

University of Delaware

## Using Multimedia in the Classroom:

What are the Effects on Young Children?

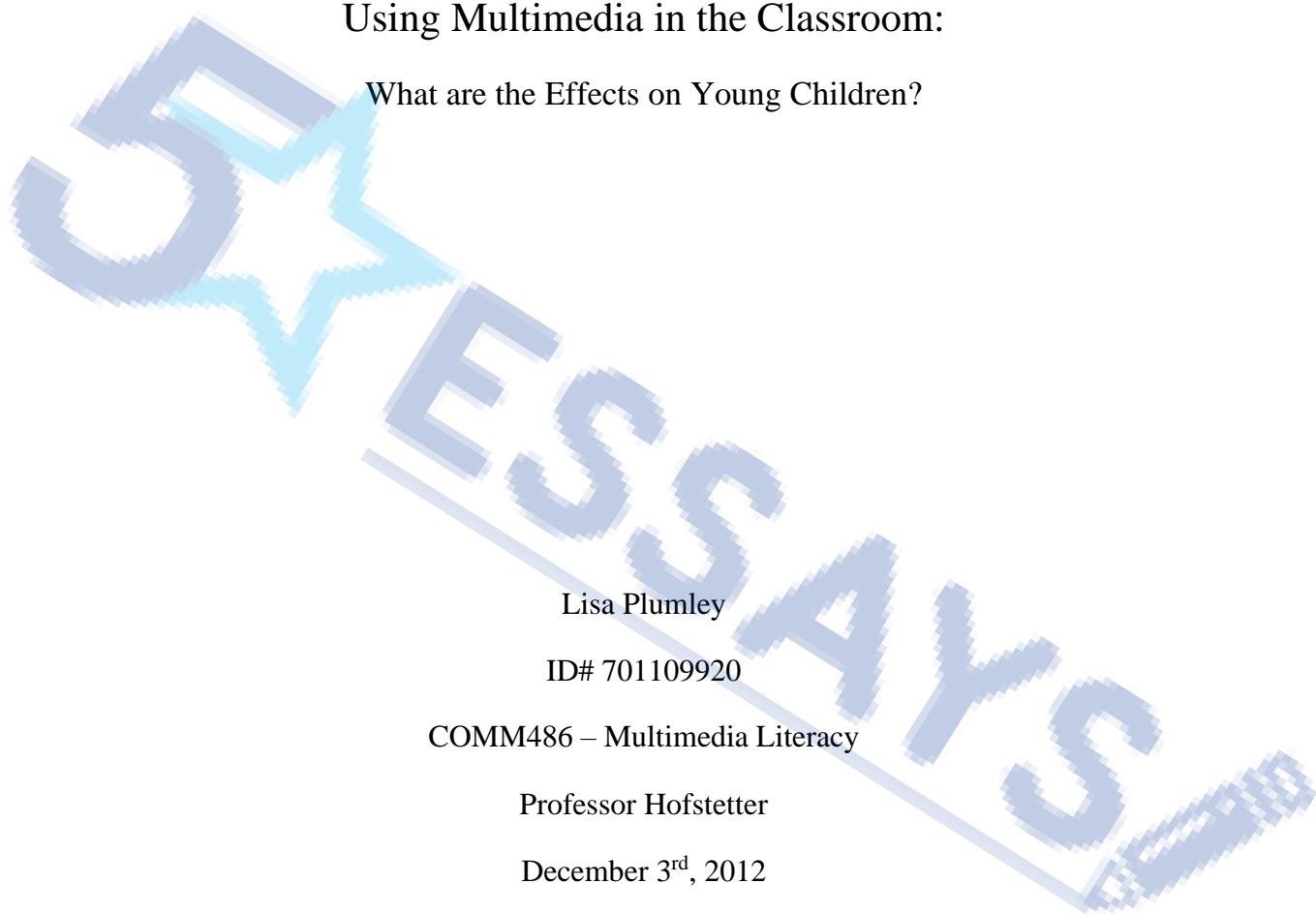
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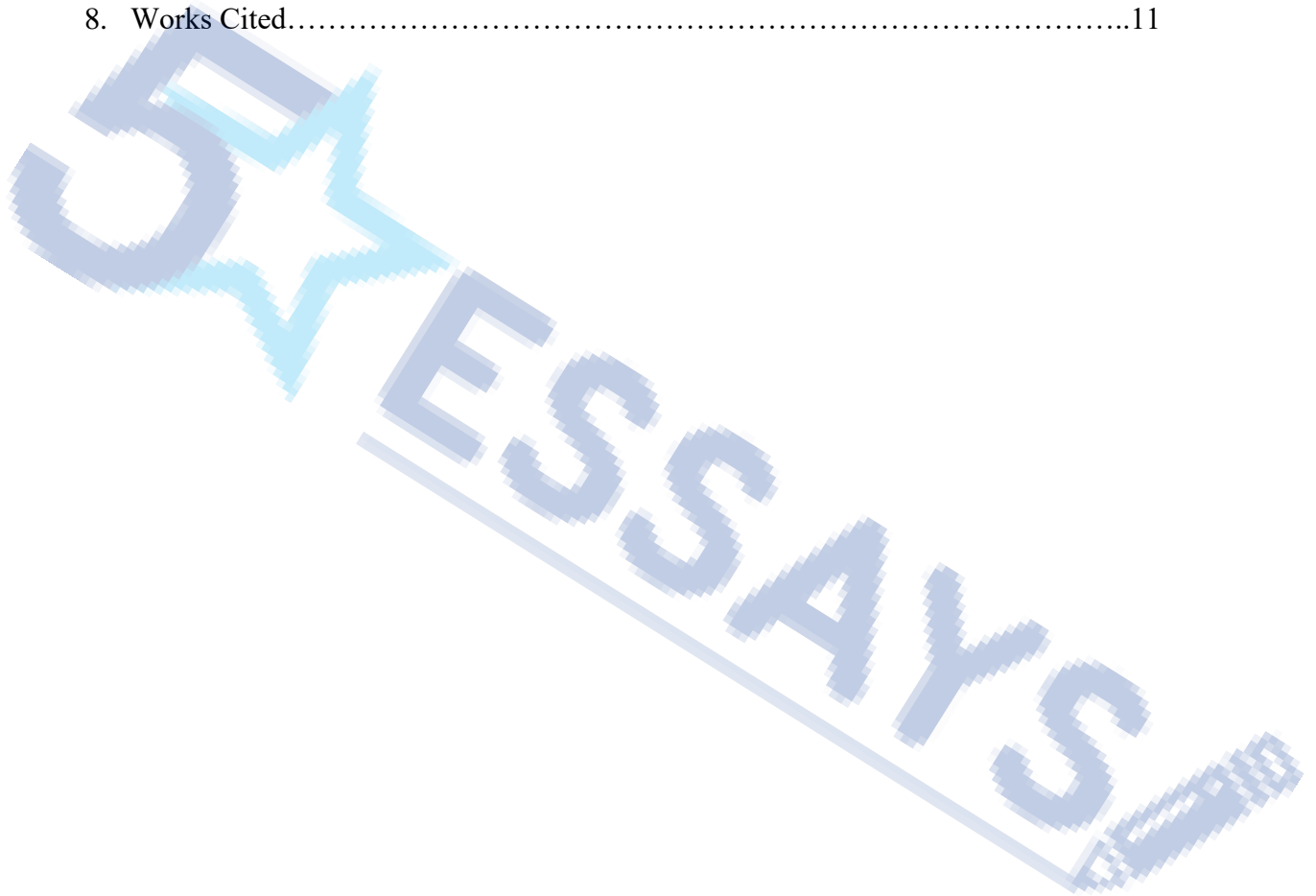
## Abstract

This paper reviews the increasingly common forms of multimedia which educators use in teaching younger children. It discusses the intended purposes and forms of usage in a classroom setting, and how it relates to basic and traditional goals and theories of early childhood development. This paper also addresses numerous observed positive effects on the education and development of children which are taught using different means of multimedia. Lastly, this paper discusses and explores ways in which using multimedia may negatively affect a few aspects of early childhood development and may also influence destructive learning-based habits.



## Table of Contents

1. Introduction.....	4
2. Types of Multimedia in the Classroom.....	4
3. Purposes and Educator Uses.....	5
4. Early Childhood Development and Education.....	6
5. Positive Effects on Children.....	7
6. Negative Effects on Children.....	9
7. Conclusion.....	10
8. Works Cited.....	11



## 1. Introduction

Given the many technological advances in the 21<sup>st</sup> century, using multimedia in the classroom has become wildly popular with today's teachers. There are many different forms/types of educational multimedia, which can be used in a variety of ways by teachers and students. Using this new technology in the classroom is a great way for educators to relay information, get a particular point across to students, and to better capture students' attention. For young students in particular, this type of educational stimulation may result in numerous positive effects on early childhood development and skill building. This technology can also be presented in forms which can help struggling students keep up to the pace of their classmates, and can aid significantly in the education of students with disabilities. However, overusing this type of educational stimulation may also lead to attention problems or deficiencies.

## 2. Types of Multimedia in the Classroom

Multimedia can be defined as information presented in a variety of multiple media forms, such as text, audio, graphics, and animation. Hypermedia is also term that describes a form of multimedia. Hypermedia (or hypertext) is defined as an informational medium involving the linking of audio and text or video and text. Multimedia is primarily computerized, as it offers the easiest way to create graphics and presentations. It can also be displayed digitally, using CD-ROMs or DVDs. The most common classroom applications of multimedia include digital text, CD-ROM storybooks, video, and computer simulations.

Digital text (also known as "talking books") is essentially a textbook which has recorded messages. These messages can be a recorded human voice, or a synthetic "text-to-speech" program. This kind of speech synthesis can have a variety of feedback formats, such as passages, sentences, single words, rhymes, or syllables (Borgh and Dickson, 533-544). This benefits early-learners in providing the sound confirmation for forming words, and helps the reader follow along with the text if he or she is having difficulty following along. This is also a considerably beneficial tool for those (of any age) to learn a foreign language.

The late 20<sup>th</sup> century gave rise to the CD-ROM, which has data storage and media/audio playback capability. This is very useful for educational purposes, such as CD-ROM storybooks. These combine story texts along with other forms of media such as animations and/or audio (Doty, Popplewell and Byers, 374-384). This is a helpful tool to engage children and students while incorporating the basics for key literacy skills.

Using videos in the classroom has recently become more common due to its wide variety of uses for any subject or curriculum. In particular, videos are great for presenting real-world situations and contexts to what they are studying, while engaging and inspiring students with respect to the subject matter.

Computer simulations are computer-generated versions of real-world objects, situations, or processes. Often created as interactive learning tools, these simulations provide the user with the opportunity to observe and even manipulate the phenomena (Woodward, Carnine, and Gersten, 72-86). This helps the user to visualize and form another perspective on what they are observing, which is a key learning tool in developing conceptual models and skills.

### 3. Purposes and Educator Uses

Educators typically use interactive multimedia with the purpose of engaging their students in a subject matter. This may be done by changing student and teacher roles, improving technical and design skills, and increasing the use of outside resources. This helps in introducing real-world skills related to technology, collaboration techniques, the challenges of communicating to different audiences, and how to express their ideas creatively (“Overview of Multimedia”).

In a normal classroom setting, the student is playing a passive role as a recipient of information, typically by a teacher or textbook. Giving students a task using technology as a tool for communication reinforces an active, rather than passive, role in transmitting information. The student then must choose how to obtain, generate, manipulate, and/or display information. Upon doing this, the teacher also changes their role, from the center of attention and transmitter of information, to supporting the students’ individual or group leadership (Singh and Barbra). Teachers may question the students about their ideas and design choices, putting the teacher in more of a “coaching” or supportive position, which encourages creativity and individualism in students.

Children of all ages seem to show increasing capability in acquiring technology skills, particularly of those used in in-class multimedia activities. Although these initial skills may differ from future applications, they provide a basic understanding of how various computer tools and applications behave and grant the student the ability to be comfortable and confident in working with computers and technology (Singh and Barbra). This is a very important quality and skill set to have due to the rise in technology of our era.

Teachers may choose to enhance students’ literacy skills by giving them a task to perform literature-based research or to write an essay from a credible source. This is often done on an online database, where students are able to access a multitude of information on nearly any subject matter. This is a great way for students to explore and learn about topics or read a variety of literature that they likely may not be able to otherwise. This is also a great way for teachers to educate students on the importance of the validity of resources. This is an important mind-set to have while exploring the internet and other online or multimedia technologies.

While many educators view multimedia as a positive influence in the classroom, there are a few obstacles an educator must face while using multimedia technology. For one, if an educator is not particularly skilled in this kind of technology, they might find it difficult to operate in the classroom, or will struggle with editing or creating a desired form of media which they wish to

present. This can cause overall frustration and a waste of class time. Teachers that may desire to upgrade or introduce new classroom technology may also face the issue of cost. Many schools, particularly early education institutions, lack the funding required to purchase and maintain such technology. This is an unfortunate scenario in that newer classroom technology provides numerous benefits for the educator and their students.

#### 4. Early Childhood Development and Education

Two significant psychologists of the 20<sup>th</sup> century, Jean Piaget and Lev Vygotski, theorized the nature and development of human intelligence, starting with basic childhood development traits and stages. Piaget developed the theory of cognitive development, or “developmental stage theory”, which categorizes the developmental “stages” which humans gradually acquire. Vygotski established a few major themes in the cognitive development of children, including the Zone of Proximal Development (ZPD) and the correlation between social interaction and cognitive development (“Social Development Theory”). These two psychologists/philosophers had a large influence on the way educational institutions constructed their methods and standards for education and instruction, particularly in North America and Europe. These theories not only tie directly into early educational practice, but in the methods of technology and multimedia utilized in the classroom.

Jean Piaget theorized that cognitive development was a progressive organization and reorganization of mental processes as a result of biological maturation and environmental and social experience, focusing on the operative aspect of intelligence (McLeod). He believed that at any time, operative intelligence frames how the world is understood and it changes if understanding is not initially successful; this involves two basic functions of assimilation and accommodation (how humans perceive and adapt to new processes) (Crawford, 43-62). Piaget’s belief of this assimilation involved the integration of external elements into structures of life, environments, or those one could have through actual experience.

Piaget’s theory revolutionized the way educators must look at the development of young children. He made a strong point that their way of thinking is strikingly different than that of adults, and must be treated as such (McLeod). Children construct an understanding of the world around them and then experience discrepancies between what they already know and what they discover in their environment, so this “discovery learning” proves to be very important. In a strictly educational sense, this theory relates to the encouragement of individual learning, the centrality of play, and overall flexibility in the curriculum to allow time for individual children to catch up or remain at a desired stage/level of development. This stresses the importance of active discovery learning; a goal which can be achieved through everyday experience, real-world classroom examples, and now, multimedia representation of objects and situations. These may include storybooks or even animations, each stimulating the basic assimilation and accommodation aspect of cognitive development which Piaget had theorized.

Where Jean Piaget focused more on the general developmental stages of children, Lev Vygotski believed that cognitive development should be analyzed as a lifelong process, and not in completed stages. Vygotsky proposed the Zone of Proximal Development (ZPD) theory, which bridges the gap between what is known and what can be known. He had defined this to be the zone in which learning can occur. Because of this idea, Vygotsky focused on the connections between people and the cultural context in which they act and interact in shared experiences (Crawford, 43-62). He explains that humans use tools that develop from a culture (such as speech and writing) to mediate their social environments, stressing the importance of social interaction on the propagation of cognitive development.

Based on Vygotsky's theory, an ideal classroom would be one in which peer instruction/collaboration and small group instruction capability is encouraged. The learning material would be structured to promote student interaction at a level which is just above the student's current developmental level. Teachers then must engage in students' interests and motivate the students to actively pursue a set goal and/or engage in an activity in order to help facilitate meaning construction ("Social Development Theory"). Multimedia easily integrates into this classroom model, where social and interactive types (such as video lessons or group multimedia-related projects) encourage peer collaboration and creativity. These can also help reinforce speech, writing, and general communication skills. Vygotski believed that progressively building these skills lead to higher thinking skills ("Social Development Theory").

#### 5. Positive Effects on Children

Along with stimulating and motivating students, using multimedia and hypermedia technologies have proven themselves to be a fun, useful way to educate young children while also having a positive effect on the learning comprehension and technology skills of young children. This technology, when applied to a certain content area, such as literacy, can significantly improve young students' strategy use, vocabulary development, metacognition, and reading motivation and comprehension (O'Hara and Pritchard). Although multimedia technology used for literacy purposes is very common, multimedia can enhance learning and early development in a multitude of ways.

It is understood that multimedia presentations in the classroom can create stronger memory links than text alone. This type of technology is also typically capable of media playbacks, which is a helpful tool when students need clarification on material or are having a hard time keeping up with the pace of the presented material (O'Hara and Pritchard). For example, Speech-to-text tools can be a useful aid for children writing an essay or short story. This tool is especially helpful and comforting for students struggling with fine motor skills or basic keyboarding skills. Therefore, using these audio/visual tools in the classroom (and also at home) is of particular importance in educating young students, especially in cases where one is dealing with various educational levels. J.R. Williams reviewed approximately 100 literature studies based on the use

of multimedia in instruction and found that combining visual and verbal information can lead to enhanced comprehension (1447-451).

The concept of using computers in education today is profound in that the internet opens many doors for learning any subject, anywhere around the world, over any time period, and with many different sources of information. This provides the classroom accessibility outside the classroom, broadening the worldly view of young students. Children can learn to navigate through the internet and search engines, learning what is credible and what is not while doing research or other activities. This allows a fun way for students to explore and learn a vast array of information, which is a critical skill to develop at an early age, as the typical student will be required to do more advanced learning and research in the future while implementing these basic technology skills.

Performing multimedia-based projects in the classroom also has its many benefits for the young student. These types of projects are engaging and motivating for students of any age, and heighten project-based learning and authoring skills in a dynamic setting (Lachs). Group projects of this type are particularly helpful in stimulating the student's individual creativity, while also reinforcing the development of team/group work and collaboration skills, which are very important techniques to develop at an early age. These projects (if asked to present) demand that the student considers and faces the challenge of communicating to a particular audience, stress presentation and speaking skills, expressing ideas creatively, and how to accept and provide constructive feedback amongst their group or others. Incorporating this technology into projects is a great way for the student to develop these essential skills, while having fun and learning about the impact and importance of different media.

Interactive multimedia, in particular, requires students to engage themselves in the learning material. This often comes in the form of a computer game or story, where the user will have a degree of control of the narrative and direction of a story by clicking and moving around the screen. This sense of control helps stimulate the user's interest in the material, making it seem more of a fun game, rather than an educational program or activity (Lachs). Teachers can obtain interactive programs in forms such as storyboards, puzzles, quizzes, or problem-solving programs for any subject-matter. Interactive storyboards, for example, provide a different approach to literacy and improving decision-making skills.

Not only is the use of multimedia practiced to benefit the average classroom, but is used in the aid of students with disabilities in particular. Disabled children are usually taught in separate, inclusive classrooms or schools which accommodate their needs. However, the main goal of improving and assessing the child's education and development is the same. This then stresses the importance of keeping them up to par with their classmates, considering each student's unique situation or disability. Educational software and multimedia has become an important tool in these inclusive classrooms, often for students' personal use. Disabled students can learn to use computer programs designed to simulate hands-on or other interactive projects or activities



that they would otherwise be unable to participate in, such as a chemistry experiment (Shapiro). Vision-impaired students can learn to use audio-based media programs that may also be incorporated with braille, to further improve their literacy skills without being hindered by their visual disability. Multimedia is also an exceptionally useful tool for students with a hearing impairment, as they can be involved in a lesson or activity like a video or media presentation with the capability of subtitles. These students are then provided with the same material and have the same learning advantage as a student without disability. Although these students can often fall behind on a standard curriculum due to their disability, using multimedia can aid in a multitude of ways as programs can be edited and adapted to meet the needs of individual students. This allows them to reap the benefits of an educational lesson when they otherwise may have been left out (Shapiro).

#### 6. Negative Effects on Children

Although numerous positive effects of using multimedia in the classroom have been presented, many challenge this with observations of certain negative effects on children. During some study analysis research, Y. C. Liao found that while multimedia/hypermedia improved learning achievement in medicine, science, and literacy, a decrease in learning achievement was observed in a few other subject areas such as art and music (Liao, 255-77). Some of these negative observations include taking away valuable learning time, turning educational experiences into games for children, hindering education/development by overuse of multimedia presentations, and creating present or future attention deficit problems due to over-stimulation.

Today, with the standard for curriculums becoming more material-loaded and time deficient, educators are pressed to make every minute count while teaching. If a student is not familiar with technology or multimedia programs, they are often left behind in technology-based programs as they have not acquired the basic skills in order to run such programs or activities. Also, if a teacher is unfamiliar or inexperienced in using multimedia technology in the classroom, valuable student time is often wasted with technical problems (Klaus). This again stresses the importance of basic technology skills in early learning, so that when integrated into instruction, students will be able to keep up with the pace of the activity and learning time will not be wasted.

Another problem often faced when using computer programs in the classroom is that the students will take the learning program (such as an interactive multimedia activity) and focus on the game-aspect, rather than absorbing the material and learning objective of the activity. Many students, when asked to do some sort of work on a computer, will often get distracted and use this opportunity to surf the internet or play games. If children are primarily using computer time at home for game playing or web surfing, it is likely that they will be tempted to do the same during computer time in the classroom (Klaus).

The overuse of technology and multimedia can lead to a variety of problems. Most students learn best when engaged and interacting mentally and/or physically in what they are learning and

studying. If the majority of their instruction is done using a computer, the students' educational needs are not met. This can cause present and/or future learning problems and even disabilities.

Although there is a variety of theoretical and medical causes of attention deficit disorders (ADD and ADHD) in children, surveys have found that young children who spend more than two hours per day in front of a computer, TV, or other type of "screen", increased their odds of exceeding the average level of attention problems by 67% (Joelvig). Generally, multimedia in the classroom is aimed to be primarily educational; however, even playing relevant movies or other media presentations regularly, may have the same effect. This induces the idea that learning problems may be caused if children are constantly stimulated in the classroom by similar educational techniques and have little, if any downtime for personal creativity and non-stimulated learning. Children tend to form habits from adapting to frequent situations, and if they are constantly stimulated at school (or even at home in front of the TV or computer) the child may form a dependence on this type of learning technique. This makes learning more difficult for the child under non-stimulating conditions such as lecturing or reading text, and may cause the child to lose interest in these methods/forms of education. This may even lead to future learning and attention problems, such as in high school or college, where students are expected to listen to a lecture or read textbooks in order to learn, and stimulating means of education (like multimedia technology) is not as common.

## 7. Conclusion

As technology has become more advanced and complex over time, its integration in the typical classroom has become more frequent and involved. Multimedia in particular has become a popular instructional and interactive tool used by educators. This can include presented material such as video/audio clips, PowerPoints, or computer simulations. It can also include multimedia for students' independent use such as eBooks, interactive storybooks, or educational computer games. Integrating multimedia into an early childhood education program has proved to be a helpful aid in developing fine motor and technology skills, encouraging creativity and independent thinking/decision-making, and capturing and holding the attention of the students. However, overuse of multimedia in the classroom and at home may cause children to develop attention deficiency or hyperactivity problems due to overstimulation. Not only has the integration of multimedia been observed to improve only particular areas of study, but every child learns differently and processes/absorbs information at different paces. Therefore, different learning techniques using multimedia (by educators) will affect each child differently and can either aid or hinder a child's early education and development.

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