual, and so will be the learning experience. Every student has a different way of learning: some are kinesthetic learners, some are visual and some are auditory. Multimedia provides learning opportunity to each type.

Use of multimedia becomes very important in online classes. This tool helps the teacher to deliver lectures to the students, is an effective tool for communication between students and teachers, and helps in creating an ambiance of learning for students. As discussed earlier, teachers use one form or combination of many multimedia options in their classes to enhance learning. Different types of multimedia used in online classes are:

- Video
- Hypermedia
- Computer simulations
- PowerPoint/Prezi
- Digital books

Much research has been done, and is still in progress to find a solution for effective learning techniques. This

paper will focus on one such theory called Cognitive Load Theory.

### **Cognitive Load Theory**

Cognitive Load Theory is one of the popular choices of educational psychologists and instructional designers to create effective educational materials for their students. The last 25 years has seen a big demand in use of this theory as the basis of research. Cognitive Load Theory is a psychological theory, as it tries to explain psychological/behavioral phenomena resulting from instruction. Cognitive Load Theory is also known as CLT. English researcher John Sweller developed it in late 1970s. The theory focuses on human memory. Humans learn using two kinds of memories: working memory and long-term memory.

1. "Working memory is the active component, and its main role is conscious processing. It has a very limited storage capacity, and can be easily overloaded if lot of information is supplied at a same time."
2. "Long term memory is the main knowledge repository."

A lot of research has been done on using the knowledge of working memory and long-term memory to help students learn faster and better. The objective of Cognitive Load Theory is to predict learning outcomes by taking into consideration the capabilities and limitations of the human cognitive architecture. This theory was selected as the framework for this paper because this theory can be applied to different learning environments, as it links the design characteristics of learning materials to principles of human information processing. CLT is based on the idea that effective learning can be achieved only if it is designed in the way the human mind works. CLT emphasis the point that if we have good knowledge of the human brain's strength and weaknesses, one can apply this in creating an effective learning environment, which will not only ensure learning aspect but recalling and applying aspect as well.

### **Measuring Cognitive Load of Multimedia Use**

Cognitive Load Theory has been used for past 30 years as the basis for instructional design. It is used as a tool to measure cognitive load on the lectures presented to students. "Researchers have identified different sources that contribute to cognitive load, formulated principles of instructional design that are based on Cognitive Load Theory (CLT), and learned how to design instructional strategies and activities that reduce certain types of load"(Brünken, Plass Leutner, 1999). In the journal paper "Direct Measurement of Cognitive Load in Multimedia Learning" the authors suggest that based on different cognitive load sources, three types of load are identified: "one type that is attributed to the

inherent structure and complexity of the instructional materials and cannot be influenced by the instructional designer, and two types that are imposed by the requirements of the instruction and can, therefore, be manipulated by the instructional designer.” (Brünken, Plass Leutner,1999). Many research theories suggest that measuring cognitive load can help in delivering effective learning materials.

Cognitive load is measured assuming one important aspect of human brain, which states that, “Humans possess separate information processing channels for visually represented material and auditorily represented material” (Sawaya F. Sandra, 2010). This is also known as dual channel theory. The theory states that the human memory is dual channeled, i.e. the visual and auditory stimuli are processed separately. If a visual stimulus is presented to a student, he/she will initially process it in the visual channel. Similarly, on presenting an auditory stimulus, it will be initially processed in the auditory channel (Sawaya F. Sandra, 2010).

All these research theories suggest that, multimedia tools can help in promoting a learning induced environment. Multimedia presents information in two modalities, auditory and visual. These two modalities will help in processing the given information in different channels. This will help the students in understanding the problem easily. This can be explained better with a traffic analogy. By dividing the traffic on two lanes instead of a single lane, the traffic jam situation can be avoided. Similarly, by dividing the information in two channels, the overloading of one channel can be avoided (Sawaya F. Sandra, 2010). Even though multimedia helps in reducing the cognitive load on students, if not planned properly, it can cause extra load as well. Animation, if used extensively, can result in distraction for students, and may cause overloading of a particular channel. It becomes important for faculty to design lectures to create a balance between both the channels.

## METHODOLOGY

### Sampling technique:

Survey was used as mode for collecting samples for the study. Two surveys were designed, one for GIT faculty and one for GIT students.

### Survey Instrument:

Two surveys were designed using Survey Monkey, an online survey development cloud based company. These surveys were sent electronically to GIT students and faculty. The survey for students comprises of 9 questions, and a time period of seven days was given to finish this survey. The faculty survey consists of 8 questions, and like students, was given a time frame of

a week to finish it. No reminder email or messages were sent to any group.

### Data Collection:

The collected data was aggregated and screenshots were taken of each question for graphical display. As the percentage of data collected was small, all data was included to capture the outliers. The responses will be shown through graphs.

## RESULT OF THE PROJECT

### Survey Response Rate:

The survey was designed for two different groups, faculty and students. The response rate of faculty was 60% where 6 out of 10 faculty members responded to the survey. A total number of 739 students are enrolled in GIT this semester (including online classes). The response rate of students was 7.04%. 52 students responded to the survey over the period of seven days.

### Presentation of Survey Result:

#### Students' responses

Quest.1: What is your academic standing?

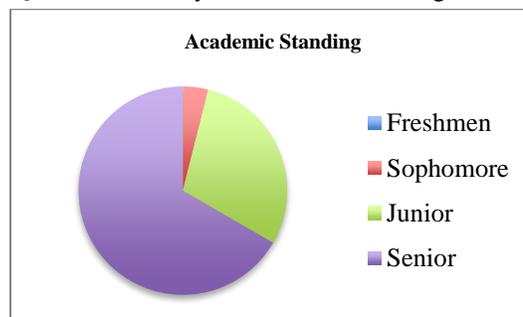


Fig 1: n=52 (n is number of students)

Quest.2: How many classes are you taking this semester?

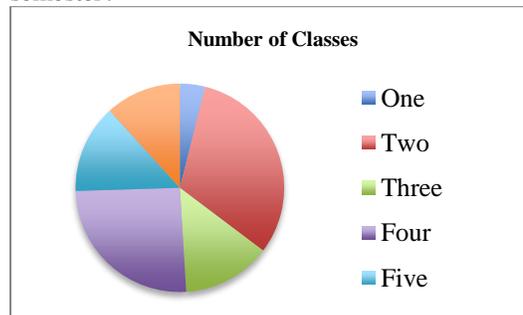


Fig 2: n=52 (n is number of students)

Quest.3: How many online classes are you taking this semester?

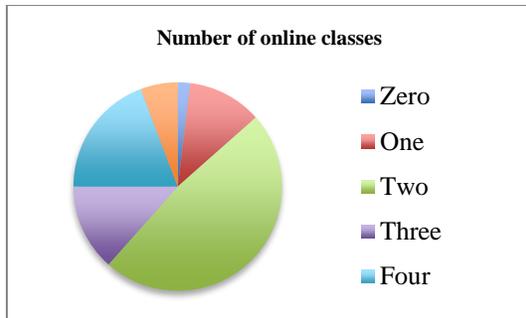


Fig 3: n=52 (n is number of students)

Quest.4: Which mode of class do you prefer?

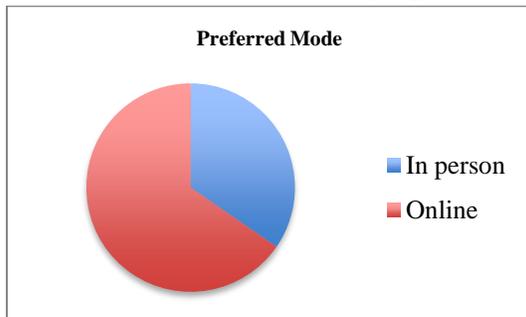


Fig 4: n=52 (n is number of students)

Quest.5: Why do you prefer this particular mode (online or in person)?

50 students answered this question and 2 students skipped it. Most of the students favored online classes over in-person, because of its convenience, 24-hour availability, cost effectiveness, and flexibility of schedule. Some students responded positively to in-person classes as well. They felt that in person classes helps in effective communication with faculty and classmates and easy access to teacher aid.

Quest.6: What is lacking in online classes as per you? (Click more than one if necessary)

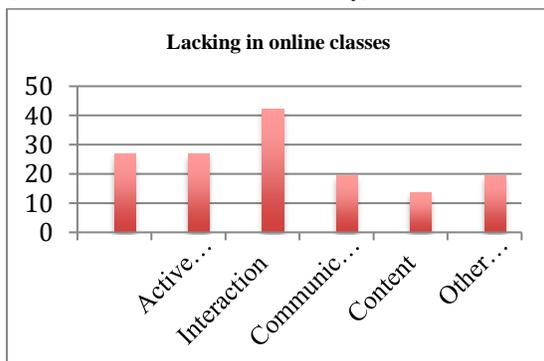


Fig 5: n=52 (n is number of students)

Quest.7: What types of multimedia are used in your online classes? (Click more than one if necessary)

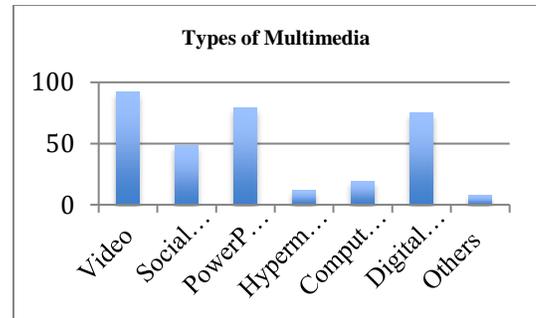


Fig 6: n=52 (n is number of students)

Quest.8: Which mode of multimedia do you prefer and why?

45 students answered this question, and 7 students skipped the question. Most of the students preferred video multimedia option, as it is the most interactive option. They also felt that video instructions are easy to follow and replicate for their assignments and projects. Some students liked PowerPoint slides, as they are easy to print out and easily accessible for reference.

Quest.9: Any suggestion for incorporating other multimedia for classroom?

31 students answered this question and 21 skipped it. Most students feel that social media and tools like Skype can be used for more interaction with the faculty and other students. Some students felt that there should be a provision of at least one in-person lecture. They believed that this would help them in getting accustomed to the new learning environment, and a chance to interact with classmates and the faculty.

### Faculty's Responses

Quest.1: How many classes are you teaching this semester?

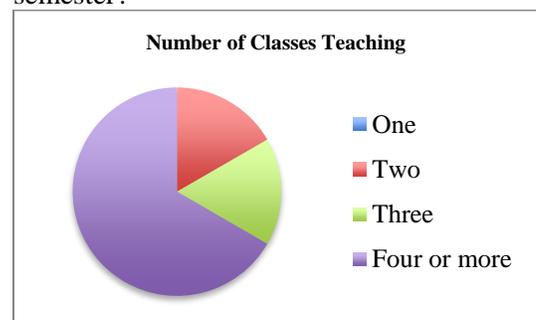


Fig 7: n=7 (n is number of faculty)

Quest.2: How many online classes are you teaching this semester?

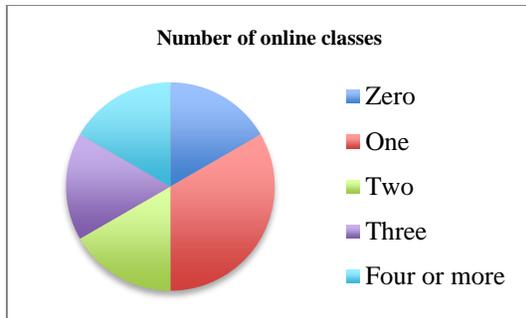


Fig 8: n=7 (n is number of faculty)

Quest.3: Which mode of classes do you prefer?

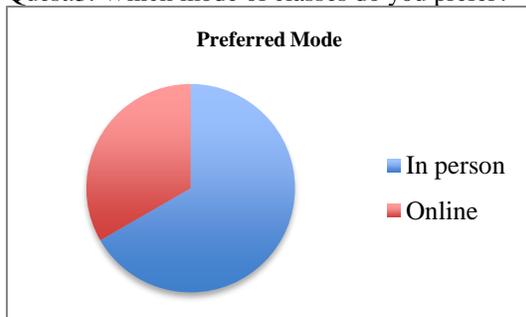


Fig 9: n=7 (n is number of faculty)

Quest.4: Why do you prefer this particular mode (online or in person)?

6 faculty members responded to this question. Most of them felt that in-person classes provided an opportunity to interact with students, and found it easy to explain questions in person rather than over the emails.

Quest.5: What types of multimedia are used in your classes? (Click more than one if necessary)

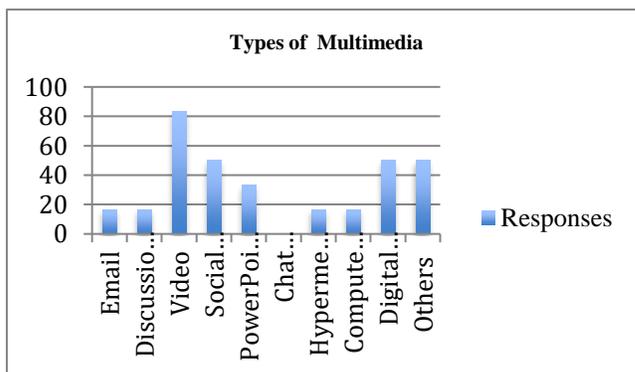


Fig 10: n=7 (n is number of faculty)

Quest.6: Which mode do you prefer and why?

6 faculty members answered this question. There was not a consensus in this question. Some faculty responded positively to video, because of its

interactivity. Some felt social media has great potential in filling gap in terms of communication.

Quest7: What is lacking in your online classes (as per you)? (Click more than one if necessary)

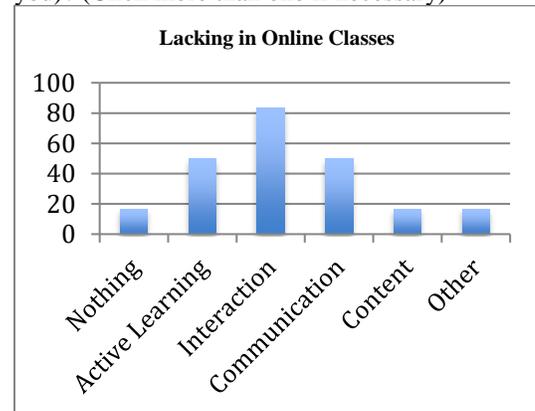


Fig 11: n=7 (n is number of faculty)

Quest.8: Any suggestions for incorporating other multimedia for classrooms?

3 faculty members responded to this question, and 3 skipped it. Each respondent had a different perspective for this question. One respondent felt that social media is still not used to its full potential in online classrooms, and should be incorporated more. Second respondent stressed the idea of incorporating more synchronous media delivery in online classroom, and the third respondent felt on-line textbook can help in improving the learning environment.

## CONCLUSION AND RECOMMENDATION

### Summary

Online education has attracted attention of students all across the world. The convenience, cost effectiveness, and 24/7 availability has also impacted the rising trend positively. This study looked at first choice of mode of learning among students and faculty, and preference in multimedia options among the same group. What are the gaps between online and in person education? How does multimedia help in filling this gap?

### Conclusion

- 96.1% GIT students are taking more than one class this semester, and 86.5% students are taking more than one online class.
- Online education is becoming the preferred mode of education among the students, as 65.38% students responded positively to this mode.
- Online mode is preferred mode because of its convenience, cost effectiveness, flexibility, and 24/7 availability.
- 42.3% student feel that online classes lack interaction between faculty and students, and

22% students feel active learning is missing in these classes

- 92.3% students feel that video is a good multimedia option as it is easy to follow and is a more interactive option.
- 79% students chose PowerPoint/Prezi, and 75% selected Digital books as good multimedia options.
- 67% faculty are teaching four or more classes this semester, and 50% are teaching more than one online class.
- 67% faculty chose in-person classes as their preferred mode of teaching. They felt that in-person classes are better in terms of interaction and communication
- 83.3% faculty use video in their online classes to help students, 50% faculty use social media and PowerPoint slides in their classes.
- 83.3% faculty feel that online classes lack interaction. 50% feel that these classes lack active learning and communication.

This study shows that there is a gap between faculty and students' thinking. Online classes are the preferred mode for students, but faculty were more inclined towards in-person classes. Convenience was the decisive factor for students, and their choice was influenced by this factor. Faculty's response was influenced by the lack of interactivity and communication gap in online classes. Both sample groups feel that online classes lack interactivity, communication, and active learning. Both the group members stressed the idea of including some method to induce interaction and active learning in online classes. Social media and communication tools like Skype were rated high for their role in communication. Both the groups voted video as the most impactful multimedia option. Both the sampling groups vouched for the effectiveness of video in sharing ideas and learning new skills. Multimedia definitely has impacted the GIT online classes and helped students to reach their goals. The impact of multimedia use in online classes cannot be dismissed, but are the current efforts enough or is there a greater need of research to help students? The answer to these questions is yes. A lot of research needs to be done to help students learn, because for better or for worse, online classes are the future of learning!

#### **Recommendation**

After analyzing the results of the surveys and research studies on effective learning techniques, I feel that though the steps taken by faculty in online classes are in the right direction, they are not enough. I would recommend the following solutions to resolve the issue:

- Stronger involvement of communication tools like Skype, Google hangouts, and Adobe

Connect. This will resolve the issue of lack of communication and interaction between faculty and students.

- Informal communication through social media (such as Youtube, Vimeo, Facebook, and Twitter) as a platform to reach out to the students. This will be helpful in creating informal interaction among students, which usually lacks in online classes.
- Incorporation of multimedia in lectures, but the cognitive load on students should be considered along with the interaction part. Learning should be fun and interactive, but not at the cost of distraction and extra cognitive load on the students. This will help in producing learning materials that will help all type of learners to get most out of the class.

Multimedia can be a boon if used effectively and wisely. I hope that the new generation online classes will have a balance of all aspects of learning. I have a positive feeling that next generation technology savvy students will be able to make most of their situation through these tools.

#### **References**

- Price, J. (2010, June 7). Definition of Online Education. Retrieved September 15, 2015, from [http://www.ehow.com/about\\_6600628\\_definition-online-education.html](http://www.ehow.com/about_6600628_definition-online-education.html)
- Foundations of educational theory for online learning. (2004). In Theory and Practice of Online Learning. California: Athabasca University.
- How do we Learn? (n.d.). Retrieved from <http://general-psychology.weebly.com/how-do-we-learn.html>
- Nafukho, F., & Irby, B. (n.d.). Learner's Perception of Engagement in Online Learning. In Handbook of Research on Innovative Technology Innovation in Higher Education. Texas: Texas A & M university.
- Ni, A. (n.d.). Comparing the Effectiveness of Classroom and Online Learning: Teaching Research Methods. NASPA.
- Dunlosky, J., Rawson, K., Marsh, E., Nathan, M., & Willingham, D. (2013). Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. Sage Journals.
- Moore, M., & Kearsley, G. (n.d.). Scope of Distance Learning. In Distance Education: A systems view of online learning (Third ed.). Wadsworth Cengage learning.

- Mayer, R. (2009). Introduction to Multimedia Learning. In *Multimedia Learning* (Second ed.). Santa Barbara, California: Cambridge Press.
- Plass, J., Moreno, R., & Brunken, R. (Eds.). (n.d.). Cognitive load theory. Frontmatter.
- Clark, R.C. & Nguyen, F. & Sweller, J. (2006). *Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load*. San Francisco, CA: Pfeiffer. Miller, G. A. (1956).
- The Magical Number Seven. Retrieved September 20, 2008, from Music Animation Machine Web site: <http://www.musanim.com/miller1956/> Schnotz, W. & Kurschner, C. (2007).
- A Reconsideration of Cognitive Load Theory. *Educational Psychology Review*. Volume 19, Number 4 / December, 2007, 469-508.
- Sawaya, S. (2010). Reducing Cognitive Load in Multimedia Learning.
- Roland Brunken , Jan L. Plass & Detlev Leutner (2003) Direct Measurement of Cognitive Load in Multimedia Learning, *Educational Psychologist*, 38:1, 53-61, DOI: 10.1207/ S15326985EP3801\_7