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Theory development for the use of DVD technology based on brain research

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THEORY DEVELOPMENT FOR THE USE OF DVD TECHNOLOGY BASED ON BRAIN RESEARCH

A Project

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ABSTRACT

The purpose of this thesis was properly refined to identify and produce a practical mode of technology for implementing brain based research that can be effortlessly utilized by classroom teachers to enhance instruction through incorporation of visual and motion activities supported by brain based research.

The diverse new uses and technology surrounding DVDs is developing at such a rapid pace, in fact, that most current information becomes outdated before it hits print; the sure sign of a hot technological commodity. DVDs provide up to seven times more storage space than other disk storage systems, offer faster access speeds, and crystal clear, cinema quality, video picture. Recently DVDs have been making their mark on the educational scene in replace of CD-ROM technology. The purpose of this thesis has been narrowed to include the purpose of DVD implementing brain based research that can be effortlessly utilized by classroom teachers to enhance instruction through incorporation of both visual and motion activities.

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CHAPTER ONE

OVERVIEW OF THE THESIS

Introduction

The state of public education has been the subject of consternation for many decades and the standards movement of the current administration is only the most recent of many attempts by officials to try and effect change in a distressed system. However, the question that needs answering is not how to motivate teachers to teach, but how should they teach in order for children to learn. Or more pointedly, how do children learn and therefore, making use of the diverse and vast quantity of technology at our disposal, how should we teach. In an effort to utilize cutting edge educational research and technology, this project will apply the latest in brain based research to the construction of educational technology in order to show the effectiveness of using a moving visual medium in classroom instruction.

Context of the Problem

Brain based research has been the subject of scientific study since the mid 1800's when Hitzig and Fritsch first discovered that the areas of the brain responsible for movement could be located in the cerebral cortex. However, the results of this fascinating field of research, which have such diverse applications in the field of education, have not found their way into general practice. Despite the fact that numerous studies have consistently proven that arts programs focusing on visual creativity and physical education classes focusing on movement are more effective than discipline or standards in effecting achievement, special subjects continue to be dropped from curriculums in favor of extra practice in basic skills (Kearney, 1996[TCT1]; Sharma, 1997[TCT2]). The current educational system is not making effective use of the resources available, nor putting into practice the volumes of relevant research that could make a difference in what our children learn.

This country has developed a very rich, visual, mobile, multicultural society with countless readily available modes of technology. In our midst we also have access to cutting edge research in scientific fields. Brain research demonstrates that our bodies, eyes and brains are all inherently connected and that no single organ has one unilateral purpose. The old vision of a seeing eye and understanding brain are really just an archaic myth which has been replaced by what we now recognize as a perceiving individual (Kindler, 2003). Our visual culture is cultivating the visual-spatial sense of our people, but schools are still failing to make full use of visual mediums in instructional practice.

Most recently, studies of brain-based learning have shown that exercise can increase cognitive ability in children. This has specific applications for the field of education and draws into discussion such questions as how an increasingly sedentary lifestyle in this country is effecting is affecting its youth. It also brings into question current methodology for dealing with Attention Deficit Disorder and whether or not these interventions are on par with what we know about the brain (Hannaford, 1995[TCT3]). The implementation of progressive technology is another area in which education consistently lags behind business and the private sector. Technological education needs to go beyond mere physical access to computers and the internet (Gorski, 2002). Based on brain-based research, instructional methodology should consistently incorporate visual and movement activities into the daily educational program of all students; advancements in technology provide a variety of mediums for carrying out these practices.

Purpose of the Thesis

Current drive in education is for instruction to be implemented with research based best practices, those methods that have been substantiated through study as being effective. However, advancements in technology and revelations of new research often promote the development of innovative instructional practices that, by definition cannot be validated by prior results. In order to develop new methods, previously untried instructional practices, it is important to ensure that the foundation for such development is secure in research. Therefore this thesis will attempt to substantiate through related literature the development of a new instructional method that implements research through technology.

Technology is revolutionizing the way in which people communicate, do business and live their lives. Easy accessibility, decreased cost and portability are introducing technology into areas of functioning where applications were previously unconsidered. However, whether through a lack of equipment or knowledge many educators are not making use of these tools. The purpose of this thesis was properly refined to identify and produce a practical mode of technology for implementing brain based research that can be effortlessly utilized by classroom teachers to enhance instruction through incorporation of visual and motion activities supported by brain based research.

Digital videodiscs, or DVDs have been called the "fastest-growing area of the infotech scene at present" (Clyde, 2003, p. 66). The diverse new uses and technology surrounding DVDs is developing at such a rapid pace, in fact, that most current information becomes outdated before it hits print; the sure sign of a hot technological commodity. DVDs provide up to seven times more storage space than other disk storage systems, offer faster access speeds, and crystal clear, cinema quality, video picture. Recently DVDs have been making their mark on the educational scene in replace of CD-ROM technology. According to Mikat (2003), teachers, administrators and students are finding that burning personalized DVDs are a practical, cost effective way of developing versatile, media-rich presentations. However, it is also evident that this technology is not being utilized to its fullest capacity. Given this information, the purpose of this theis has been narrowed to include the purpose of DVD implementing brain based research that can be effortlessly utilized by classroom teachers to enhance instruction through incorporation of both visual and motion activities.

Significance of the Thesis

The United States is consistently leading the world as one of the most developed countries with access to cutting edge technology and state of the art research facilities. Unfortunately, despite rapidly developing technology and relevant brain based research, educational instruction has not been shown to utilize best practices for reaching and teaching all children. A specific reason that practice is lagging behind theory is because classroom teachers do not know how to effectively implement research and therefore do not know how to incorporate either brain based learning or instructional technology.

The current thesis will provide the importance to teachers how brain based research on visual and motion activities can be assimilated into technological innovations that are easily utilized in classroom instruction. This is significant because in order to ensure that best practices are being implemented, teachers must recognize the validity of an approach, understand its applications and find it easily accessible on a routine basis.

Assumptions

The following assumptions were made regarding this thesis:

1) It was assumed that the most current research available was accessible through multiple databases in an academic network.
2) It was assumed that the teacher utilizing this technology would have access to minimal training regarding the use of applicable instructional technology.
3) It was assumed that the teacher utilizing this technology would have access to the appropriate equipment necessary to use this technology in the classroom.
4) It was assumed that teachers offered this technology would be willing to implement it as part of their classroom instruction.

Limitations and Delimitations

Limitations

Best practices and instruction are wide fields of study and there are innumerable areas of research that could conceivably affect the development of new processes. For this thesis, information that related to learning and brain research, movement, physical education, developing technology and digital video were accessed and evaluated. Three databases were accessed in search of this information on three successive occasions to ensure timeliness of the information. While these search criteria and research devices were considered ample for the scope of the thesis, it is possible that additional topics of investigation could have provided differing information than that presented herein. Given the pace of continuing research, particularly in the area of technological developments, it is also assumed that more recent information could conceivably displace the data covered.

While the application of the research utilized in this thesis is limitless, this thesis itself is limited in that the subject of the DVD is in written form and that it will cover only one.

Definition of Terms

Attention Deficit Disorder - A disorder characterized by the inability to pay attention to task for extended periods of time, identified most often in young male students

Brain-Based Research - A line of research specifically concerned with how the brain functions and how learning progresses

Brain Gym - A program that accesses innate potential through the use of specifically designed positions and exercises which align the brain and improve mental functioning.

Classroom Management - The act of maintaining student attention and discipline in the classroom environment.

Drill & Practice - Repetitive activities that focus on rote memorization of facts

DVD - A digital disk that stores large volumes of material and plays back high-quality images on computer and television screens

Fine Motor - Those skills and actions that access small muscles and muscle groups, such as writing or playing an instrument

Gross Motor - Those skills and actions that access large muscles and muscle groups, such as running and chopping wood.

Integration - the combination of two or more skills or activities into a single domain, in this instance the integration of right and left brains, physical and content instruction, technology and research.

IQ - Intelligence quotient- traditional quantifier of intelligence as measured by standardized and normed referenced tests.

Left brained - Typically references the left hemisphere of the brain which is known to be primarily responsible for language and linguistic based activities like writing and reading.

Multiple Intelligence - Gardner's theory that intelligence is neither one dimensional nor stagnant, but exists on a variety of levels that can be cultivated.

Neurons - specialized nerve cells that transmit electronic messages throughout the body

Neural networks - neuron connections that grow out of sensory experiences

Palm Pilot or Personal Digital Assistant (PDA) - electronic handheld device that allows for scheduling, organization of data and appointments and provides basic assistance

Physical education - Specialized instruction in sports, exercises and games that require active participation.

Right Brained - Typically references the right hemisphere of the brain which is known to be primarily responsible for creative and artistic based activities like painting and sculpture.

Self-management - The ability to control ones activity and plan one's activities. In this case the self-management of physical activity outside the classroom.

Sensory experience - An incident that activates any or all of the senses of smell, touch, taste, hearing, or sight.

Summary

Despite the extraordinary quantity and quality of brain-based research that calls for visual and motion activities to be utilized in the instructional setting, these types of activities are not being consistently implemented in classroom practice. Likewise, the various modes of technology available are not being effectively utilized in the classroom. The purpose of this thesis is to show that research supports best practices which merge brain based research with technology and to explore the possibility of DVD for classroom use that will employ these methods. Developing technologically based visual and motion activities for the classroom which follow brain based research and are easily implemented will help ensure that research finally finds a consistent place in education.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

In order to support the convergence of different types of research into the same instructional technique, it is important to thoroughly explore the research in all of the applicable fields. For this reason, the following review of literature provides in depth coverage of brain-based research, including brain development, attention issues and their relationship to learning. This leads in turn to discussion on ways of thinking and learning and to the effect of movement on learning, including the effects of both integrated and increased compartmentalized physical education. Finally, technology was assessed to determine what breakthroughs might be applicable and the appropriateness of Digital Video technology for this thesis.

Brain Development and Functioning

According to Gabbard (1998) the major circuits of the brain such as those that control breathing, heart circulation and other reflex actions are wired before from birth. However, an adult brain contains over one hundred billion neurons, which fullfill the functions of sensory, intermediate and motor, that are interconnected, and these connections, some more subtle than others, develop as an individual develops. Neurons are specialized nerve cells that transmit electronic messages throughout the body; neural networks grow out of our sensory experiences and no two individuals can expect to have exactly the same system (Hannaford, 1995[TCT4]).

The brain functions are interrelated and despite trends to separate specific right or left brained tasks, Jensen (2000[TCT5]) cautions against compartmentalizing such a complex system. The brain has several interwoven systems. One is the pleasure/reward system located in the Ventral Tegmental Area (VTA), starting at the top of the brainstem. This system is activated by enjoyable sensations, anything fun. Another covers fine and gross motor movements, while still others control stress responses, circulatory and neurovascular systems and balance. Vision, sensory-motor, immunity, cognitive, memory, social/emotional attunement, attentional and alarm systems are also directed by the brain. These systems can be defined separately, but in reality function in interactive patterns with one another (Jensen, 2000[TCT6]).

Environment, specifically stimulation in the early years, can significantly influence the formation of neuron connections in the brain (Gabbard, 1998). Critical periods of development open intermittently throughout early childhood. During these times, motor development is integrally tied to total growth and development. Ground-breaking research by Hitzig and Fritsch in 1864 Germany revealed, to the consternation and bafflement of many scientists, that the cerebral cortex was responsible for movement (Hannaford, 1995[TCT7]).

The cerebellum is a specific area of the brain whose functioning has been redefined by recent brain research. According to Allen, Buxton and Wong (1997) the cerebellum, with more neurons than the rest of the brain combined, was once considered to be purely in charge of motor control. However, recent studies show that the cerebellum is actually quite active during the process of sensory discrimination, attention, working memory, semantic association, verbal learning, memory and complex problem solving activity (Allen, Buxton, & Wong, 1997). It would therefore be inaccurate to consider the cerebellum solely as a master of the motor domain of functioning. Nevertheless, it remains significant that the functions of movement and attention are both coordinated by the same section of brain.

Getting the Brain's Attention

The ability to pay attention is integral to learning; before the brain can learn it must attend. For this reason attention, or the ability to focus, has been given high priority in classroom management and motivation. The brain's attentional system incorporates four features, the ability to quickly identify the most important element in a complex environment, the ability to maintain attention to that element while monitoring or ignoring other information, the ability to access previous knowledge that could be important to the current circumstances, and the ability to shift attention quickly upon the introduction of new relevant information (Sylwester & Cho, 1993).

The brain seeks out, attends to and makes sense of experience (Housner, 2001). In order for the brain to make sense of an experience, it must first search for and maintain attention to that information. The importance of attention in learning dictates that educational programs take into account the specific brain functions regarding attention. One's ability to maintain attention is affected by normal cyclical fluctuations in the efficacy of the neurotransmitter molecules that chemically regulate attention. Stable attentional mechanisms focus automatically on information that contains high contrast or emotional intensity.

There is a verifiable link between an individual's emotions, body and reasoning system. Hannaford (1995[TCT8]) stresses the importance of the limbic system, where emotional processing occurs. Located between the reptilian brain and cerebral cortex, the limbic system links emotional and cognitive processing. According to Hannaford, the specific wiring of the limbic system demonstrated that learning and remembering cannot happen without sensory input and for this reason a personal emotional connect and movement must precede information processing and memory. Prigge (2002) reinforces the suggestion that instruction should both recognize emotional importance and create sensory associates.

Our brain can simultaneously process information from at least two opposing sources. When it comes to processing sensory information, the brain simultaneously employs a fast system process to manage items from the background, extraneous and monitoring information, and a slower processing system to deal with foreground information, detailed and focused for understanding (Sylwester & Cho, 1993). Between two opposing sources, the brain will focus the slower processing system of attention on one. The brain pays attention to the experiences that it finds interesting (Houser, 2001).

There is evidence that the brain attends more strongly to information that is engaging to the entire body. Solid research supports the adage that individuals remember 10% of what they read, 30% of what they see, 50% of what they see and hear, 70% of what they say and 90% of what they say and do (Porta, 2000). This is why looking at movies and watching demonstrations are so much more effective than reading or listening to lecture, and why discussion and either simulating or completing a task are so vital to mastery of content and concepts. This is due in part to the fact that verbal memory is primarily short term, while visual, emotional and kinesthetic memory are long term systems. To ensure understanding and retention, verbal representation is not enough; children must be emotionally engaged in activities that inspire both their eyes and bodies.

Teachers have already learned to deal with attention issues when planning instruction. Employing methods such as alternating repetitive sedentary activities with pleasurable, active activities are successful because interest and enjoyment can overturn a depressed attentional system. Sylwester and Cho (1993) point out that, instructional methods such as math relay games are not directly related to math, but "artificially engender attention-getting excitement through rapid action", taking advantage of the students' stable attentional mechanisms (p. 74). Our brain's attentional system is set up to prefer high contrast, originality and exciting connotations. Students, who are increasingly exposed to television and video games with incorporate high contrast, out of the ordinary imagery and state of the art visual content are even more capable of discriminating visual information, and consequently less likely to sustain attention to visually flat materials or linguistically based materials that do not access visual/spatial reasoning.

In many ways, attention and motivation are inherently linked. An individual who is motivated to attend will more likely activate brain processes that allow for assimilation of new information. Hickey (2003) notes that the actual act of participating in a knowledgeable activity changes knowledge and meaning, much in the way that internalization of social processes are dependent on participation in those social processes. In so much as learning and constructing meaning are influenced by the individual's motivation and participation in the learning process, it must be recognized that each individual comprehends and participates in a distinctive way. In order to prepare learners to approach content from a brain based perspective, teachers should incorporate instruction about the brain into the classroom, including information on the importance of sleep, water and nutrition as specific to brain health (Prigge, 2002, p. 237).

Ways of Thinking and Learning

According to Housner (2001), the accepted primary role of the brain is to organize and store information in an individual's memory. Learning occurs when the brain, recognizing and attending to new stimuli, forms connections between the new information and existing knowledge. Information that has been stored and organized in a person's memory is then made available to repeatedly perform the learned skills and respond to additional new knowledge (Housner, 2001). The brain can be wired and trained to specifically seek out particular types of information and attend in a specific manner, thus making sense of new experiences and information, learning, in an explicit context. Kindler (2003) maintains that one of the most important advances in neurosciences has been the mapping of neural activation zones in relation to different pictorial tasks, a fact that supports the idea that a variety of descriptive images can provide diverse opportunities for different kinds of learning.

There are certain characteristics of thinking and learning which have been routinely substantiated. Research has shown that the four greatest indicators of future success in further education are quality and quantity of discussion in the child's home, clarity of value system, level of support from peer group and amount of independent reading (Abbott & Ryan, 1999). All of these factors are directly related to the idea that children learn remarkable amounts of information when they are genuinely engaged in tasks that are meaningful to them. Anyone who learns something new uses previous knowledge to assimilate new facts of experiences into their understanding. This is a well known constructivist pattern which new brain research and current instructional practices corroborate.

According to Abbott and Ryan (1999), researchers have uncovered no major changes in brain structure for over thirty thousand years. However, our understanding of brain functions has increased exponentially in the past decade as technological advances have made it possible to study brain structure and activity with sophisticated accuracy. The human brain is exceedingly complex and it is a precarious task to scientifically determine the relationships that exist between intuition and logic, emotion and reason, intrinsic and extrinsic motivation.

Caufield, Kidd, and Kocker (2000) reiterate that an individual's brain changes physiologically as a result of the individual's unique experiences. In order to ensure educational enrichment and optimal brain growth and development, it is then dependent on teachers to generate an appropriate environment that challenges a brain eager to learn, and at the same time nurtures. Emotion is also a very significant factor that influences the brain and learning, as evidenced by recent research on emotional intelligence.

It is widely recognized at this point that intelligence itself is not a constant, but a wide-ranging set of multiple competencies and that the brain retains more of what it views as useful and meaningful. Recognizing these tenets provided by brain based research, educational development and practice should be duly influenced; schools who have implemented practices grounded in these principles have drawn, not just academic success but happier healthier students as well (Caufield, Kidd, & Kocker, 2000). Students who are taught that there are learning preferences in the way the brain receives, processes and expresses information, which are all normal and valid, are more likely to actively engage in and better able to take advantage of their preferred methods and strengths (Prigge, 2002).

The idea of intelligence as a multiple dimensional is not new. Gardner's theory of multiple intelligences is well documented and has received ample attention in the educational circle. Most educators have had some experience with the interpersonal, intrapersonal, naturalistic, bodily-kinesthetic, visual-spatial, logical-mathematical, musical, and linguistic intelligences that Gardner has defined in an effort to increase educational understanding for all children. Gardner (1995) recognized that intelligence is a biological and psychological capacity for learning that is influenced by experience, culture and motivational factors and consequently that realization of potential is influenced by both genetic and environmental factors.

Gardner's approach at once recognized that children who were not linguistically intelligent, the traditional realm of formal education, were not un-intelligent, but different intelligent. His approach calls for personalization of education and entreats schools to cultivate capacities that are valued in a global, technologically enabled society. Gardner recognized the phenomenon that existed leading many people to separate mental and physical functioning, and realized that his theory would undoubtedly result in contradiction from some circles (Hannaford, 1995[TCT9]). Gardner (1995) also recognized that simply playing music in the background or using intelligence to develop mnemonics was not sufficient to engage and develop these active intelligences; meaningful activities that focus respectively on all functions of the brain are essential for optimal learning.

Unfortunately, a lack of understanding, and limited application of what little understanding existed, has created an educational system that fails to pay tribute to the unique workings of the brain. For instance, Abbott and Ryan (1999) refer to current practices which undermine developing individuality and ingenuity in adolescents by denying them responsibility and trivializing their idealism; teenagers often view school as less real than the emotionally charged environment that they are engrossed in otherwise.

Multiple intelligence refers to a specific innate potential that exists in an individual in regards to a specific type of reasoning/ functioning. Other classification systems, and preference for a particular type of learning, have been covered in other brain research. Learning modalities were exhaustively researched in the 1960's by Bruner, who identified three types of knowledge, ionic was a knowledge that was systematically linked to visual and spatial understanding, enactive was knowledge linked with movement and action, and symbolic covered knowledge of reason and logic represented by letters, numbers and coded systems (Samples, 1992).

The ultimate realization was that the human brain processes experiences differently, and that diverse ways of processing can be intentionally generated through the instructional environment. However, Bruner recognized, as have many others in a variety of ways, that the formal educational system has traditionally relied almost entirely upon symbolic knowledge. If human brains process experiences differently, this leaves those who rely on enactive and ionic knowledge without guidance or validation (Samples, 1992).

Visual spatial reasoning, musical thought, movement and dance do not represent extraneous information; they are in and of themselves comprehensive systems of understanding and forming knowledge. Along the same lines as Gardner, Samples (1992) stresses that reading about art and doing art are two very different actions, which utilize very different processes or intelligences. Turning art, music, dance and physical education into special compartmentalized classes with a linguistic base could conceivable be as detrimental as dismissing them altogether. Teachers who want to employ brain-based learning are encouraged to establish a positive atmosphere, an interactive environment that incorporates music and visual reminders (Prigge, 2002).

Hannaford (1995[TCT10]) emphasizes the connection between touch and learning, recognizing that the large number of sensory receptors for touch located around the mouth and hands make touch in these areas increasingly important in exploring new sensations. Simple activities like manipulating clay or positively touching a child's shoulder when praising them have been shown to increase positive response, concentration and learning.

While today's educational system inconsistently attempts to reach all learning styles and intelligences in the classroom, formal identifications of learning differences are increasing. Learning disabled students and students with Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder are entering the classroom in record numbers. New research questions the best course of action when dealing with children with ADD/ADHD. Many children who have been identified with attention problems have been shown to be muscularly either flaccid or extremely tense; they have difficulty participating in organized physical activity and exhaust easily (Putnam, 2003).

Hypokinesis, an inadequate amount of movement, has been theorized by some as a possible cause or aggravating factor of ADD/ADHD. According to this approach, hyperactivity becomes a coping strategy, whereby children try to increase their focus by moving. Hyperactive children who run before class have improved their behavior so significantly that doctors were able to decrease stimulant doses in children who ran everyday (Putnam, 2003). Sibley and Etnier (2003) have uncovered data that supports the fact that learning and mentally disabled children also display a positive relationship between physicals activity and cognition. Incorporating movement into classroom instruction is considered an appropriate next step.

Movement and Learning

One particular area of knowing and learning that needs to receive more consistent credit is the area of movement. Hannaford (1995[TCT11]) terms every movement a sensory-motor event that helps us, often with the help of our core senses, to understand the physical world around us and input stimuli from outside sources. Hannaford, in addition to other notable researchers such as Gardner and Sperry, challenges the assumption that experiences and actions can be categorized either entirely physical or mental, or that one should be intrinsically valued over the other.

Movement has significant impact on thinking and learning. Movement anchors an individual's thoughts, in essence providing a rhythmic action as a set background to thinking. Most people think more productively while they are participating in low concentration, repetitive activities such as swimming, walking, driving (Hannaford, 1995[TCT12]). Movement provides a framework for developmental processes as well. Babies who do not crawl, and at the same time develop cross-lateral hand eye coordination, often have difficulty with later reading, which requires the same coordination and skill at its basis. Movement in and of itself, dance, physical education, recess, sports, and games, elicit body centered learning (Jensen, 2000[TCT13]).

Integrating Physical Education and Content Learning

Integrating subject learning with physical education learning provides maximum opportunities for youngsters to realize that behavioral competencies and motor skills are interconnected and compliment other areas of study. Gallavan and Muraoka (2003) recently offered suggestions for aligning National Standards for Sport and Physical Education with National Standard for Social Studies. For instance, while orienting themselves to the field and discussing the organizational relationships between the people on a team, students can reference mapping skills and make connections to government and other social organizations. Most specifically, when exploring different cultures in social studies, the content can be extended and enhanced by investigation and participation in the local sports, dances and ritual movements which will help to increase cognition of the content area material (Gallavan & Muroaka, 2003).

Ayers and Wilmoth (2003) follow a similar line of justification while making recommendations for aligning physical education and scientific concepts. They recognize that integration of content area information with vigorous exercise can often be accomplished with minimal effort and maximum benefit. Benefit is twofold because children don't just increase learning of physical education and science knowledge; they also come to recognize interconnectedness between physical education and the rest of their lives. This is considered a primary goal, given National Health Organization support for more active lifestyles for all citizens. Many scientific principles are easily and more effectively taught with motion; force production, drag and friction, frequency and intensity, to name a few, would be more difficult to understand without active reinforcement (Ayers & Wilmoth, 2003).

The Effects of Physical Activity on Content Learning

Sibley and Etnier (2003) compiled data from the large-scale existing studies that tracked the effect of physical education on cognition and academic achievement. Focusing on the South Australian study, the Vanves project, the Trois Rivieres study and Project SPARK, the researchers found that all either substantiated the benefits of physical activity on achievement or at least drew no detriment from the implementation of such a system.

The first study, conducted in 1978 in South Australia assigned an experimental group to 1 hr of physical education each school day, giving the control group continued the usual curriculum of academic instruction. While physiological and fitness variables improved, there was no initial differences in academic grades. However, two-year follow-up data did favor the experimental students with regards to arithmetic and reading grades and classroom behavior (Maynard, Coonan, Worsley, Dwyer, & Baghurst, 1987).

The research project conducted in Vanves, France, in the 1950's also reduced the time spent on academics for some children and simultaneously increased their physical education time. The result was increased academic performance, less need for discipline intervention, improved enthusiasm, augmented fitness and better health for the students who participated, superior in all aspects to students who were not involved in increased physical activity.

The study conducted in Trois Rivieres, Ontario in the 1970's, gave 546 Canadian primary school students an additional five hours per week of physical education that was taken in turn from academic subjects except of English. Throughout the study, and after six years, the children in the experimental group who were given extra physical education consistently scored better in academic subjects and in physical education achievement than their counterparts in the control group who did not receive additional physical activity. Studies show that all these benefits do pay off significantly.

More resent investigation centered on Project SPARK, a comprehensive curriculum and professional development program designed to promote physical activity both in and out of school during fourth and fifth grades. The physical education curriculum teaches activity skills and self management, providing physical activity for all students during class. Sallis, McKenzie, Koldey, and Lewis (1999) found that use of the 2-year health-related physical education program SPARK precipitated several notable favorable effects on academic achievement.

Brain Gym

Brain gym was developed by Paul Dennison in the 1970's, has been continually perfected and is currently being utilized in thirty-nine countries, although it has yet to be peer reviewed (Jensen, 2000[TCT14]; Hannaford, 1995[TCT15]). Jehue and Carlisle (2000) identify Brain Gym with the field of Educational Kinesiology, a system by which learners are empowered by using movement to draw out their hidden potential. The basic tenets of Brain Gym are that learning is a natural, continuous process, learning can be blocked by stress, uncertainty or an inability to move, and therefore those who have not learned to move are "learning blocked" (Juhue & Carlisle, 2000[TCT16]).

The Brain Gym program is composed of a series of simple movements and body positions that are typically teacher lead. Based on three distinctive types of brain function, laterally (left and right hemisphere), focus (front and back brain) and centering (top and bottom brain), brain gym incorporates specific exercises that are essentially designed to "align" the brain for optimal learning (Jensen, 2000[TCT17]). In addition, lengthening activities also help children to develop neural pathways, responsible for making connections between previously learned information and new content (Jehue & Carlisle, 2000). These micro-interventions have been found to contribute to major changes in academic functioning, perceptual motor skills and self-esteem (Hannaford, 1995[TCT18]).

Technology in an Audio-Visual World

In recent years it has become increasingly more evident that our highly visual culture has a need for imagery to represent, express and process ideas and emotions and this transformation calls for new ways to integrate visual learning into education (Kindler, 2003). The connection between visual culture and human cognition has been revealed by studies that show a significant rise in IQ over the past decades that can only partially be attributed to such factors as nutrition or education. Instead, growth is directly ascribed to a rise in ability to answer questions that require visual/spatial reasoning and has been the springboard for debates that the current generation's ability to analyze visual material has rendered them "more intelligent" than previous generations (Kindler, 2003, p. 294). However, there is every indication, while the outer world, full of video and auditory enhancement, has sparked a visual/spatial evolution, at its core, publicly funded education remains a linguistically based system that fails to adequately capitalize on the technological advances of the past decade.

While there are teachers and educational institutions who independently attempt to utilize the options offered by technology, these are employed inefficiently and inequitably. Gorski (2002) cites information from the NCES which demonstrated that, while teachers who have primarily white students from higher socioeconomic groups more often use technology to engage student creativity and critical thinking, teachers with high percentages of students of color and low socioeconomic status rely on the internet and computers more for drill and practice (p. 29).

Despite a tendency not to make optimal use of growing technology, different pockets of the educational system are utilizing technology to a higher degree. Special education is one area where technology has long been cultivated for the benefits that it can derive for challenged individuals. New developments that are expected to once again revolutionize the process include the wearable computer. Because computers are becoming so small, many feel it is only a matter of time before they become as much an accessory as the mobile phone (Hofstetter, 2001).

This has significant implications for all students in the classroom and can help to ensure the continuation of easy movement, reversing the reality that technology must to some extent create a more sedentary lifestyle. Hofstetter (2001) envisions a classroom environment where technology can be optimally accessed by students who are actively engaged in inquiry and experimentation learning, where all students can have access, at least remotely, to individualized support and instruction.

Already a variety of portable devices are helping some specific populations (Caverly & MacDonald, 2003). For instance, AlphaSmart provides a word processing and Personal Information Manager for less than $300 dollars which can be easily accessed from a variety of locations and then hooked up to a printing device. Palm pilots, or personal digital assistants (PDAs) are being used to help individuals with weak organizational systems. Spell checkers, speech readers, and study aids all come in easy to transport, digital format. Mobile wireless phones allow for internet access and increasing options for communications. New portable computing options include full size models on which one can take written notes. As laptops become smaller, and less expensive, their mobility will make them a more viable option for a society on the go, and an active learning environment.

Digital Video

Clyde (2003) relates that DVD is currently one of the fastest-growing areas of technology. DVD technology is changing so quickly that it is difficult to read relevant information that isn't already outdated by the time of publication. DVD was originally assigned to stand for Digital Video Disc, but is recognizable today just by the abbreviation. DVD’s hold more information than previous storage systems and offer faster access speeds (Clyde, 2003). The quality of DVD storage is infinitely superior to other methods, offering better quality video and audio. DVD’s hold an average of 4.7 gigabytes of data, offering seven times more storage than an average CD-ROM and are expected to last 50 years without image degradation, offering ten times the life of a videotape (Mikat, 2003). DVD technology is especially suitable for film distributions recordings of special events, computer games and simulations (Clyde, 2003).

There are several Digital Video Disk formats currently in use. DVD-Video is usually just referred to as DVD and is played on a conventional DVD player linked to a television screen. DVD-ROM is linked to a computer and holds programs in addition to video files. For the most part DVD-ROM drives also play regular DVD’s as well. DVD’s can be coded on one or both sides and in a single (audio or visual) or double (audio and visual) layer (Clyde, 2003).

Not only does digital video disk technology enable playing of disks, it is also possible to use this technology to make your own DVD’s that will playback on most commercial players (Hofstetter, 2001). A variety of

DVD authoring systems exist to allow individuals to record or write DVD's. These systems, once unreliable and quite expensive, have become faster and more dependable and can be purchased for as little as $250, a fraction of their former price (Mikat, 2003). One should be cautious, however, since there continues to be some incompatible variations of recordable format. Therefore it is advisable that individuals using this medium be certain of how the information will be implemented so that they can guarantee the correct functioning of the DVD with available decoder hardware (Clyde, 2003).

Primary-grade students are capable of developing their own digital video (Van Horn, 2001). The creation of digital video is becoming increasingly less expensive and simultaneously less difficult. Unfortunately, according to investigates by Van Horn (2003), education is one of the only industries not making sufficient use of this digital video technology. Digital video is being developed in pockets by some large organizations for future use, but as yet is not widely available. The University of Iowa has developed InTime (Integratging New Technologies Into the Methods of Education) which offers digital video supplements.

Teachscape is a private organization that is attempting to capture the digital video market for professional development. Meanwhile the Peabody College at Vanderbilt University is using digital video to help teach the skills of peer tutoring in their Peer-Assisted Learning Strategies program, and the National Board for Professional Teaching Standards is a work to develop a Digital Library Project. To take advantage of these programs one would most likely need to purchase Mac computer's, as graphics are much more sophisticated on Apple PCs and therefore much digital video technology is developed for use with these models (Van Horn, 2001).

According to Mikat (2003) digital video, audio and image files are becoming increasingly more common features in both student and teacher portfolios and can also be used to create media-rich presentations that are practical and cost-efficient. Color graphics, moving images and sounds add depth to programs, but also take up immense amounts of space. Currently CD's offer limited storage and therefore CD users cannot include the array of graphic rich material that DVD users have come to depend upon.

Digital Video Interaction is yet another innovative use of digital imagery and audio that is being developed for education and training purposes. Digital Video

Interactive combines motion video, still pictures, multi-track audio, and computer graphics into a single program that is controlled by a personal computer (Bassoppo-Moyo, 1997). DVI can provide a rich, comprehensive computer generated environment that acts a simulation and can draw the user into the program by providing navigable panoramic imagery with authentic sounds and expert audio. This type of programming is significantly more interactive than similarly topic CD-ROM materials have proven; DVI provides a more enjoyable learning experience.

According to Bassoppo-Moyo (1997) this technology has been successfully utilized to teach individuals with learning disabilities and other training and educational environments. There is specific application for this technology in areas and subjects where trainers and educators are scarce. Advanced video data compression and the ability to combine real-time video with computer generated graphics make the DVI system superior to previous methods, but creating high-quality programs still requires input from multiple videogrpahers and cinematographers who can provide a multitude of film, still pictures and graphics (Bassoppo-Moyo, 1997).

Dickinson (1992) specifically explored technologies that could prove most advantageous for particular intelligences. Because all individuals learn best when there are optimal opportunities for interaction with their environment, Dickinson highly recommended the use of videodiscs, CD-ROM, hypermedia and multimedia computers in the learning environment to achieve a higher degree of interactivity. Hands on tasks, the ability to produce illustrated text, telecommunications programs computer software, multimedia data bases, and additional innovations are available to enhance instructional opportunities while giving children ownership and direction over their own learning. According to Dichinson (1992), Multimedia technology can "offer students the means to explore and better understand their inner worlds" and at the same time will assist teachers by transforming traditional classrooms into "centers of student directed inquiry" (p. 12).

The drive to revolutionize instruction is evidenced in a variety of educational circumstance. Recently, the nation's leading dental schools released details regarding their plan to replace previously existing textbooks and lab manuals with technologically advanced laptop computers and DVDs (Dental School Embraces High-Tech Learning Tools, 2002). This system will place direct control of content and learning into the students' hands; they will be to decide how and when they access information.

Each student will be issued updated text and course material editions twice a year that include four-year curriculum of more than 100 dental textbooks, 40 lab manuals, slides and graphics. This is more information than would previously have been feasible for each student to possess and update twice a year. In addition, the program allows students to highlight and post-it notes within their text. Each DVD is capable of offering 29 hours of video, audio and 2.2 million pages of text, images, 300,000 diagrams, slides, carts, photos and illustrations (Dental School, 2002).

Summary

The review of literature has offered a depth and variety of current research to support the convergence of brain based research, learning and movement research and technological advances into the same instructional technique. Brain research including development, attention issues and their relationship to learning, ways of thinking and learning, the effect of movement on learning, and effect of physical education were included as well as applicable technology and Digital Video resources.

CHAPTER THREE

METHODOLOGY

Introduction

The following chapter documents the steps that were taken during the development of this project. Specifically it considers the goals of the project in terms of the population to be served and offers details about the specific research methods used to collect information. Compilation and delineation of the data are also included and referenced for relevance to the development of the final Digital Video Disk project that was included with this research.

Population Served

Population addressed is a multifaceted issue in regards to this thesis. Primarily in education the definitive group directed is the group of children for whom learning and achievement is augmented and quality of life increased. However, in delivery of effective systems, the instructor is as an important a component as the individual receiving the instruction. Therefore the populations addressed by development of this thesis and the facts within are both the group of children for whom the instruction practice is employed and the group of educators who can more easily implement the instructional practice.

This thesis was developed with elementary school students in mind who are in third and fourth grades for use within the school day with instruction from a classroom teacher, certified to teach grades third and fourth.

Research Methods

Compiling several strains of research and learning data into one thesis meant that accessing information on a single variable would have been ineffective. For this reason, research was collected on a variety of topics. Searches were initiated through digital library card catalogues and database resources for the following topics: brain based research, brain development, brain and attention, brain and learning, brain gym, active learning, movement and learning, physical education and learning, technology and education, DVD and digital video. Related searches that were accessed via one of these initial topics, such as multiple intelligences, were also included in an effort to explore all relevant information related to the development of this project.

In order to obtain the depth and breadth of information considered appropriate to support the development of this project as a research based practice, it was determined that a single library or database search would be inappropriate to ensure the proper compilation of data. For this reason, library searches of two university academic library online catalogues were undertaken to provide print resources in the form of books that coincided with one or more of the terms associated with this study.

In addition, three academic databases, ProQuest, EbscoHost and FirstSearch, were utilized for searches of the above mentioned key words. Successive searches for information were completed on three separate occasions from August thru October of this year. The initial investigation included information from the past two decades, while the subsequent searches focused on any recent information that might be added. Every effort was made to ensure that the most current and pertinent information was included in the literature review for investigation and validation.

Initial quests for information revealed over forty viable sources of information in these categories. Review of abstracts from the preliminary list revealed that thirty-five sources were applicable to the current research question. Thorough reading of each resource resulted in the final selection of twenty-nine sources that demonstrated essential information to development of the final project. Sources were included that met one of the following criteria: 1) Primary research studies that included sound methodology 2) Secondary research studies that analyzed primary research studies and compiled data, 3) Articles and books that clearly restated research and incorporated the data into practice.

Analysis of the Research

Repeated research conclusively demonstrates that which should be obvious, but often times is given little consideration in education, the fact that the brain is the key to learning and cognition. Understanding how the brain works and providing the resources that are necessary to maintain optimal brain functioning are essential prerequisites to learning. Developing and implementing teaching methods that employ brain based instructional methods have proven most effective in promoting student learning.

The brain is a complex organ in which sensory, cognitive and motor skills interconnect. It is important that instruction not try to separate brain functions into specific right or left brained tasks, but instead build an environment that stimulates and engages the whole brain. Since the brain has several systems, including pleasure/reward, fine and gross motor movement, balance, vision, sensory-motor, cognitive, memory, social/emotional, attentional and alarm systems it is important to remember that instruction geared toward a single skill or response will be ineffective. Because the cerebellum actively takes part in sensory discrimination, attention working memory, semantic association, verbal learning, memory and complex problem solving activity as well as motor activity, there is specific justification that the brain normally responds to the these activities in relation to one another. Delivering instruction in one medium can leave the brain inactive and decrease attention.

The brain's attentional system automatically discriminates between relevant it needs to address by filing new information in the appropriate place and irrelevant information it filters out. If instruction does not engage the brain's attention it will not be absorbed. Also if there is no functional relating of the information to a greater schema of learned content, then it is unlikely that the brain will bother to file, or correctly file the new information. Instruction must engage the brain and scaffold learning so that the brain can easily store information for future reference.

The emotional processing limbic system is important to learning and remembering and sensory processing shows that the brain is more likely to pay attention to things that are interesting. Therefore, when planning activities that engage, sensory input and a personal emotional connect should precede information processing and memory, which should have a meaningful purpose to the learner. Instruction that fails to recognize this interconnectedness will be unsuccessful. Interesting and personally relevant material is the more likely to be recognized and recalled and should be the basis for instruction.

Verbal memory is not as strong as visual, emotional and kinesthetic memory. Because individuals attend to and remember more of what they say and do than what they read and listen too, the bulk of classroom time should be spent engaging in activities that involve the senses and whole body. Movies, demonstrations, active discussion, simulating and hands on tasks should be a preferred medium for delivering content and concepts, and not just reserved for extension activities and classroom filler.

Instructional methods should alternate repetitive sedentary activities with more pleasurable, active activities because our brain's attentional system is set up to prefer high contrast, originality and exciting connotations. While a wide variety of experiences is important for developing into a balanced individual, routinely dismissing and censuring television and video games with their high contrast imagery and visual content can be counterproductive. Children today are more capable of discriminating visual information than the visually flat, linguistically dominated material of the past. Instead of force-feeding dull and ineffective content, instruction should take a cue from media and include more visually stimulating, interactive material.

It has been demonstrated that activity is necessary to gain knowledge and because each individual comprehends and participates in a distinctive way, it is impossible to plan a single activity, engaging a specific method and predicting a patterned response, and still expect that all students will learn. Because an individual's brain changes physiologically as a result of the individual's unique experiences it is impossible even to predict from day to day which singular activity might prove successful. Instruction must be diverse if it is to capture the attention of each member of a diverse group of students.

It is important for academic growth and individual well being that instruction cultivates a child's intelligence, not the static number provided by standardized tests but a wide-ranging set of multiple competencies. Students need to be taught that there are learning preferences in the way the brain receives, processes and expresses information so that they can recognize themselves as normal and validate their learning methods.

Ideally, classroom instruction should model Gardner's theory of multiple intelligences, valuing and providing activities that foster interpersonal, intrapersonal, naturalistic, bodily-kinesthetic, visual-spatial, logical-mathematical, musical, and linguistic intelligences. Although this degree of personalization may seem at odds with the traditional classroom, it is in line with the desired capacities that are valued in our global, technologically enabled society. People spend most of their time in a state where mental and physical functioning are entwined, separating them for the duration of classroom instruction is unnatural. While strategies like playing background music and mnemonics are helpful, direct activities that actively involve all intelligences in a meaningful way should be a focus of instruction. Instruction that focuses on multiple intelligences will inherently incorporate ionic, enactive, and symbolic covered knowledge, not just the symbolic knowledge provided for by traditional instruction.

A back to basics regime in the United States has prompted the practice of reading and writing across the curriculum. While the goal may be worthy, the results are ineffective and the consequently children are less likely to engage in activities that once interested them. Special classes are being abolished or rewritten as content reinforcement periods. Rather than making the focus of art, music, dance and physical education classes into a linguistic based study of those subject areas, these classes should be active investigations into the mediums. In turn, subjects that have traditionally used more linguistically based content instruction should try to incorporate more art, music, dance and physical activity into their instruction.

Given the increasing numbers of ADD and learning disabled children in the classroom, a group that is often highly medicated for movement issues, it is irresponsible to ignore data that many children who have been identified with attention problems have Hypokinesis. Even more than for their peers, learning programs for children with ADD, learning and mental disabilities should incorporate movement into classroom instruction.

It has been decisively and consistently demonstrated that movement has significant impact on thinking and learning by anchoring an individual's thoughts and providing a framework for developmental processes. Body centered learning that incorporates dance, physical education, recess, sports, and games should be routinely included in instruction. Integrating subject learning with physical education learning should be an ongoing strategy that collaborating teachers use to maximum opportunities for youngsters to learn both motor skills and content area information.

Significant large-scale existing studies have shown that physical education has a positive effect on cognition and academic achievement. Increasing physical activity with the framework of the school day can increase academic performance, reduce the need for discipline intervention, improve student enthusiasm, enhance fitness and improve health for students.

Specific exercises such as those incorporated in Brain Gym have been shown to explicitly align the brain for optimal learning and help children making connections between previously learned information and new content, improving academic functioning, perceptual motor skills and self esteem. Physical education should not be eliminated from the curriculum, it should be increased and exercises should also be incorporated into other areas of classroom instruction.

Because our highly visual culture has a need for imagery to represent, express and process ideas and emotions, integrating visual learning opportunities into instruction is vital. A cultural rise in visual/spatial reasoning and a widespread ability to analyze visual material should not be ignored or played down. This focus should in fact replace the linguistically based system that has managed to subsist despite the visual/spatial evolution.

Technology must be made available to all students across cultural lines and without regard for perceived ability and utilized in ways that engage creativity and critical thinking. New advancements will soon make it possible for classrooms to access technology while actively engaged in inquiry and experimentation learning that is both supported and individualized, but only if classrooms have the necessary equipment and are supervised by instructors who respect and utilize the technology. Instruction needs to keep pace with advancing technology.

DVD technology is infinitely superior to other methods, offering better quality video and audio and holding more data, DVD is especially suitable for film and movies, recordings of special events such as demonstrations, games and simulations. These are all activities that are supported by brain research as being engaging to students and likely to prompt learning. DVD technology involves both the playing of pre-made disks and the making of DVDs which has become increasingly less expensive and less difficult. This means that specific disks relevant to classroom content and instruction can easily be developed and utilized as primary sources or to supplement existing curriculum materials.

Digital video is an effective medium for developing portfolios and media-rich presentations for instruction. Color graphics, moving images and sounds add depth to programs and align with brain-based research that instruction should be visual and movement oriented. Using motion video, still pictures, multi-track audio, and computer graphics into a single program effectively combines the targeted mediums. The education field could be, but is not making sufficient use of this digital video technology. This is unfortunate because, as shown by the nation's leading dental schools' plan to replace previously existing textbooks and lab manuals with technologically advanced laptop computers and DVDs, there is unlimited application for the use of digital video in education.

Curriculum Development

The following guidelines were assimilated from the presented literature and used to direct the ideas for development of supplemental DVD for instructional use. Overall, it is advisable that instructional content and practices employ brain-based research. Instruction should not try to separate brain functions into specific right or left brained tasks, but instead should focus on building an atmosphere that stimulates and engages the whole brain. Instruction should be delivered in more than one medium and engage the brain. Instruction should scaffold learning so that the brain can easily relate and store information. Instruction should center on interesting and personally relevant material. Movies, demonstrations, active discussion, simulating and hands on tasks are viable methods that should be incorporated into classroom instruction for delivering content and concepts.

Instructional methods should offer high contrast, alternating between repetitive sedentary activities and active activities. Instruction should take a cue from media and include more visually stimulating, interactive material. Instruction should be diverse. Students need to be taught that there are learning preferences and differences in the way the brain receives, processes and expresses information. Instruction should model Gardner's theory of multiple intelligences fostering interpersonal, intrapersonal, naturalistic, bodily-kinesthetic, visual-spatial, logical-mathematical, musical, and linguistic intelligences.

Subjects that traditionally use linguistically based content instruction should try to incorporate more art, music, dance and physical activity into their instruction.

Learning programs for children with ADD, learning and mental disabilities should incorporate movement into classroom instruction. Body centered learning that incorporates dance, physical education, recess, sports, and games should be routinely included in instruction. Physical education should be given increased priority in the school day and exercises should also be incorporated into other areas of classroom instruction. Instruction should also take advantage of a cultural rise in visual/spatial reasoning.

Instruction needs to keep pace with advancing technology. Ideally, instructional technology combines equal parts pedagogical theory and technological application. One criticism that has frequently been leveled against the field is an overreliance upon gadgetry and gimmicks. However, in actuality, technology is only one aspect of instructional technology. Without a strong foundation of instructional context underlying it, technology cannot in itself ensure that the most effective learning environment possible will be achieved. In fact, when technology is deployed in the classroom without sufficient theoretical grounding, the net result can often be heightened confusion and disengagement, which ultimately gives rise to an instructional environment that is far less efficient and effective.

Today, instructional technology has become widely implemented at many levels of the American educational system. It is particularly prevalent among younger students, where the confluence of technologically-savvy students, sophisticated technological infrastructures, and the acute need for increased methods of discussion and information transfer have created an environment where the concept and practice of instructional technology has been enthusiastically embraced.

Many experts in the field have predicted that as policymakers gradually come to recognize the future economic benefits associated with a student population that has had the opportunity to gain familiarity and conversancy with a variety of technological applications, more technology-friendly changes will be made to curricular standards at the state and local level. While the Clinton era marked a substantial advance in the acceptance of instructional technology, as evidenced by several federal initiatives geared to increase students' access to and awareness of emergent technologies and their applications, the current Administration has been more focused on increasing accountability through standardized testing and "back to the basics" curricular reform.

This divergence between the current and the past administration reflects a major division among the larger population in their positions on the use of instructional technology. While many regard the use of computers, the Internet, and related technologies to represent a beneficial advance for public schools, others view this as an unnecessary expenditure that only serves to detract from the learning that needs to be taking place in the classroom environment.

Although most in the field of education view instructional technology in a positive light, the current crisis of funding in many public schools does present a compelling counter-argument to the widespread implementation of technology as a learning facilitator in the classroom. However, it must be recognized that technology is rapidly become a part of virtually every aspect of our social landscape.

Future workers who have not gained a degree of familiarity and facility with technology will be relegated to the lower economic rungs. Not only would this sharply limit the personal opportunities for individuals without basic technological skills sets, it will also negatively impact the economy as a whole. By cultivating a future generation of uniformly technologically-savvy workers, our economy will have much greater prospects for growth and expansion.

Today, we often tend to view the beginning of the instructional technology movement with the widespread availability of personal computing technology in the 1980s. While it is true that this juncture proved to have a revolutionary impact upon the use of technology in learning environments, the current field of instructional technology is actually the outgrowth of nearly a century of development.

DVD technology is infinitely superior to other methods of content development and data storage utilized for instructional technology. DVD is suitable for developing activities that are supported by brain research as being engaging to students and likely to prompt learning. Specific disks relevant to classroom content and instruction can easily be developed and used for instruction.

In developing a Digital Video Disk for classroom instruction, the above principles should be adhered to with appropriate activities and instructional materials incorporated. Instruction incorporated both visual and movement activities and instruction augmented with interactive materials. Movie clips, relevant demonstrations and content extensions should be developed.

Summary

This chapter documented the steps that were taken to develop the research thesis. The population served and the specific research methods were defined. In addition, the data was compiled and analyzed in reference to its relevance in learning, movement and technology.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

Included in this chapter are the results and recommendations drawn as a result of discussion throughout this thesis, both the research on the brain and movement, and the impact of the use of DVD.

Presentation of the Findings

When it comes to instructional practices, the following are activities that will energize the student in preparation for learning:

- Yes! Clap
- Clap Once, Clap Twice
- Reciprocal Chant
- Hand Jive (Movement with Words)
- Birdie Song (Movement with Words)
- Cross Laterals
    - Swim One Arm / Other Different
    - Touch: Knees, Heels, Elbows
    - Thumb Figure Eight
    - Nose / Ear
    - Figure Eight Backs

- o Doodle Down Backs
- Alphabet Game
- Brain Toss Game
- Massage Backs / Switch
- Lap Sit
- Team Stretches
- Team Changes Locations
- Everyone Switch Seats
- Creative Handshakes
- Psychic Handshakes
- Mass Movement with Manners
- Clapping Games
- Rewrite Lyrics to Songs using Subject Matter
- Flash Fingers / hands behind backs, flash and add

Another example:

A Multiplication Song

Chorus 2x:

Try, try to multiply (flex biceps twice, cross in front, make multiplication sign with your body)

Have fun and sing along, (wiggle to the words)

'cause multiplying's a geat short cut (squat down)

when adding takes too long. (stand tall)

When adding numbers all the same (sweep across body)

Or groups of the same size, (sweep across body again)

You can save a lot of time (snap fingers, knee up)

If you learn to multiply. (snap fingers, other side knee up)

Chorus: (repeat all moves again)

Here are a few simple tips

To get you on your way,

0 x a number = 0

..... ALWAYS!

How about the number 1?

Is there a special rule?

1 x a number equals that number.

We learn this in school.

Chorus 2x:

The numbers we call "FACTORS"

Are the ones we multiply.

The answer's called the "PRODUCT".

It's lots of fun! Let's try!

Discussion of the Findings

To view this list in a written format only, many teachers may be able to read and understand how to implement the energizers. However, many educators can become overwhelmed and confused. Because the teacher is only observing the energizers without the ability of "seeing" how the activities are done, and the inability of "doing" what is seen, the teacher is at a disadvantage. With the inclusion of DVD, the instructor could be guided through each series of activities without the vagueness of written text only. With a visual moving medium, there's no mistake what to do!

Summary

In spite of the remarkable amount of brain based research that calls for visual and motion activities to be utilized in the instructional setting, these types of activities are ignored in classroom practice. Likewise, the use of DVD available are not being effectively utilized in the classroom. Together, incredible instruments for teaching in education are virtually overlooked in the powerful process of learning. When multiple modalities are utilized, concepts are anchored.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Included in this chapter are the conclusions drawn as a result of completing this thesis, both the research and information on Digital Video Disk materials. In addition, recommendations are offered in respect to further developments in curriculum, instructional practices and technological advancement opportunities as well as possible areas for future research.

Conclusions

Individuals in education are under increasingly greater pressure to develop and deliver instruction that includes research based best practices. This means substantiating the effectiveness of instructional methods. In order to incorporate rapidly advancing technology, new methods must be developed that are previously untried. Since the advent of the personal computing technology in the 1980s, the range of learning technologies has expanded precipitously. In addition, the scope of theoretical development in the field has expanded very rapidly in order to adequately address the widened spectrum of learning technologies and scenarios.

The future of instructional technology will both parallel and transcend the future of technology as a whole. The field has long since outgrown a strict correspondence to technology, indeed, throughout the latter half of the twentieth century, theory-making has long since eclipsed the development of practical applications as the area of the most frenetic activity within the field. The era when instructional technology was limited to the use of technological devices within the classroom is long since past.

Today and in the future, both researchers and practitioners in the field will use available and emergent technologies only as the springboard for theoretical development, rather than being tethered to currently available technologies as a means of delineating the parameters of the field. Indeed, it is widely predicted that one of the most significant changes for the field of instructional technology in the future will be the elimination of the longstanding assumption that instruction can only occur within the bounds of an educational institution. An increasing number of corporations are already leveraging the latest learning technologies to train and update personnel that are often located throughout the country.

The last century has seen vast changes made in the realms of both the theory and the practice of education, and instructional technology has been a major impetus and catalyst of these changes. Because technology is playing an increasingly important role in our daily lives, it only stands to reason that it should play a correspondingly sizable role in the way that we learn. As the very concept of education and learning is being shaped by emergent technologies, the field of instructional technology will continue to play a vital role in responding to these changes. The most important contribution of the field will likely be the continued development of both theoretical models and practical applications for determining the best way to implement technology at every step in the learning process.

In developing new strategies it is important to build upon a firm foundation of research. This project has substantiated through related literature the theoretic effectiveness of incorporating learning and brain based research into a moving visual medium DVD for classroom instruction.

Given the overwhelming body of resources unearthed during this process that support the use of brain based research, instructional practices that incorporate visual and movement activities and increased technology, it is evident that this there is room to positively enhance current classroom instruction. The development of an instructional tool that is based on brain knowledge is justified by the literature; the research backs up this type of instruction. In addition, the choice of Digital Video as the format through which to develop and incorporate that research is also sound.

Recommendations

In an ongoing effort to ensure that all children are given appropriate learning opportunities, it is understandable that education should focus on techniques that have been proven effective. However, given the fact that education has a relatively poor track record of incorporating significant research into practice, it is important that research based practices not be limited to those traditional methods that might have a long-standing track record. This is especially true when one considers how rapidly transforming technology has and will continue to revolutionize education. It is recommended that the development of new instructional practice be based on thorough review of existing data, such as was undertaken here.

Based on the research incorporated into this project, it seems advisable that more educational organizations and facilities begin to develop digital video resources for use in the classroom. This technology easily allows for the development of research based instructional practices that incorporate visual spatial intelligence and engage both the eyes and bodies of students. Digital video also holds the potential for both generalized, consistent delivery of basic content and the individualization of instruction that is called for in many of today's diverse classrooms.

Given that this thesis provides theoretical justification for the use of digital video that incorporates learning and brain based research, an important next step would be to study the application of this technology in context and establish experimental data to substantiate these claims. Additional areas of research could delve into the possibility of incorporating these methods with portable technology, which would increase the ability to extend movement in instruction.

Summary

Although many aspects of twenty-first century society have come together to enact sweeping changes in the current-day educational system, probably the most prominent area of change is the use of educational technology. Currently, pedagogical scenarios that would not have been imaginable even twenty years today have become standard practice in many schools.

Literature supports the fact that instruction should incorporate learning and brain based research, including a predominance of visual and movement activities that are interactive, meaningful and engaging to the learner. Incorporating these methods into a digital video medium is also supported by resources. Development of instructional materials like the project disk is in line with educational trends supporting research based best practices.

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