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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

USE OF PHOTOGRAPHY TO SUPPORT THE LEARNING PROCESS OF SCIENCE TEACHERS OF NINTH THROUGH TWELFTH GRADES IN THE SCHOOLS OF KUWAIT

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

Abdulaziz Alenizi

College of Education and Behavioral Sciences
Department of Educational Technology

August, 2015

This Dissertation by: Abdulaziz Alenizi

Entitled: *Use of Photography to Support the Learning Process of Science Teachers of Ninth Through Twelfth Grades in the Schools of Kuwait*

has been approved as meeting the requirements for the Degree of Doctor of Philosophy in the College of Education and Behavioral Sciences in Department of Educational Technology

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ABSTRACT

Alenizi, Abdulaziz. *Use of Photography to Support the Learning Process of Science Teachers of Ninth Through Twelfth Grades in the Schools of Kuwait*. Published Doctor of Philosophy dissertation, University of Northern Colorado, 2015.

The purpose of the study was to investigate the relevance of teachers in Kuwait when utilizing photographic aids in the classroom. Specifically, this study assessed learning outcomes of teachers amongst high school students in schools at Kuwait. The learning outcomes were then compared with teachers who are barred from using photographic aids.

The research utilized a descriptive quantitative research design. The number of participants was limited to an acceptable number in the range of 250-300. Data were collected through a questionnaire and analyses were conducted using various types of statistical designs for interpretation, specifically Spearman correlation analysis.

The study revealed that visual media such as images and photographs made it easy for the students to understand the concepts of science subjects, specifically biology, physics, and chemistry. Visual media should be included in the curriculum to enhance the comprehension level of students. The government of Kuwaiti, therefore, should to encourage the use of visual aids in schools to enhance learning.

The research did not indicate a capacity of skills students and teachers can employ effectively when using visual aids. There also remains a gap between possessing the skills and applying them in the school. Benefits associated with visuals aids in teaching

are evident in the study. With the adoption of audio-visual methods of learning, students are presented with opportunities to develop their own ideas and opinions, thus boosting their own interpersonal skills while at the same time questioning the authenticity and relevance of the concepts at hand. The major merit of audio-visual platforms in classroom learning is they cause students to break complex science concepts into finer components that can be easily understood.

ACKNOWLEDGEMENTS

I use this opportunity to express my sincere gratitude to all who have hugely contributed toward the successful completion of this dissertation.

I do know that I would never have been able to successfully complete this research study without the help of my advisor, my committee members, my friends, and the priceless support from members of my family.

Firstly, I would like to appreciate and express my profound gratitude to Dr. Mia Kim Williams, my advisor, for giving me the insight and creating an excellent atmosphere for me to undertake this study. My advisor provided me excellent guidance and was very caring and patient with me in the course of putting this research together.

I would like to express my deepest gratitude to the faculty members who provided me with the necessary textbooks and patiently corrected my writing. The faculty members hugely contributed to the development of my passion for this area of study.

I offer special thanks to the faculty members who showed the willingness to participate in my final defense committee not minding the shortest notice. I would like to thank a few of my course mates who as good friends were always willing to help and give their best suggestions. Therefore, many thanks to Dr. Linda Black and Dr. Mia Williams for their help.

I would like to thank my parents and all members of my family for always supporting with finances and they also provided timely encouragement mixed with their

best wishes. The successful completion of my dissertation would probably not have been possible without their tacit helps.

Finally, I would like to thank my best friend, Ahmad Alfailakawi. He was always there for me when the going appeared tough. He cheered me up and most importantly stood by me through thick and thin until this dissertation came to a successful completion.

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CHAPTER I

INTRODUCTION

According to a Chinese proverb, "A picture is worth a thousand words" (Bleed, 2006, p. 5). The human race has applied the use of images to communicate its thoughts no matter their complexity. Information has been more effectively communicated through the use of visual images, especially through photography (Yunus, Salehi, & John, 2005). Although, every picture or a photograph or an image tells a story, they are devoid of any national language and only profess a universal language of knowledge (Wirth & Dexter, 2008). Incidentally, a photograph is believed to give a cultural context, establish a connection with the viewer, and impart the message, which has a long retention in the memory of the learner (Wirth & Dexter, 2008).

We live in a world of advancement and technological dynamics. Our world is encompassed in a virtual bubble and electronic media have overpowered most aspects of our life. Visual media has further been supported by the westernization of the world and visual discourse has been conceived as a way to develop social and cultural identities. Sudden emergence of visual media has not only supported the advancement of mankind but has also improved learning potential (Hewlett Packard, 2004).

The field of education has continuously evolved over the years with the incorporation of new teaching methodologies and resources on the basis of the psychology of students to produce the best learning curve. Over a period of time, new

psychological understanding and teaching methodologies have emerged that have slowly mitigated a strong stance of development (Akram, Sufiana, & Malik, 2012).

The emergence of virtual aids such as presentations and web presence are gradually offering students and teachers an opportunity to diversify the learning experience (Yunus et al., 2005). Graphic representation has been deemed an effective medium for imparting complex and uncharacteristic information as it is believed to mitigate multiple level responses in the student psyche (Yunus et al., 2005).

Since early civilization, man has utilized pictorial messages to impart and share knowledge. This case is evident amongst pictorial representations and carvings of early ages found all over the world (Dzemyda, 2005). Based on this perception and scientific data collected over a period of time, it is not prudent to presume that pictorial representation has left a definitive mark on education (Nusir, Izzat, Al-Kabi, & Sharadgah, 2012) Science educators across the globe rely heavily on inscription and imaginary representations for the purpose of information attainment (Dzemyda, 2005).

Alternate Media and the Present Day Educator

Use of visual medium or photographic images has increasingly been encouraged by educators to make the learning process of students more divergent as it enhances overall learning (Sibanda, 2009). Types of visual formats being advocated and used as part of teaching resources include digital material that are web-based along with the transparencies and printed matter (Wilbur & Adamo-Villani, 2008). According to Bleed (2006), learning preferences of students and their learning style could be enhanced and addressed more effectively through the application of visual materials in teaching since the retention level is higher than with a verbal teaching style.

With the passage of time, written communication has and is being complemented by visual communication such as photography. Researchers stressed that educators should focus on learning complemented by the use of photographs to enhance visual learning as a way of staying current (Rasul, 2011). Today's education system is more and more text-driven without clearly understanding the learning styles of students and whether the teachers prefer to impart learning through visual methods or texts only (Yunus et al., 2005). The current global scenario is one in which the use of technology and the manner of communication (i.e., texts, tweets, Instagram®) adopted primarily by late adolescents (Werner, 2004) has made the world seem smaller and more connected. Because these late adolescences spend much of their lives in school, educators and researchers are understandably interested in studying the ways in which their students communicate through photographs as a communication platform (Sieber & Hatcher, 2013). Thus, teachers who desire to meet the needs of today's students respect the ubiquity of photographs as a communication medium used by students and include photographic imagery in their curriculum (Gilakjani & Ahmadi, 2011).

It is commonly believed that most people have a preferred learning style (Gardner, 2011). Researchers suggested that over one-third of the population prefers attaining information through a virtual medium (Wilbur & Adamo-Villani, 2008). Interestingly, auditory and kinesthetic forms of learning follow a close second and third with regard to preference. Despite these learning styles and preferred choices by most people, many educators prefer a verbal-oriented form of communication (Rasul, 2011).

Apart from the way of relating to the students, it is also important to understand their mindset. By deciphering a student's preferred learning style and possible challenges

he/she might overcome in a particular course, learning style could improve learning outcomes over the long run (Vethamani & Nair, 2009).

During the course of this research, it was realized that the Ministry of Education (MoE) in Kuwait understands the need of complete learning. As a result, they are shifting away from simplistic learning to a more comprehensive education. Unfortunately, this has presented a problem in adaptation and learning. Following the new curriculum introduced in Kuwait in 2008 by the Ministry of Education, many educators have proposed an alternate style of learning.

Education in Kuwait

The new Kuwaiti curriculum focuses on reforming the curriculum of several subjects, especially science at various stages of schooling such as primary, intermediate, and secondary levels (Alshammari, 2013). The primary, intermediate, and secondary level grades are characteristically first through fifth grades, sixth through ninth grades, and 10-12 grades, respectively. The Ministry of Education reformed the curriculum by adopting a curriculum already well established and being used in other nations (Al Mamun, 2014). Parallel actions taken in Western cultures provided an edge for average students, i.e., an added advantage or competitive advantage was provided to students whereby they could learn more effectively. The Ministry of Education selected the science curriculum being used and taught in U.S. schools (Alshammari, 2013).

Most Arab countries tend to adopt curriculum of Western countries in the process of developing their own education systems. This was evident in the adoption of a Western science curriculum by the Kuwait government along with other Arab countries such as United Arab Emirates (UAE), Saudi Arabia, Lebanon, and Bahrain (BouJaoude

& Dagher, 2011). According to BouJaoude and Dagher (2011), the Ministry of Education of UAE adopted a Western science curriculum published by Harcourt. Additionally, Saudi Arabia and Bahrain adopted a Western science curriculum published by McGraw-Hill that was advocated by the government to be in sync with the culture, environment, and societal framework of the country (BouJaoude & Dagher, 2011).

Unfortunately, whilst the changes were in accordance with the desire to embrace Westernization, perceptions of the teachers were not taken into account (Al Mamun, 2014). Most Kuwaiti teachers were uncertain about the new advancements and questioned the efficacy of these curricula in teaching and contributing to the positive learning curve of students. According to Alshammari, (2013), there was zero involvement by teachers in the reform process of the curriculum; the teachers felt that the new curriculum did not reflect the cultural and social framework of the students of Kuwait since it was directly adopted from Western countries (Al Mamun, 2014). Additionally, researchers indicated the teachers found the curriculum difficult to teach as proper training was not provided and students perceived and retained the information at a very low level as there was too much text to be remembered (Roth & Lawless, 2002). Students failed to establish any connection with their own cultural and social context, which made the learning more difficult (Alshammari, 2013).

Thus, it was increasingly evident that the present curriculum being taught in the schools of Kuwait was likely not effective and had potentially hampered the teaching style of the teachers and the learning style of the students (Roth & Lawless, 2002) because of its dependency on text and lack of sociocultural context. The adopted curriculum was advanced in nature, which meant the way in which it was implemented

was ineffective. The curriculum was rendered ineffective in spite of having all other qualities; was up-to- date with modern and current practices, discoveries, and inventions; and enabled students to compete globally. Moreover, the curriculum remained potentially incomplete and ineffective if it was not taught in a way that helped students retain it for a longer time and actually understand the concepts (BouJaoude & Dagher, 2011).

Yunus et al. (2005) reported that concepts are best understood when they are taught in relation to the respective social and cultural frameworks in which students live. This could be best done by the application of photography and visual images that relate the concepts to the students' own daily surroundings and occurrences (Barab, Warren, & Ingram-Goble, 2009).

Detailing the importance of visual media in the classroom, Yunus et al. (2005) reported in the 52 schools in Malaysia, Kapit, and Sarawak that (a) 96.2 % of teachers found visual aids like photography were relevant to the curriculum and made teaching and learning enjoyable for students and teachers because the photographs enabled students to understand the concepts and ideas more clearly; (b) 94.2% of teachers believed the use of visual aids enabled them to attract the interest of low performing students by focusing on their lessons; (c) 92.3% of teachers found it easier to teach through the use of visual aids by specifically making difficult concepts and theories in science easier to explain through the use of images and photographs; and (d) 86.5 % of teachers stated the use of visual aids helped students cope with cultural elements embedded in the texts because audio visual, animated videos and films, and graphic pictures aided students in clearly visualizing the texts.

Effective and successful science education requires qualified science teachers who are creative and able to apply different teaching techniques, media, and strategies to explain abstract concepts to students. If teachers use creative visual media to teach science, most students would most likely be able to apply these concepts in real world situations (Barab et al., 2009). While there are multiple methods of making a concept more palatable to students, some preferred visual aids used across the globe include cartoons, virtual laboratories, newspapers, Facebook, Wikis, and blogs (Pozzer-Ardenghi & Roth, 2005).

A close look at an average textbook would reveal the brilliance of modern teaching aids. A typical textbook is a combination of written concepts and pictorial descriptions. Most textbooks have a plethora of visual aids like flowcharts, images, and pictorial descriptions (Lee, Li, Ling, & Yeung, 1996). These visual aids are most frequently found in high school biology textbooks. Whilst it is understood that visual aids play an important part in the learning process, little is known about their relevance for learning in classroom lectures (Peackock, 2001). Educational photography or the inclusion of visual images as a teaching resource has also been advocated by many educators (Li, Lam, & Wu, 1999).

This dissertation delved into the efficacy of teachers related to incorporating educational photography in the learning process of students from 10th-12th grades in Kuwaiti schools. This researcher also reviewed the effectiveness of using photographs during lectures in a classroom. In accordance with the curriculum change, many students have trouble understanding new concepts. However, teachers are advocating the

utilization of visual aids to make learning more palatable for these students (Pozzer-Ardenghi & Roth, 2005).

This study further discussed the relevance of virtual resources and other projected photographic aids in understanding and learning new concepts. Photographs have the potential to enhance the understanding of scientific concepts, yet an increasing number of new learners are hindered by their own disdain. This research assessed the possibilities of learning and interpreting new concepts in contextually hindered learners and aimed to decipher the possibility of learning a new concept more easily compared to conventional learning aids, especially in subjects with scientific backgrounds in K-12 learners.

Problem Statement

Teachers are struggling with the new curriculum introduced in science related subjects in Kuwait. The Ministry of Education (MOE) made the decision to wholly adopt a Westernized curriculum that does not reflect the cultural realities of Kuwait. Kuwaiti schools today are committed to providing a values-based international education at the highest academic standards to remain in sync with a fast paced world (Li et al., 1999). Kuwaiti children deserve an education that brings about the highest level of human consciousness in a learning environment, allowing them to survive in an intercultural environment and understand and respect the modern world (Pastizzo, Erbacher, & Feldman, 2002).

However, to bring about changes in the entire curriculum and the educational structure introduced by the MoE would be a difficult or nearly impossible process currently (Pastizzo et al., 2002). Thus, teachers have to implement a different way of teaching the curriculum to the students in accordance with the preferred learning style of

the students or a learning style that enables students to grasp the concepts and link them to their social and cultural situation (Al-Duwaila, 2012).

Purpose of the Study

This study investigated the relevance of teachers in Kuwait utilizing photographic aids in the classroom. This study assessed the learning outcomes of teachers amongst high school students in schools in Kuwait. The learning outcomes were then compared with outcomes from teachers who were barred from using photographic aids.

To provide an effective educational environment, a teacher needs to avoid certain pitfalls like monotony in lectures, or focusing completely on a selected group of students, or being unable to reach students with regard to a concept. In today's world, educators must exercise care to avoid the pitfalls of routine and monotony (Al-Duwaila, 2012). However, despite several theories, there is no sure shot solution to a pitfall-free learning style. Educators across the globe are using technology in teaching, especially in higher education. Judicious use of technology is bound to yield benefits (Yunus et al.,2005). Teachers in most Kuwaiti schools acknowledge the need for an alternate means of learning.

In wake of curriculum change by higher authorities, most educators in Kuwait are in a dilemma. They are handed the responsibility of teaching a Westernized curriculum to culturally enriched and proud Kuwaiti students. They are convinced that the added pressure of accepting an alien concept could induce difficulty for the average learner. The study was directed toward assessing whether the use of imagery in the classroom by teachers was effective in enhancing students' learning. This study deciphered the

perceptions of teachers in Kuwait who utilized photographic aids in the modern day classroom.

Context of the Study

In the last few years, Westernization has been advocated to most Middle Eastern countries as a way to attain success. To sustain in the current world, one must be ready to emulate it (Hindal & Whitehead, 2013). This trend is not simply evident in the language or products but is also evident in norms and educational characteristics. Arab countries are gradually following the norm of modern learning and are evolving new school curricula (Krechevsky & Stork, 2000).

Average Kuwait schools persist in their learning and have followed a specific learning pattern and curriculum. However, in wake of the perceived commercialization, they are resorting to adapting their learning module (Hindal & Whitehead, 2013). Interestingly, an increasing number of educators in Kuwait schools are encountering learning concepts drastically different to the cultural and social concepts of the people (Alshammari, 2013).

The researcher created a portal where students' learning outcomes were assessed before and after initiation of a new learning aid. Teachers were entrusted with individually scrutinizing the learning potential of the student before the study (Roth, Pozzer-Ardenghi, & Han, 2005). This study would not only assist in understanding the relevance of photography as an acceptable mode of learning but would also suggest whether it could assist learning despite the cultural barrier. It is said that a picture is description despite all barriers, has no language, yet has all meaning (MacKeracher, 2004). This study assisted in learning whether pictorial representation could be used as a

powerful aid in future learning portals. This study deciphered the learning potential of teachers in grades 10-12 so a higher education pattern could be attained and a platform built for possible higher education assessment (Wu & Newman, 2008).

The researcher acknowledges that Kuwaiti schools, learning centers, and institutions have suffered from a lack of modernization. As a result, there is a requirement to improve the curriculum (Wirth & Dexter, 2008). This study highlighted the teaching styles and learning patterns amongst Kuwaiti schools and suggested varied educational patterns amongst the educators and students. In addition, this study highlighted the interplay of cultural and social aspects with the Westernization. This study also briefly provides conclusions concerning student-teacher relations in the country and discusses steps taken by the educator to improve the learning outcome of students.

This study dealt with the limitations of learning faced by educators (Roth et al., 2005). Traditional and heritage aspects of average Kuwaiti residents are under scrutiny as they are forced to embrace a modernized perspective through Western education. These curriculum changes could threaten the socio-cultural foundation of the Middle Eastern world.

In wake of new learning aids, teachers are introducing new technological methods that could motivate students in attaining knowledge. Since students are facing difficulty in understanding new concepts, especially owing to cultural differences, teachers are utilizing the assistance of virtual aids (Krechevsky &Stork, 2000). Rasul (2011) believed in order to impart knowledge of an intricate scientific concept, teachers could utilize assistance of photographs and make learning plausible. The educator's rationale rested

on the choice of a medium that was accepted by students, was likely to be motivating for students, and provided a greater support for their learning.

Rationale

Audio-visual aids have long since been established to make a lesson interesting not only for students but for teachers as well. This learning platform offers a portal for improved learning for students (Yunus et al., 2005). Studies have suggested that of all the learning aids available to man, visual and audio aids provide a correlation of hearing and seeing that improves overall learning. These aids are believed to save the teacher's time and help in developing innovation and motivation (Akram et al., 2012). As one picture is worth more than a thousand words, use of pictures by teachers is worth more than merely describing a concept.

This particular study deciphered the concept of virtual aids in learning. It was learned that no similar study has been conducted on this subject in Kuwait. However, since Westernization is inevitable, progress rests upon understanding of the virtual aids in learning concept. This study assessed the learning patterns of teachers at 10th-12th grade levels. It is believed that learning is independent during this period and could act as a foundation for future higher education.

The participants implemented visual literary lessons utilizing the suggested curriculum. These tools were believed to provide learners with a visual-based learning experience, especially through pictures and graphs (Barab et al., 2009). These aids were thought to provide content engagement, improve the learning process, and demonstrate the understanding of the concept by the educators in a particular classroom set up. At the

conclusion of the exercise, the teacher and students were expected to have an informed learning experience and the possible attainment of better learning outcomes.

Research Questions

The following research questions guided this dissertation:

Q1 What were teachers' perceptions of the teaching method when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q2 What were teachers' perceptions of their efficacy when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q3 What were teachers' perceptions of students' comprehension of concepts when using visual media, specifically photographs, and was there a statistically significant difference on the basis of age, years of experience, and school district?

Significance of Study

This study emphasized the need for embracing modernization in the context of education. This study was unique in several ways and had multiple areas of significance. It was one-of-a-kind educational research in Kuwait that was concerned with the development of modern curriculum in the field of science amongst students in grades 10-12. This study discussed the development, limitations, and strengths of educational administration in the country. This study deciphered possible learning patterns deployed by educators in a classroom in Kuwait. This study also provided ways a teacher could escape educational pitfalls. This study raised issues and concerns for further research and discussion in the area of educational administration. The researcher also assessed learning outcomes utilizing a photographic method in a decidedly conventional, yet

accepting environment. This study provided insights with respect to the culture, social paradigms, and educational state of the country.

It was believed the information obtained during the course of the study would not only assess the problem encountered during learning by students with regard to a new concept but it would also provide solutions and possible recommendation to improve this learning. It was presumed that educators at various levels of institutions would benefit from this study as multiple aspects of the Kuwaiti educational system were deciphered and analyzed during this study. Finally, this study was intended to shed light on any future attempts to reform educational administration in the country.

This study primarily discussed whether visual aids provided assistance to the teachers so as to improve learning outcomes amongst students in the wake of the new curriculum. It also assessed whether the notion of virtual media as an effective tool was viable with regard to learning and engagement with lessons in the classroom (Wu & Newman, 2008). This study examined how the teacher implemented the lessons using the visual literacy curriculum (pictorial representation).

Key Assumptions

The benefits of using visual aids are not hidden from anyone, especially in a teaching setup. This model created maintenance of reading momentum, interest, and motivation amongst students. Pictorial representations create strong connections between the text and the concept, further improving learning outcomes of students. Visual aids enhance reading potential and act as a motivational factor. Pictorial representations improve student concentration and lead to a better understanding of the context and concept. Owing to multiple levels of learning amongst students, it is difficult to reach out

to all students on similar levels. Pictorial representation of a concept and an aid in learning reduces those discrepancies and improves overall learning outcomes.

Difficulty in understanding a text often leads to loss in interest. Pictures reinstate that interest in learning. Use of visual aids helps students comprehend difficult literary concepts. Visual aids also provide a valuable aid to students with learning disabilities. Visual aids are believed to provide cultural context to students with regard to the text.

Definition of Terms

Audio-visual learning. When both hearing and sight are involved in learning (Schuller, Valster, Eyben, Cowie, & Pantic, 2015). Practical work is more essential in this case and involves a lot of tangible tools such as chalk or videotapes. Audio-visuals also help in elaborating certain facts that cannot be explained without involving video presentations (Lajoie & Derry, 2013).

Photographic image. Refers to an image retrieved by uncovering a sensitive surface to light. Most photographic images are taken using a camera.

Pictorial representation. When photography, drawings, and artwork are represented visually (Maddux & Johnson, 2013). In addition, pictorial representation usually helps explain finer details that cannot be explained orally.

Visual aids. Accessories used to enrich visualization by presenting information more clearly, i.e., shades and models (Becker, Cleveland, & Shyu, 2015). Visual aids are often used by students and teachers who might have eye problems in order to improve their sight. The main purpose of visual aids is to make the content more impactful and easy to remember.

Visual design. When images are made skillfully, making them more presentable, beautiful, and, thus, more captivating (Schuller et al., 2015). It is evident visual design helps in education by creating a clear difference between various facts.

Limitations

This study had the following limitations:

- This study was essentially an evaluation of the current educational system in the state of Kuwait and was not intended to present a final solution to defects and difficulties in the existing educational system.
- This study was not intended to provide an insight concerning cultural misnomers or discrepancies of Kuwait.
- This study did not discuss the possible shortcomings of previous curricula for grades 10-12.
- It was hoped the points made would be taken into consideration regarding any future plans for reform.
- The study was limited to pictorial representation as a virtual aid and hence was limited in scope.
- This study was based on the presumption that pictorial representation is a widely accepted way of teaching amongst high school educators.
- This study was not designed to decipher possible shortcomings of the ministry in educating teachers and assisting them in professional development.

CHAPTER II

LITERATURE REVIEW

Educational experiences of students can be improved by gaining an understanding of students' learning styles and by adjusting the teaching style in such a way that is congruent with those styles. Armstrong (2012) described how a "hands-on" learning experience (a) provides an opportunity to measure the ability of students because they would be able to ask questions in this type of setting, (b) determines if students are competent enough to actually function at a specific grade level from which they can articulate, (c) provides an opportunity to introduce other possible fundamentals, and (d) determines students' reading abilities/understanding. This would allow teachers to create a better learning experience.

Students tend to learn based on the value and importance of the information shared in the classroom. Therefore, if students do not comprehend a presentation, they will not learn as much as possible or it could indicate that particular lesson was not beneficial to the student. When learning styles of students are discovered, it would be helpful if teachers incorporated those styles into their teaching techniques (Hwang & Embi, 2007). The most frequently referenced learning styles are visual, auditory, and kinesthetic. Students likely learn best when teachers incorporate these modes of learning into curriculum activities, enabling students to find their own ways of succeeding (Abbas & Seyedeh, 2011; Hwang & Embi, 2007).

Students learn in different ways. Some students find it easier to learn visually while others prefer auditory or kinesthetic learning styles (Nusir et al., 2012). For visual learners, charts, graphs, and pictures are preferred and auditory learners learn best through lectures and reading. Kinesthetic learners need practical or tangible ways of learning.

This literature review and general evaluation provided a connection to the root of the problem, how science and culture were involved behind the scenes, and how an overall view of how learning styles played a role within them could improve learning abilities regardless of the state of mind or facts that held them back or caused concern.

The relationships were broken down as follows:

1. Teaching Styles.
2. Obstacles Faced by Teachers and Disadvantages of Audio-Visual Learning.
3. The Importance of Visual Learning.
4. Need for Innovation.
5. Need for Modernization.
6. Different Forms of Learning.
7. Accepting Westernization in an Eastern World.
8. The Value Technology Can Add to the Learning Process.
9. Dimensions of Learning Styles in Science.
10. Differentiating Science Instruction.
11. Visual Media in Science Education.
12. Use of Photographs in Other Content Areas

13 Visual Design.

Teaching Styles

In science subjects, the teaching environment must be creative and stress-free to allow ideas to flow freely. Science teachers should therefore strive toward establishing the fact that comprehending the content of the subject matter should come before memorization. Nevertheless, because science is normally an information-rich subject, many students tend to move immediately into memorization, which eventually leads to zero knowledge attainment. De Jager (2012) claimed that when students are not in a position to learn what teachers teach them, teachers need to learn to teach students in a way students will be able to comprehend.

Bowen and Kiser (2009) stated that teachers need to be versatile in the way they teach. Students need to be provided with a suitable environment for learning that can basically be done through adopting a teaching style suited to the student. Nevertheless, Roth et al. (2005) also argued that a method suited to most students might well be ineffective for other students who find it easier to learn using a different approach. Methods of teaching, ways of presenting the information, and the personal characteristics of the teachers can significantly affect the learning process.

Teachers need to make use of different methods during the teaching process and, sometimes, it can be a combination of several methods. Since students' learning styles vary, science teachers need to differentiate, diversify, and incorporate their teaching styles with pedagogical approaches. Four teaching styles were proposed by Grasha (1996): authority, demonstrator, facilitator, delegator, and hybrid. Each of these styles is distinct in terms of the extent to which instruction is student-centered or teacher-centered.

It is very difficult to find an instructor who comfortably represents one teaching style as it is hard to find a student who is also characterized by one learning style.

Authority teaching style is teacher-centered and normally consists of lengthy lecture sessions and one way presentations. Students are expected to take notes as well as absorb the information. Although the authority teaching style is acceptable in several higher-education disciplines utilizing auditorium settings that have large groups of learners, it is a questionable model for teaching children since there is basically little or no interaction between the learners and the teacher.

In the demonstrator teaching style, teachers promote self-learning as well as assist students in developing critical thinking skills that will help them retain knowledge and hence lead to self-actualization. Style strengths include training students to ask questions and at the same time develop skills in finding answers and solutions by exploring. As a result, Tanner Chatman, and Allen (2003) claimed that facilitator teaching style is ideal for teaching science subjects. However, this style challenges teachers to interact with students as well as prompt them into discovering instead of just lecturing facts or testing knowledge by memorization.

Delegator teaching style is also referred to as group style and is best suited for a curriculum that normally requires lab activities such as biology and chemistry. It is also feasible for subjects that require feedback from teachers. This style offers guided discovery along with inquiry-based learning; as a result, it places the teacher in an observer role that in turn inspires students to work in tandem to achieve common goals. Nevertheless, delegator teaching style is also considered to be a modern style of teaching,

which is criticized as newfangled or geared toward making the teacher assume a consultant figure instead of a traditional authoritative one.

Hybrid teaching style, also known as blended teaching style, assumes an integrated approach to teaching that combines the teacher's personality and interests with the needs of learners and curriculum appropriate methods. Hybrid teaching style strengths utilizes an inclusive approach by combining teaching style clusters that also provide an opportunity for teachers to simultaneously blend their styles with student needs and appropriate subject matter. On the other hand, this style runs the risk of students learning numerous things and as a result makes teachers spread themselves too thin for learning. The categories proposed by Grasha (1996) offered a framework through which teaching styles could be explored and assessed.

Obstacles Faced by Teachers and Disadvantages of Audio-Visual Learning

While there are many uses and advantages of using audio visual aids in teaching, teachers also face several obstacles in implementing this method effectively in day-to-day teaching. One of the main obstacles is the inability of the teacher to effectively handle visual aids such as photographs. They lack the dedication required to find relevant pictures and other resources in order to present their class with appropriate material. On the other hand, this becomes an additional responsibility, which they find difficult to handle. This problem is seen more among teachers in government schools and schools in rural areas. They are hesitant to incorporate new experiments into the traditional way of teaching they are already used to; hence, they are unable to choose and handle the right type of audio visual tools in their class (Awasthi, 2014). As much as the audio-visual aids are good and effective, Nath, Ganesh, Singh, and Iyer (2010) acknowledged that

they could be inconveniencing to teachers. Teachers will need to spend more time preparing the audio-visual presentation. Actually, some of the aids, such as films, require the teacher getting permission before using them. Other aids are bulky and, hence, difficult to transport. These inconveniences tend to discourage teachers.

Akram et al. (2012) noted that even if schools are able to acquire the required technology, teachers must spend adequate time preparing the lessons and designing the material so when they present it to the class, it brings about the desired results and attitude changes among students. Finding the time to make such extra effort is one of the big challenges facing teachers as they are flooded with several responsibilities. Also, teachers must think about the nature of the concepts they are planning to teach and choose the right type of resources for each concept.

For instance, if a teacher wants to teach about the geographic nature of a region, a map that is marked with the geographical features of the area in different and appropriate colors for each would be the right choice instead of choosing pictures of each geographic area. Thus, students are able to visualize the area in terms of geographic locations rather than getting absorbed in the structures, thereby losing the learning experience they were intended to get from the class. Teachers must also consider the level of understanding of the students before choosing the material (Nieto, 2002).

Using complex diagrams to teach elementary school students is not likely to provide an appropriate learning experience for students, whereas using colorful pictures that are less complex would likely help elementary students understand and enjoy the lesson. Also, high school students can be presented with demonstrations and diagrams to help them understand the subject. However, presenting students with very simple

material would also make them lose interest in the class as they would not receive any benefit from the class or the material presented (Oravec, 1999).

Parents' perception of these tools also plays a major role in the effectiveness of visual aids. Unfortunately, it was found that parents are not yet aware of the various benefits both teachers and students can have by using visual aids for teaching and learning. When concepts are taught at the primary levels, it is essential that they be made very clear so students can begin exploring and build their ideas on the concepts. However, due to the ignorance of parents on the various benefits of visual aids in learning, schools and educators are not able to use these effectively to teach students (Awasthi, 2014).

Some schools lack the funds required to collect the required visual resources. Several schools in rural areas operate on minimal funds; hence, it is impossible for them to spend more on teaching resources than is traditionally required. Schools are focused more on the learning outcomes, i.e., the marks obtained by students in tests and exams rather than on how well they understood the concepts taught to them, making them deviate from the objectives of teaching and education. Thus, they consider it optional to use visual learning resources to teach students (Schlosser, 2010). Similarly, Nath et al. (2010) claimed that professionally put together audiovisual aids might be an expensive affair. For instance, videos, films, and slides cost money unless they are borrowed from a library and the required equipment to make the audio-visuals could be expensive and cost prohibitive. Hence, some schools might not have an effective number of audiovisual equipment due to budget constraints. Several schools run on a budget so the schools might find it difficult to acquire the technology and other tools required to provide

students with an expected learning experience. When effective pictures are not used, it becomes a total waste of time and effort for both students and teachers. Moreover, the schools' financials also suffer an unnecessary burden due to lack of sufficient funds. Even those schools that manage to buy a set of audiovisual equipment often find it difficult to make it available so all students in different grades get to use them (Akram et al., 2012).

For any teacher to be effective in their profession, they have to be given appropriate training. According to Nath et al. (2010), some teachers spend a lot of time preparing audio-visual aids sometimes due to lack of proper skills. This tends to discourage a number of teachers who would want to utilize the aids but do not have the necessary skills. When teachers are not given the required training to use audio and visual aids effectively and when they are not trained to choose appropriate visual material for teaching, the plan to teach using visual resources results in failure. Hence, it is essential to train teachers in choosing and using relevant visual aids to teach effectively (Muller, 2006).

On one hand, using audio visual aids gives both students and teachers several opportunities to improve the understanding and performance in the subject. However, this method of teaching also has disadvantages that should be remembered when the teacher tries to incorporate these tools in teaching (Werner, 2004).

Students nowadays are increasingly exposed to audio-visual media so they show more interest in watching pictures, videos, etc. than reading a textbook. Therefore, it is the responsibility of the teacher to choose the right type of pictures and other audio clips to capture students' interest in the subjects (Nath et al., 2010)). There are several ways

by which students might be shown pictures, e.g., DVDs, projectors, CDs, sharing photographs of objects on display, etc. When such methods are used, the teacher can also make use of other factors such as sound and color and students receive a rich learning experience. However, when such systems are used, there are chances of equipment breakdown so the desired outcome might not be possible (Brazdeikis & Masaitis, 2012).

On one hand, these aids help students in learning a great deal; on the other hand, there are also chances of students being diverted from the path of learning to enjoyment and entertainment, which could become a hindrance in learning. When students' attention is diverted, teachers might find it difficult to control the classroom and bring the attention back to the lesson. Therefore, when visual aids are used, the teacher must have a solid plan before using them in the class so students are not diverted but engaged in healthy conversation and interaction with other students (Akram et al., 2012).

If such aids are not used effectively, they become an ineffective way of teaching students. Thus, schools must carefully plan the activities and schedules for the aids so all students get a fair opportunity to make use of the school's learning resources and tools (Brazdeikis & Masaitis, 2012).

Visual aids are very useful in helping students learn. However, previous research suggested that students could learn better when audio aids are also combined so students get the whole experience when learning. Moreover, people are able to remember what they see and hear about it simultaneously longer than what they only see. Hence, teachers must understand what pictures are self-explanatory, what are not, and use their discernment to accompany pictures with an audio tool or provide explanations to pictures

during class so students get a clear understanding of the concept being taught (Emanuel & Stunkel, 2012).

If students are left to interpret the pictures without guidance, they might come to inaccurate or not uninformed conclusions and potentially misunderstand the concepts, lowering their performance in the subject (Nath et al., 2010). Hence, teachers also have the responsibility to take the time to decide and organize the resources and pictures, make a plan to present them to the class in the ideal way, and successfully present the lesson to the class. However, there are also disadvantages of using audio and visual aids in teaching but several of these disadvantages could be overcome if careful planning and wise allocation of resources were made (Guerrero & Tinkler, 2010).

The Importance of Visual Learning

In day-to-day life, we learn 3% through taste, 3% through smell, 6% through touch, 13% through hearing, and 75% through seeing. While all the senses help us learn, seeing helps us learn more effectively. It was found that children could be taught effectively by presenting the lesson through visual aids rather than through other means so they get a better understanding of the concepts taught. It was also found that in a span of three days, we are able to remember 10% of what we hear, 35% of what we see, and 65% of what we see and hear at the same time (Using Visual Aids, 2010, p. 5).

Hence, audio visual methods are very effective in teaching students. There may be different types of learners in a classroom; about 83% of people learn better by seeing, 11% learn by hearing, and only 6% learn from what they do. Hence, a majority of students are visual learners while only a small percent of them are kinesthetic learners (Using Visual Aids, 2010, pp. 6-9).

When students are presented with visual aids, they are able to successfully develop an interest, visualize, conceptualize, participate in learning, innovate, reflect, and improve their overall knowledge in the subject. Students are also able to develop their own ideas and opinions independently while being able to develop interpersonal skills. They are encouraged to discuss what they learn with their peers and teachers; hence, it becomes a way through which they can interact with others and develop interpersonal and intrapersonal skills. Using visual aids in art classes helps both teachers and students as art connects both the personal and social lives of the artist. Instilling such skills in students utilizing effective visual aids would help them develop their skills and also prepare them for the future and achieve their dreams (National Art Education Association, 2009).

Visual tools are now a major part of some education systems and are used to teach, learn, and assess students' skills in classrooms. When this method is employed, teachers and students can generate mental models of their perceptions of the world and when the power of computers is also used alongside, it could help students receive a high quality learning experience. Visual aids form a very significant part of visual-spatial learning, which helps teachers understand how students recognize images and how they are able to distinguish familiar from unfamiliar objects. It is also well known that visual-spatial learners perceive and visualize better than normal learners (Hindal, 2014).

Heinich, Molenda, and Russell (1993) stated that visual aids could help teachers transform into creative managers who can efficiently manage the learning experience they offer their students rather than being mere dispensers of knowledge and information. An experimental survey conducted among nearly 120 science teachers from more than 30

secondary schools revealed that although the chalk and talk method was still the most followed method in science classes, audio visual aids such as projectors, pictures, and models were widely used to offer a variety of ways in which students could learn. Also, other types of visual technology such as multimedia and three-dimensional visualization also help students learn science concepts effectively (Lee et al., 1996).

Teachers must also be properly educated and trained before they are allowed to teach students so these technologies and visual aids must initially be used in the training of teachers. Teachers must be given adequate training to choose relevant visual resources for the audience and the lessons they are presenting; they will benefit from a concrete plan of how to present visual resources in their classes so students can fully utilize the advantages of learning through visual aids. Teacher educators have long since emphasized education technologies and developed teachers' skills of presentation through visual and audio tools and equipment (Li et al., 1999).

When teaching visual-spatial learners, it is important to give teachers time to create a visual image of the learning material. Use of different colors is recommended to create categories and information unique to the categories must be made clear. Teachers are also required to organize the materials visually; music or any other fine arts could be combined with the teaching methods to make them more useful and interesting for the students. While doing so, teachers might also create kinesthetic connections to enable students to grasp the ideas presented (Choice, 2013).

One method that has gained quick popularity in recent years is the multi-dimensional data visualization method in which complex scientific data are displayed and students are asked to explore the data. Using this method, raw data are transformed into

an image and a series of images are generated. This method offers students an opportunity to explore the subject on their own. It also develops an interest in students to actively take part in the class and learn new concepts outside the curriculum by themselves, thus developing inquisitive thinking. It also helps them clearly comprehend the concepts and information presented (Pastizzo et al., 2002).

Teaching through pictures is an effective way to keep students' attention on the lesson throughout the class period. When students are shown pictures related to the subject, they find it interesting and naturally concentrate on the lessons. Moreover, teaching using visual aids helps in the personality development of students. Students have an opportunity to think, speak, and act without fear when general interaction among peers is encouraged in the class when the teacher uses visual aids to teach. Therefore, the class also becomes a platform for students to develop their personality and gain skills to help them succeed not only in their academics but also in their future (Akram et al., 2012).

A study conducted among students of Kuwait associated with mathematics and their achievement in the subject revealed intriguing facts (Al-Duwaila, 2012). The sample included 20 mathematics teachers who taught fifth grade students in three primary schools--a private school and two public schools. The sample also included 80 students. The results indicated it is ideal to use visual and audio aids such as pictures, TV, and projectors to teach mathematics to students as it helps them learn. An effective education management strategy is required to incorporate these elements into teaching methods (Al-Duwaila, 2012). An analysis of the multidimensional data visualization revealed students obtained detailed knowledge of the subject when visual aids were used. It also helped

them make optimal decisions that would have an impact on their ability to study and develop an interest in the subject. Moreover, educators who develop and design the curricula could also greatly benefit from incorporating visual aids such as photographs in the curriculum (Dzemyda, 2005).

Another significant advantage of using visual aids to teach subjects is the students' cognitive characteristics and skills could be greatly developed. In a study that involved Kuwaiti students to analyze the impacts of visual aids in their learning experience, students' cognitive skills were increased when visual aids were used (Hindal & Whitehead, 2013). This would be especially useful with gifted students when a different set of education requirements is taught. The working memory capacity developed significantly when visual aids such as photographs were used. Students also developed their visual-spatial abilities. The extent of field dependency and divergency-convergency also developed significantly when such visual aids were used as part of teaching. It was recommended that schools must not only consider the marks obtained by students to determine their giftedness, use education as a means to guide them to greater knowledge, and encourage them to explore beyond the classroom (Hindal & Whitehead, 2013).

As "a picture can say a thousand words," it is highly beneficial for both teachers and students to learn using visual and audio aids. While both media used separately have their own advantages, they offer more advantages when used to complement each other. Hence, audio visual aids form an integral part of modern teaching methods that aim to stimulate the interest in students to learn and explore more about the subjects. Visual aids bring students in direct contact with the concept; thus, they are able to apply the

concepts easily in real life situations. It is essential for students to prepare themselves to have such experiences in order to be ready for practical, real life situations where they have to use the concepts learned in classroom so they can be professionally successful and achieve personal satisfaction (Akram et al., 2012).

When visual aids are used to teach new concepts, students are motivated to study the subject and understand the concept, which helps them learn the framework of the concept clearly. Group learning is highly encouraged in modern times. This alternate way to teach gives students an opportunity to understand what it is to work together as a team as most people have to learn to do when they go out in the real world to work. The effectiveness of being able to do this builds bonds and can benefit every single person when working together to solve problems.

When a visual demonstration is made, students can relate to previous observances of real life situations they came across when the concept was used and use that experience to understand how it worked. This makes the subject more interesting and also helps students perform better in their academics. Students can also clearly identify areas where they have difficulty understanding and seek help from their teachers in solving them (Lee et al., 1996).

Critical thinking, reasoning, and creativity are three main elements that propel students to a higher interest in the subject. These qualities could be increased significantly using audio and visual aids in class. When students are presented with a picture, they start thinking of what the picture conveys and simultaneously try to relate it with what was taught earlier, thus developing critical thinking. Reasoning helps students understand theories and concepts clearly; hence, trying to reason the outcomes helps

them perform better in the subject. When students are able to develop creativity, it also boosts their learning capacity and helps them enjoy learning rather than view it as a monotonous task. As a result, they will have a better learning experience than just through traditional methods of teaching (Roth et al., 2005).

Need for Innovation

Students' needs change constantly. Therefore, what was relevant a decade ago is no longer effective as students are exposed to different experiences outside the classroom. Hence, teaching methods should be made innovative to suit the requirements of students and also consider teachers' work responsibilities. The methodology used to teach and aids made available to teachers must be reconsidered from time to time to keep pace with recent trends (Awasthi, 2014).

As students are exposed to different experiences, teachers must find innovative ways to help students get a similar or better experience in the classroom. Schools must also consider changes in trends and plan their resources accordingly to spend on what is necessary to get students interested and understand the concepts they must learn. Moreover, students become more interested in their subjects when they are taught in a different way than they have been exposed to in the past, resulting in increased student participation and helping them develop themselves and their academic performance (Schell, Ferguson, Hamoline, Shea, & Thomas-Maclean, 2009).

Need for Modernization

In the present world, most cultures are losing the battle of maintaining their integrity and Westernization is winning. The average home and school are also not lost to these changes. As a result, an increasing number of young people and children have

been compelled to adapt to the modern world. They have been force fed a language not their own in the name of adapting to the modern world.

Interestingly, this transformation and adaptation has not been limited to attire or language or specific ideas. Westernization has also overpowered basic concepts taught in school and has thus forced the authorities to embrace a new curriculum. Today, varied fields are adopting a modern take on knowledge; thus, previous lessons are being untold and new concepts are being introduced. History, language, mathematics, and science are under review and, as a result, are being altered (Guerrero & Tinkler, 2010). Typically these alterations are being force on a relentless class of students who have no option but to succumb to new learning.

The average Eastern school has been told to alter its curriculum so new concepts can be introduce that have more relevance in the globalized world. Not surprisingly, several of these concepts are upsetting to the heritage of these students. This further places pressure on school authorities and educators to introduce and appreciate alien concepts. This also places a pressure on students to let go of cultural norms and embrace concepts to which they cannot relate (Hok-Chun, 2002). Fortunately, since most professionals understand the relevance of this change in learning, there is little to no rebellion in the process. However, this barrier to advanced learning is faced by the educators and students alike.

Different Forms of Learning

To understand a concept, varied forms of learning are known to man. While there is no definitive way to introduce a learning pattern, it is broadly classified in four domains: (a) physical domain--visual, auditory, and motor styles; (b) cognitive domain--

dominated by abstract and random styles; (c) affective domain--learning through influencing internal and external psychological and physiological factors; and (d) social co-relation and culture domain.

Every individual has a unique learning style; however, most have a preference to a particular way of learning. The human brain is designed to accept and relate to multiple ways of learning--ways concepts are retained more accurately. For some time, researchers have advocated various forms of learning that improve the learning efficiency of a person. An increasing number of people are more prone to retain information from audio-visual aids as it relates to them on two levels. In a modern teaching classroom, typical teachers today are introducing audio-visual aids so their students can have a better learning curve (Gardiner, 2002).

Interestingly, learning styles is not the only factor that affects the learning efficacy of a person. An increasing number of students are believed to be affected by their culture as well in this regard. An increasing number of teachers have put this theory under consideration (Schlosser, 2010). By relating to the cultural element of a student, a teacher can co-relate a concept to the student. There are various aspects of culture such as language, education, and art (Herod, 2000). It is believed that if a teacher is able to examine the learning environment of a person and understand the cultural paradigms, they have a better chance of relating to that individual.

Accepting Westernization in an Eastern World

In the wake of modernization, an increasing number of Asian and Arabic countries are facing arduous battles while embracing Western culture. Interestingly, most Eastern countries are succumbing to this pressure and gradually accepting new cultural

norms. It is also realized by the government and scholars alike that in order to have a better chance at survival, the change needs to begin at the grass roots level (Oravec, 1999). For this purpose, an increasing number of parents, educators, and officials are mitigating an environment where young people can develop a learning pattern for a Westernized world (Maduna, 2002).

An evaluation of learning abilities can make a huge difference in a society's culture, which tends to learn and pass on new information in a certain manner, many times traditionally. A teacher's style is greatly influenced by how a culture socializes and what others have learned. It can, however, be a dominant style and not everyone learns in the same manner. Cultural research in the past 50 years has primarily focused on differences between Eastern and Western cultures (Chang et al., 2010).

Chang et al. (2010) believed that cultural learning differences are a response to the physical environment that has tapped into the memory of how the culture was initially founded. This could oddly include climate, patterns, wars, or agricultural suitability. The evolution was believed to be a product of a congruent number of years. The key aspect of culture is learned through experience and participation; this is noted by a process a child acquires or is referred to as enculturation. This allows individuals to obtain skills they are unable to independently overcome on their own. This immaturity of dentition could lead to misleading learning abilities. However, that could be altered when exposed to another culture.

The objective of learning is to retain memory and deal with ideas. These need to apply to specific systems and sets of control mechanisms, plans, or, generally speaking, recipes. The rules of learning, even in culture, are dependent on innovation or the ability

to create new responses, allowing the mind to maneuver new ideas in combination to learned ones.

The Ministry of Kuwait state is enthralled by the opportunities a Western world can provide to its citizen. They understand that students are tomorrow's future and are hence advocating the acceptance of Westernization. Kuwait education standards have been well above the mark in the modern world. However, these standards were derived from a strong preference for their cultural heritage, which could act as a barrier in the modern world.

The Value Technology Can Add to the Learning Process

We live in a world of change; it is a dynamic entity that ensures people are always in motion. Those who remain stagnant are caught in turmoil and are barred from attaining success. To attain progress and prosper in current society, it is paramount that a child be exposed to the best (Yunus et al., 2005). Incidentally, the necessity of Westernization is recognized by the modern man; however, his association with change prohibits him from acceptance. As a result, an increasing number of people despite realizing the relevance of Western education are still caught in the turmoil of cultural and social perception (Wu & Newman, 2008).

Within Kuwait, the Ministry of Education advocates the need for accepting Western education so as to promote better chances of survival. Unfortunately, while an increasing number of professionals, educators, and guardians understand the relevance of the demand, they are still unable to provide total acceptance. As a result, an increasing number of students are facing conflict in learning new concepts in their classroom

(Krechevsky & Stork, 2000). Thus, educators are faced with the dual challenge of sticking to the new curriculum but forced to teach students who are conflicted.

To resolve this conflict of interest, virtual aids, especially photographic representations, would assist learning outcomes. This presumption is based on the knowledge that virtual aids would improve the learning capability and provide students opportunities to co-relate the concept with their culture (Yunus et al., 2005).

Dimensions of Learning Styles in Science

In order to provide better access to learning science and encourage more students to pursue scientific studies, teachers, instructors, and faculty must address the differences in learning styles among students in classrooms (Norflus, 2012). The visual, aural, read/write, and kinesthetic (VARK; Fleming & Mills, 1992) sensory modality model and Gardner's (1983) multiple intelligences schema, along with other theoretical frameworks not presented in this paper, offer approaches to think about when including diverse learning styles in a classroom. However, these did not specifically indicate different aspects of learning styles relevant to science education and dealt with the issues in including or excluding learners in science classrooms. Tobias and Baffert's (2012) study explained why some students were capable of self-selecting out of introductory science classes through the use of Felder and Silverman's (1987) framework that differentiated diverse learning styles and conventional teaching styles in science classes. Their dimensions of learning styles in science is not only useful for analysis, teaching, and learning for those in the field of engineering but has also proved useful to all disciplines in the vast realm of science.

Felder and Silverman (1987) proposed four different dimensions of student learning styles and related preferred mode of receiving information (Ha, Wong, Sum, & Chan, 2008). The first dimension describes the type of information students receive (sensory or intuitive); the second describes the modality of the reception of information (visual or verbal); the third describes the process through which students receive the information (actively or reflectively); and the final dimension describes the order in which it is conveyed (sequentially or globally). These dimensions are useful when considering the diversity of learning styles and how teachers can use strategies in science classes to provide regular access to information for different types of students (Alhajeri, 2011).

Science coursework, regardless of the style of the instructor, is usually rich in the amount of information presented. In their model, Felder and Silverman (1987) proposed that students might have substantially different abilities in the types of learning they prefer--sensory or intuitive. Intuitive students think in abstract, futuristic, large-scale, and nonsequential ways, like creating theories as well as new possibilities, have sudden insights, and prefer to guide their own learning. In contrast, sensory students tend to be grounded in the here and now; they like facts rather than theories, want guidance and specific instruction from the teacher, and look for consistency. Moreover, sensory students prefer to receive information, have adept memorization skills, and listen to details. They prefer clear expectations and well-established routines in learning. By contrast, intuitive learners prefer to learn concepts, trace relationships among ideas, and explore complexities and exceptions. These students welcome innovative approaches and appreciate varied approaches to problems. According to Felder and Silverman, there

must also be a continuum of preferences between the two extremes of sensory and intuitive learners as described but they also argued that the differences were helpful when considering the common or unique points between these two different style dimensions. Students need to use both types of learning if they want to acquire the knowledge and skills required to apply their knowledge in practical situations and scientific problems.

Another dimension of the learning styles by Felder and Silverman (1987) related to the actual sensory modality used by learners to get information, which was similar to the VARK (Fleming & Mills, 1992) framework described previously. Visual learners can be identified by their preference for demonstrations, diagrams, pictures, and graphs. Verbal learners tend to prefer learning through language-based processes like talking, writing, explaining, and discussing. Allison (2009) indicated that a major part of science teaching in colleges depends on the use of the lecture method, does not include as many visual materials as preferred by visual learners, and remains to be one factor that hampers learning in visual learners. In life sciences, visual resources are becoming available in different ways such as illustrations in different formats by publishers and libraries offering electronic resources that include animations and videos.

The dominant pedagogy of science classrooms was also relevant to Felder and Silverman's (1987) third dimension of learning styles that draws out the differences between active learners and reflective learners. Active learners tend to learn better when actively engaged in activities such as investigations, discussions, group work, and other opportunities that encourage interaction between students and teachers. Whereas, reflective learners tend to seek opportunities that encourage them to do individual work and provide them a chance to digest information when the social context is missing. Seen

through the lens of Gardner (1983), active learners in Felder and Silverman's framework might also have high interpersonal intelligence and reflective learners might have intrapersonal intelligence (Ha et al., 2008). To provide an equal opportunity for both, every introductory science course must include both types of elements and learning means in its curriculum.

Felder and Silverman's (1987) final dimension of learning was based on the preferred method by which a learner builds new knowledge for themselves, which describes the dichotomy between a sequential learner and a global learner (Alzheimer Europe, 2009). Sequential learners prefer a linear pathway that is well-ordered to acquire new knowledge and is presented as a series of small pieces that can form a complete course when fit together. On the other hand, global learners tend to favor establishing an overview of the larger concepts and working their way into the undergirding of these ideas, which include smaller details (Alhajeri, 2011). Sequential learners in traditional science courses might excel and might even be able to achieve the same in the absence of an understanding of the systems and how the major concepts are interconnected. In similar environments, global learners are vulnerable to getting lost in facts and fail to understand the big picture, which is considered an essential part of learning and knowledge building.

In short, Richard Felder (1993) argued that students who fail in any of the categories still have the potential to become leading scientists (Alhajeri, 2011). While observant and methodical learners become great experimentalists, those who are imaginative intuitors become great theoreticians. On the other hand, active learners are good at administration and projects that involve working with teams and reflective

learners are remarkable at individual research and design. Felder also said sequential learners are good analysts who possess the skills to solve convergent problems and global learners are good synthesizers who have the ability to draw information presented in different types of material and organize them to solve problems that might not have been solved with traditional single-discipline approaches.

Differentiating Science Instruction

We live in a world where development is the key to success. In the current scenario, tremendous growth options are available in the field of science and technology. To compete with the world, science has become an important aspect. As a result, special emphasis has been given for this research. When research on why students tend to abandon science courses is conducted and further digging into the frameworks is followed for different categories of learning styles, the challenges faced by them become clear. Teachers must differentiate and diversify teaching styles and pedagogical approaches used in science courses in order to address the needs of different types of learners. In most cases, it is not possible or undesirable to customize the coursework to fit the different learning styles of students (Ha et al., 2008).

Assessing how students characterize their learning styles and the framework followed by them might not be as important as it seems but knowledge of it could help with their academic success by promoting self-awareness and helping them use learning strategies unique to their style of learning. A teaching style followed by the teacher is ultimately essential in enabling student access to information through different learning styles during the course. One of the time-tested ways to avoid instructional selection and retaining as many students as possible in science courses is following differentiated

instruction--a teaching style derived from multiple pedagogical approaches, not a singular approach.

Digital tools that support visual meaning provide science supported student learning. When information and communications technology (ICT) including videos, animations, maps, images, and models from the Internet; visual thinking software such as concept mapping software, and a digital microscope are used to represent, reflect, and argue, these tools became more like investments. For example, when students of some teachers were taken on a joint field trip to the river nearby to collect rock samples, they were asked to bring their digital and video cameras (Alhajeri, 2011). The site description was video recorded and the students also took photos of the rocks at the site. The students used the videos they recorded to review information later when they were asked to fill out an in-depth description of the trip on paper. The photos taken during the trip were used to record and later compare with the photos when they were asked to break the rocks open (Alzheimer Europe, 2009). The recordings helped students personalize their investigations and became a part of an evolving scientific study further engaging students in the process of learning. Teachers also used the video recordings of the students to gain more informative insights into how students understood the description. The students were asked various questions related to the use of photographs in the above study, which elicited the following responses; their responses were indicative of many educators' experience. Educators were asked, "What are the advantages of a DVD that visualizes science experiments?" and one responded, "Since, our school does not have a laboratory, the DVD was absolutely a 'wonder from heaven' for me, as I had more time to facilitate and assess my students"(De Jager, 2012, para. 1).

Several teachers indicated the DVD helped them spend more time on completing their administrative duties, assessing students' assignments, and facilitating students. The DVD also removed additional pressure from teachers as they did not have to set up and execute experiments. Students also showed more interest in the discussed topics and the same was reflected in their term results (Britt, 2011). A research revelation by De Jager (2012) also supported that using media to introduce a new concept made the subject more interesting than other wise and students found it relevant. Other benefits included increased class attendance, improved cognitive reasoning, and better examination results. The experiment could also be repeated and explained step by step for students who could not understand the new concept when it was demonstrated the first time (Alzheimer Europe, 2009).

When observing such visual science experiments, students were more interested and motivated to learn the topic. Media-generated images helped students recall difficult and unclear concepts that could later be explained or clarified as needed by replaying particular parts of the DVD to the class. Students might also develop process skills through the completion of their assignments as the visual media provided a precise introduction prior to the concept being fully explored and learned. After the concept was learned, teachers could use media to let them use their analytical skills when they had to apply their knowledge in real life situations (Awasthi, 2014). Because the visual media were saved and readily accessible, students could also replay the DVD during school breaks and even after school to clarify concepts that were still unclear to them and develop the required process skills to finish the tasks assigned. In such cases, they were not bound by a time requirement within which they should gain the knowledge. "Many

of my students are struggling to learn with English as their second language. The visual connectivity with English explanations on the science DVD assisted them to understand difficult concepts" (Drew, 2007, p. 52).

Henderson and Wellington (1998) had earlier noted De Jager's findings (2012) when they reported the language barrier is one of the major challenges facing science students. In South Africa, science curricula is mainly taught in English or Afrikaans, which makes it difficult for students who are not familiar with the second language in which they were taught. In such cases, using science DVDs could help them visualize new concepts and solve the language barrier of students (De Jager, 2012). Edelson (2001) recommended that media be used to reinforce complex concepts and be shown before the concepts are discussed in class so students have an image that can be used for comparison when the discussion takes place.

Media contain controversial and socially relevant issues found in the real world in order to engage students in active learning. In such cases, media not only assist students in improving their knowledge, stimulate their thinking skills, but also motivate them and stimulate their interest. Students are also motivated to carry out investigations and apply the knowledge of their new concepts in real life situations and discuss the same with their peers (De Jager, 2012). When media are used for classes with a large number of students, the screen size should also be large enough to ensure visibility is clear for all students. Students could also take advantage of watching the DVD when in large classes as most of them have similar emotions and laugh and cry at the same time. They gasp when they are shocked, cry when they feel empathy, and so on, resulting in increased participation (Coffield, 2004). Such collective experiences in class evoked by media

could become a powerful tool to stimulate an interest in learning and help teachers teach the concepts easily.

For learning to be effective, the concept is to ensure the person can relate to the studies. It has to demonstrate one of the techniques discussed but technology is being developed as modern days arise. There is always a need for instructor/student coordination and communication. Most students feel they are learning to the best of their capacity but this might not always be true. Incorporating these ideas is best, not just by evaluating grades.

Visual Media in Science Education

Since the dawn of human civilization, people have used their perceptions to learn. Audio-visual aids are of great help to teach students new concepts in subjects like science, math, etc. When teachers use audio-visual aid, they are able to utilize resources that assist them in teaching the concepts more effectively. For example, Kinder in 1959 said using audio-visual aids help in achieving clear comprehension as they bring the student directly in contact with the concept. Students are also more attentive and interested in the subject when audio-visual aids are used compared to classes conducted without the help of audio-visual material. Moreover, students are able to conceptualize concretely and in a clearer way when an audio visual medium is used to convey information (Ha et al., 2008). In addition, it provides freedom to students as they are free to discuss and comment on the material presented. This way, they are encouraged to express their doubts and areas of difficulty, which can be clarified by the teacher and result in not only a better learning experience but also in improved performance (Akram et al., 2012).

To illustrate the purpose of visual media in education, Edgar Dale developed a cone of experience in 1969. This cone of experience describes the various learning experiences. Figure 1 shows Raymond Pastore's (2003) modification of Dale's original cone, illustrating the percentage that relates to how much people are in a position to remember. The cone also shows the progression of experiences from the concrete at the bottom to the most abstract at the top.

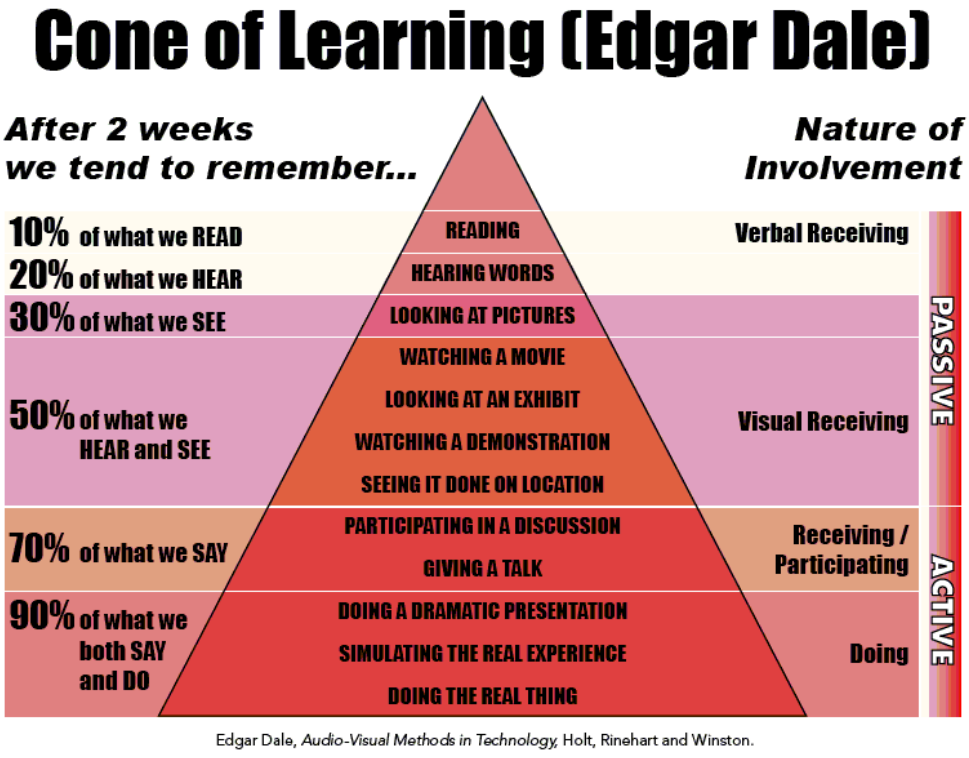

Figure 1. Pastore's adaption of Dale's cone of experience.

Dale's (1946) cone of experience shows what students are capable of doing at each level of the cone relative to the type of activity they are doing such as hearing, reading, or viewing images. The figures on the left side of the cone illustrate what people

will basically remember. From this, it is possible to deduce that practical hands on experience in a real-life context allows students to remember. It is also easy to note that what students see will help them remember more as compared to what they hear or read.

What needs to be taken from Dale's (1946) cone of experience is that experience at each and every level should be used in the second language. In a similar way as Gardner (1983) described multiple intelligences by appealing to them all, the cone puts more emphasis on different senses as well as ways in which people learn (see Figure 2).

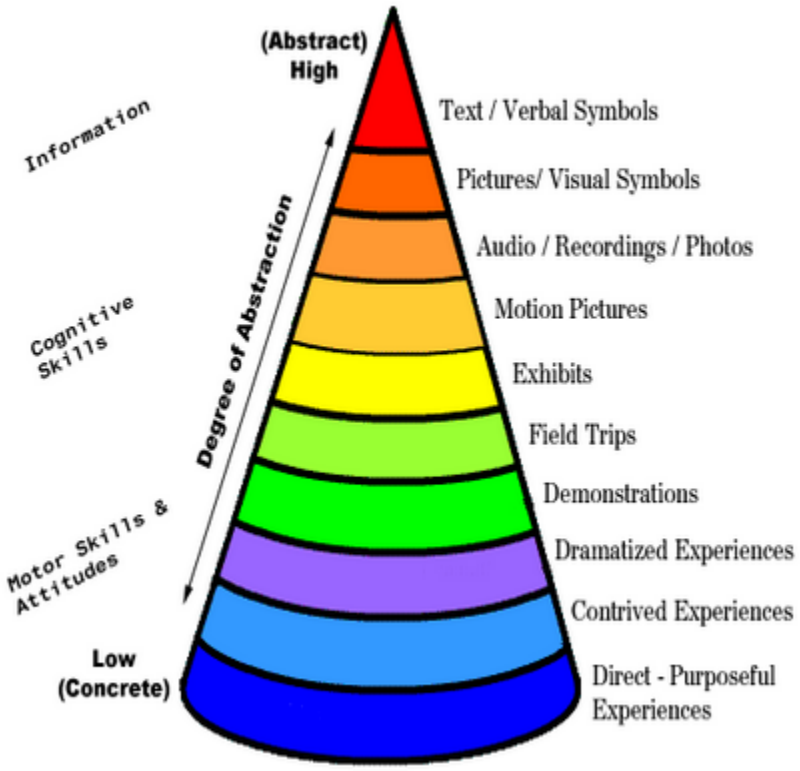

Figure 2. Illustration of Edgar Dale model.

Koba and Mitchell (2011) promoted the teaching of concepts of science through the use of photographs. Table 1 describes various concepts of science and how they can be taught to students through the use of photographs.

Table 1

Teaching Concepts of Science Through Use of Photographs

Concept	Misconceptions	Instructional Ideas
Photosynthesis: Plants need water, air, and sunlight to synthesize their food	Students often misunderstand that whatever is taken in by the plants is food for them Students often misunderstand that plants get their food from soil, air, fertilizers, root, and water and miss the point that these are sources to synthesize food	Showing them parts of plants which draw water and absorbs sunlight and how these are used to synthesize food by the plants & the parts used in the synthesis of the food. Thus, student will be able to differentiate between the different parts of the plants and their functions
Herbivores, Carnivores, Omnivores, and Food Chain	Students are often unable to conceptualize the	Photographs can show them a link between the various strata. This can be taught by encouraging them to draw pictures of what they see in their surrounding and link the different foods and consumers

The system of education is dynamic and it changes and evolves constantly as the needs of students change, making it necessary for educators to explore different ways to teach students to meet their different learning requirements. Although changes within the education system are welcomed, it is necessary that they meet the norms of the society, state laws, and in many countries, religion.

Tanner et al. (2003) recognized the importance of visual media in science. Feldman and Paulson (1994) believed that visual images play a crucial role in presenting science and technology to students and hence contribute to shaping the minds of students regarding the subject matter. The overall aim of teaching is to ensure that students understand and make practical use of the gained knowledge. Visual images provide an easy way of making students understand concepts in the classroom and enable teachers to be in a position to use the knowledge in line with the aim of education.

Hindal (2014) claimed that when students are presented with a picture, they start thinking of what the picture conveys and simultaneously try to relate it with what was taught earlier, thus developing critical thinking. Reasoning helps students understand the theories and concepts clearly; hence, trying to reason the outcomes helps them perform better in the subject.

Visual media such as images and photographs make it easy for the students to understand the concepts of science subjects, specifically biology, physics, and chemistry. Moreover, students enjoy and pay more attention when photographs or images are used to teach them. Teachers should also be trained in teaching through the use of photographs and images because when visual aids are used to teach new concepts, students are motivated to study the subject and understand the concept, which helps them learn the framework of the concept clearly. The comprehension level of students when taught orally or using standard texts is poor but when taught using photographs or images, their understanding is much improved.

Use of Photographs in Other Content Areas

One of the primary purposes of education is to encourage students to learn by themselves, explore more on the subjects they learn, and help them develop an inquisitive mind. Photographs and pictures provide a clear idea of concepts to students; a good photograph could help students learn more than they can learn from text and even without the use of text. Teachers might use both colored or black and white photographs and images to convey their lessons. Researcher Adeyanju (1997) stated that teaching methods using audio visual elements help reinforce the concepts by motivating and stimulating the interests of students and helping them learn better (Akram et al., 2012).

Bozimo (2002) recommended criteria to be followed to choose the right type of learning resources for the different needs of students: (a) visual aids such as pictures should be appropriate for the objectives of the lessons presented; (b) the teaching/visual aid should be free of bias and prejudice; (c) the quality of the visual aid should also be considered in aspects such as pictures, formats, prints, etc. and the best resource must be chosen; (d) a variety of materials must be chosen to avoid monotony for students; and (e) teachers must plan when and where to use the instructional material to effectively present the students with the lesson.

Research conducted among teachers with teaching experience ranging from 3 to 25 years revealed that using audio visual aids such as photographs improved the teaching methodology (Akram et al., 2012). The study further revealed that it reduced the talk and chalk method of teaching and helped students pay more attention to the teacher and the lesson. When students were attentive to the lesson presented, they generally developed a positive attitude essential to stimulating an interest in learning, which could result in

increased student participation in class (Akram et al., 2012). Further, these researchers revealed that audio visual aids including photographs were an essential part of the learning process and made both teaching and learning more interesting and successful. In order to generate desired learning outcomes and achieve their teaching objectives, teachers need to be knowledgeable about the appropriate types of visual resources to be used for the lessons so they are relevant to the audience to whom they present the lesson (Coffield, 2004).

Teachers can easily motivate students to learn using audio visual aids and make the learning process more interesting and relevant. When audio visual means are used to convey information, they are an excellent supplement to other types of learning elements presented and improve the intellectual capacity of students while also resulting in a better understanding of the concepts taught. Responses of the respondents who took part in the Gardiner (2002) study revealed the beneficial effects of audio visual means were better and they also improved teachers' attitudes. Teachers must develop skills to develop and use relevant types of audio visual resources do they supplement and complement the lessons presented to the class (Gardiner, 2002).

Audio visual aids are considered one of the best methods of teaching and could have a great impact on a learning system that is subject to constant change. Audio visual aids provide a realistic experience to learners; they capture students' attention easily and also help students understand historical phenomena better. They are also appealing to the mind and auditory senses of students. Audio visual material such as photographs stimulate the thinking process of students, resulting in a better understanding of the lesson or concept presented to them. Moreover, they are able to remember what they

learned through audio visual medium for longer periods of time than from other media (Rasul, 2011).

Teachers find it easy to enhance their lesson plans and teaching methods by incorporating audio visual elements into the curriculum. The teacher's work is greatly supplemented by these aids; they help students study the lessons in the textbook with a clear understanding and increased interest (Ha et al., 2008). Rasul (2011) conducted a study on students and faculties of arts, science, and education. About 200 people including 150 students and 50 teachers were sampled out of the available population and issued questionnaires. The results of the study indicated a majority of teachers agreed that the use of visual aids made teaching of concepts to university level students more effective. Not surprisingly, a majority of the students also said they found the audio visual elements used by their teachers were more effective in helping them learn.

Language instruction is different from teaching other subjects. Past research on the value of utilizing audio visual elements in language teaching revealed they are a useful resource in helping teachers teach languages more effectively (Al Mamun, 2014). Different theories and methods of language teaching encourage the use of audio-visual aids in classes. One of the language teaching methods--the Direct Method--emphasized that all activities and instructions in the class be taught using the target language (Al Mamun, 2014).

Thus, teachers do not have the option of using the language students know and are forced to use the language the students do not know well but are learning. This is where the visual aids come into the picture. In such situations, students are able to use the pictures to understand what the teacher is trying to convey. The silent way of teaching,

i.e., teaching without classroom lectures and using only a cognitive approach, also recommends the use of physical objects. Although audio visual aids are commonly used and recommended these days, the effectiveness of these resources has not yet been completely realized. Hence, it is necessary for teachers to realize the effectiveness of these resources and implement them appropriately in their teaching in order to achieve the best results (Herod, 2000).

Using pictures in teaching languages has become a common practice and pictures are very effective supplementary resources in English as a foreign language (EFL) classrooms. Teachers can make classes more interesting and interactive for students using a variety of pictures. Teachers can also benefit from this by visualizing the content of the classroom while the learners or students become more engaged and focus their attention on the tasks. Using a variety of pictures is especially effective when teachers teach new topics to students as it helps them conceptualize the lessons and it becomes more real to them. They also get a clear understanding of the concept taught and hence can generate better ideas (Hok-Chun, 2002).

Moreover, using pictures to teach provides long lasting results. There are several advantages to using pictures. Teachers can find a variety of pictures online that are relevant to their lessons; the easy availability of pictures is one of the greatest advantages of using visual aids in teaching. While reading is essential to learning a subject, students often do not show interest in reading; hence, the job of teachers becomes more complicated. In such situations, teachers can make use of the visual aids to get students interested in reading (Ibrahim, 2011).

Actively viewing pictures increases the satisfaction and enjoyment of students in class and hence they focus on the lessons presented and pay more attention to the main idea taught in class. Therefore, it is necessary for students to take part in such presentations with visual aids in order to get a clear understanding of the subject and also get more interested in reading. To make visual aids have a deeper impact on students, teachers can present the students with a set of questions before the visual aids are presented and students might be asked to take notes while viewing the visual elements. After the demonstration or class, students might be asked to answer the questions and be involved in discussions with their peers and teachers in order to share what they learned during the presentation (Al Mamun, 2014).

Students could also be involved in activities that would help them apply the concepts they learned in the class in real life situations so they get an experience of using the concepts, which could stay in their minds for a longer period of time. While this seems to be an effective idea, the level of students' understanding must also be considered before incorporating all of these teaching elements so the desired results are achieved easily (Ha et al., 2008). For groups of students who are skilled in listening, reading, and speaking, following all these methods could be helpful. Whereas, for students who lack certain skills, one or a combination of appropriate methods must be followed so they find it easy to keep up with the class (Al Mamun, 2014).

Visual Design

As noted, visual aids are important when assisting the students in understanding the subject matter by improving their attention span. However, teachers need to use visual aids in a way that will not distract students from concentrating on the main issues.

Thus, while designing an effective visual aid, it is then important to consider a number of attributes. A visual aid should be easily visible by the audience, aesthetically pleasing, easily handled, have clearly understood key points, and act as a supplement to the teacher's message instead of being a replacement.

While designing a visual aid, teachers should focus on all the main points together with the cultural contexts of the audience. The visual aids selected should be appropriate to the points that need to be clarified. Lee et al. (1996) claimed that using memorable words or phrases helped in ensuring that the intent of the visual aid remained clear. Similarly, it is also important to design visual aids that can be used in different environments.

According to Lee et al. (1996), four main elements should be considered while designing visual aids: simplicity, high contrast, easy to see, and effective color. Visual aids should be simple to avoid distraction or confusion. High contrast visuals should be large enough for every student in the classroom to see. Finally, the choice of color should not be distracting but one that draws attention of the students.

Design Principles

A number of design principles can come into play when designing visual aids. Effective designs could be achieved through observing principles of visual design and interaction design principles (Moreno & Mayer, 2007).

Visual design principles. Mayer (2005) pointed to a number of design principles that relate to specific demands of visual design. The main principles included coherence, redundancy, and personalization. Coherence principle basically recommends exclusion of extraneous materials from multimedia environments. On the other hand, redundancy

principle calls for elimination of the need for learners' process information with which they are familiar, and advice against utilization of on-screen text similar to text included in the narration. Finally, the personalization principle recommends use of conversational style instead of a formal style of communicating with the learner.

Similarly, Mayer (2005) described other forms of principles that should be considered during the design of visual aids. Mayer presented two design principles: contiguity and split-attention. The split principle claims understanding the visual media materials is normally hindered by the action of requiring learners to split their intention between as well as integrate several sources of temporally or physically disparate information mentally, especially in cases where all the sources are essential for understanding the material, i.e., videos with subtitles where the animations are shown using explanatory texts that change with the animations. To avoid this, the designers ought to integrate the sources with one another by considering the physical arrangement and the timing of the presentation. This might involve placing instructions, labels, and explanations next to the objects they are referring to, putting two or more objects that relate to each other near one another, and eliminating dynamic presentations of two sources of information.

On the other hand, the contiguity principle explains presenting related sources of information close to one other instead of separating them. Contiguity principle enhances learning through reduction of extraneous visual search tasks. This principle is necessary for the spatial arrangement of information as well as the timing of the information presentation.

Other principles of information design for the visual aids that should be considered include the following: cuing principle, representation type principle, integration of multiple dynamic visual representation principle, and color coding principle. Mayer (2005) claimed that cuing is a design element that tends to direct the attention of the learner to the important aspect of the visual aid and could also be referred to as signaling. Tabbers, Martens, and van Merrienboer (2004) and Mayer (2005) recommended designers make the most important aspects salient or utilize cueing in directing learners' attention to the important information.

Moreno and Mayer (2007) reported the representation type of information predicted that processing depictive information needs less mental effort as compared to processing descriptive information as visual information. In addition, Mayer (2005) also stated the color coding principle advocated instructional materials use color in highlighting important features and attributes of the visual results. Despite the fact the color coding principle could be considered under the cueing principle, it is crucial to focus on the use of color to point out important information.

The other principle crucial in information visual design is the integration of multiple dynamic visual representations that suggests learning could be enhanced when multiple representations of interactive visualization are integrated and linked with one another.

Interaction design principles. Interaction design principles allow learners to control the pacing and sequencing of the representations as well as manipulate its content and determine how it is represented. The principles under integration design principles include learner control segmenting, guided discovery, learner control pacing, task

appropriate, and manipulation of content. The learner control segmenting principle explains the way learners comprehend materials is better when they are in a position to control the presentation from one segment instead of viewing it as a continuous presentation. Similarly, the guided discovery principle claims learners are able to learn better when they are guided to use discovery-based learning in a visual media context. On the other hand, the learner control pacing principle concludes learning could be improved by giving learners control over pacing the information through features like start, pause, or stop buttons. The task appropriateness principle shows the efficiency of a visual aid depends upon the degree to which it is in line with the learning objectives. The manipulation of the content principle, on the other hand, claims learning through visualization might be improved by enabling learners to manipulate the content of the dynamic visualization.

A successful educational model should use visual aids to enhance the learning of the students and needs to be considered especially in wake of the new curriculum in Kuwait. The curriculum should suit today's global society and advancing technological tools; hence, these elements and principles ought to be considered.

CHAPTER III

METHODOLOGY

This research identified the need for the Ministry of Education in Kuwait to embrace Westernization. The Ministry has advocated upgrading the curriculum to suit today's global society and advancing technological tools. An increasing number of students are facing difficulty in learning new concepts associated with a changing educational context. These new concepts, especially in the field of science, are culturally abhorrent to many. Thus, an increasing number of educators are having a problem integrating and changing pedagogy.

Interestingly, this Westernization has not only engulfed the business world but has taken over most of professional world as well. Whether the person is a management trainee, an engineering enthusiast, or a medical professional, the transfiguration of modernization is palatable in all cases. To succeed in their respective fields, adapting to modern concepts is important. The attributes related to modern concepts can be learned to develop a strong skillset and promote workplace success in Westernized practices (Buabeng-Andoh, 2012).

Current Westernization is directly related to the economic standing of any country. Adoption of English as an official language and embracing Westernized trends and clothing are minute examples of the same. Gone are the days when Asian and Arabic countries preached about the relevance of the mother tongue. Today they have

succumbed to the pressures of a modern world and are aping their language (Buabeng-Andoh, 2012).

This study identified the limitations of introducing a foreign concept of learning to teachers of grades 10-12 in Kuwait. Educators are entrusted with the opportunity to act as facilitators to relatively passive participants. While the educators understand the pitfalls of this foreign concept of learning, they believe they can counter the initial impediment of passiveness (Alajmi, 2013). Educators realize the need for introducing a new concept is paramount for a better survival rate and speak of ways that are reachable for teachers (Britt, 2011). Thus, teachers in Kuwait are advocating use of audio visual aids to introduce a new concept and to improve learning outcomes.

Research Questions

The following research questions guided this dissertation:

Q1 What were teachers' perceptions of the teaching method when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q2 What were teachers' perceptions of their efficacy when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q3 What were teachers' perceptions of students' comprehension of concepts when using visual media, specifically photographs, and was there a statistically significant difference on the basis of age, years of experience, and school district?

Research Design

The research design of a study is the overall strategy chosen to describe, interpret, include, and synchronize components of a study in a coherent and logical way. A research design ensures an effective portal that addresses a research problem. It is a

collection of various factors such as research design, participant selection, measurement, and analysis of data. The function of a research design is to ensure the evidence obtained effectively addresses the research problem logically (University of Southern California [USC], 2015). To maintain validity of a research, certain points have to be considered.

A combination of research problems and research questions helps in choosing the type of research design. For the purpose of this research, the researcher utilized a descriptive, quantitative research design (Sibanda, 2009) to understand the perceptions of people rather than simply attain calculative data. The researcher was especially interested in understanding how a teacher accepted a new aid in the classroom, put it to use, and whether it eased his or her burden.

The researcher also reviewed learning patterns of grade 10-12 teachers in Kuwait. The purpose of this dissertation was to assess the learning outcome of teachers in response to integrating virtual aids, especially photographic representations. The educators were specifically advocating the use of these particular aids as it was believed they would interact with the psyche of teachers on multiple levels and have an improved outcome (Eristi & Kurt, 2012), especially in the wake of new curriculum from the Ministry of Education.

Descriptive Research Design

For the purpose of this dissertation, the researcher utilized a descriptive, quantitative research design that provided answers to the questions of who, what, when, where, and how associated with a particular research problem (USC, 2015). This study did not necessarily answer why a pattern was prevalent; however, it was related to specific trends. The trends in question were designed to provide opinions, conditions,

practices, structures, and differences or relationships between/amongst variables in the study.

A descriptive study was specifically used to obtain information regarding the current status of the phenomenon. It explained the extent and description of the variables and deciphered the conditions or situations to which they pertained. This method also helped in learning any limitation associated with the study model, which could instigate future research (Grimes & Schultz, 2002). This method provided for collection of large amounts of data.

In this study, numerical data were utilized to explore relationships between/amongst two or more variables. Interestingly, this exploration of relationships between/amongst variables could provide insight into the nature of the variables themselves (Dzemyda, 2005). This helped the researcher in making assumptions and recommendations about the variable and could open doors for further learning. While this research design was based on descriptive design, the data analysis and measurement were based on a quantitative analysis (Harawell, 2011).

Prior to selection of participants, approval to conduct the research was obtained from the University of Northern Colorado's Institutional Review Board (see Appendix A).

Participants

A spirited debate has emerged over the years about how many participants are appropriate for a study. An increasing number of researchers believe five participants are enough; others advocate a more relatable, larger group of participants (Katz & Rohrer, 2004). In the current study, the researcher deciphered learning outcomes through the use

of photographic aids in the classroom. The target population came from grades 10-12 science teachers in schools in Kuwait across all six districts. All teachers who teach science to grade 10-12 students in Kuwait were asked to participate in the survey, resulting in approximately 2,100 adult-age teachers. Following the information derived from Ministry of Education in Kuwait, the participants were selected through stratified random sampling over the education districts in Kuwait (BouJaoude & Dagher, 2011, pp. 78).

All participants received an email from the Ministry of Education in Kuwait inviting them to participate in the study and included an informed consent (see Appendix B) and Qualtrics link to a self-administered, researcher-constructed questionnaire (see Appendix C for survey). Participants were given one day to complete the survey. Often a small study is underpowered because of small sample size, thus leading to data inaccuracy. Similarly, a data study could become insignificant or at the least inaccurate due to an exceptionally large size (Madrigal & McClain, 2012).

Instrumentation

Any research is incomplete without measurement of a research variable and learning of its association and relationship with the research questions. While planning research, it is important to understand the distinction between methodology and methods and simultaneously assess the style of research and method of data collection (Shaw, Brady, & Davey, 2011). The method used for collecting data for this study was a survey (see Appendix C).

The choice of method is directly related to the research design. During the selection of methods for assessment, one must consider research styles, their principles,

rationales, and the purposes of a study. Formulating methodology is critical to a study; it is determined when considering the types of methods that would answer the research questions (Unite for Sight, 2015).

For the purpose of this study, the efficacy of virtual educational intervention was measured by changes in learning or measuring the learning efficacy (García, Ruiz-Molina, Montoro-Pons, & Hernández-Martín, 2009). To derive definitive results, the researcher determined the knowledge of study participants on a topic prior to the intervention and then again after the educational intervention was implemented.

The research design of this study was loosely based on a research study conducted over youth in the United States by García et al. (2009) where they used photography and narrative as educational interventions. During the course of their research, it was learned that the photo-voice project deployed within the country assisted in the learning of youth. They were allowed the opportunity and possibility to understand community needs and understand the change process by through the use of visual aids. Certain other processes conducted on a similar level by García et al. were the Capture Wales BBC Project, the Center for Digital Storytelling, and the Educational Uses for Digital Storytelling at the University of Houston.

The present study entailed participants answering questions pertaining to the success of an educational model that used imagery to enhance the learning of students through photographic aids in wake of a new curriculum in Kuwait. For the purposes of this study, the researcher used two instruments; permission was attained to use both instruments. The first instrument was a survey that investigated learning efficiency of the teachers in wake of a new teaching concept. The model was briefly derived from a study

model conducted in Kuwait that assessed school climate (Alajami, 2013) and a photo voice model conducted for promoting visual learning.

All participants were provided assignment and ethics guidelines before the beginning of study. Teachers were allowed to review websites with images and were shown various images in context with the course concept introduced to them. Teachers were also encouraged to review other course materials that would further their ability to carry out the assignments. The assignment required teachers to select a topic to which they could relate the current curriculum and then compare it with the new curriculum.

During the course of the research, teachers were free to determine the value of the photographs and choose ones that most revealed the topic. Each teacher was asked to analyze photographs and share the images and their interpretations with the class to justify learning of the same. The teachers were allowed multiple representations for interpretation such as use of PowerPoint, story board, projector; animations, etc. (Schell et al., 2009). This method provided a general overview of the assignment and its outcomes. Any variations gave teachers the opportunity to make decisions about the direction of their work.

Measures

In research, measures are the aspects to which the participant responds. There are multiple levels of possible measures: survey questions, interview questions, or constructed situations, etc. While constructing interviews and surveys, a direct relationship should be made with the research questions. To ensure authenticity of the process, the surveys and interviews should not be extremely time-consuming (ideally within a 20-30 minute limit).

Quantitative Research Methodology

For the purpose of this research, the author using quantitative research methods to maximize objectivity, replicability, and generalizability of findings. Such models predict information and are devoid of focusing on the understanding the reasons for such observation. For that purpose, the researcher should set aside his/her experiences, perceptions, assumptions, and any bias. Statistical tools were formulated to test and analyze the research questions (Harawell, 2011).

Data Collection Procedure

To assess a research question, variables have to be different or there is no point in conducting the study (Sage Publications, 2010). For this study, most personal data were collected from participants who were individually provided with assignment and ethical guidelines. However, before the collection of data, participants signed a consent form to participate in this study (Shaw et al., 2011).

Data Analysis

There are various types of statistical designs used for interpretation. For the purpose of this study, the researcher used Spearman correlation analysis as a statistical tool. To predict the score on one variable on the basis of scores on several other variables, this technique proved worthwhile. Since the survey item responses were based on a Likert scale, this researcher used a nonparametric Spearman rank correlation--a measure of statistical independence between two variables. It assessed how well the relationship between two variables could be described using a monotonic function. If there were no repeated data values, a perfect Spearman correlation of +1 or −1 occurred when each of the variables was a perfect monotone function of the other. Spearman's

coefficient, like any correlation calculation, was appropriate for both continuous and discrete variables including ordinal variables (Corder & Freeman, 2014; Spearman, 1904).

To assess whether there were any differences in responses on the basis of the levels of age, school district, and years of experience, this researcher used the non-parametric Kruskal Wallis test. The Kruskal-Wallis test is a rank-based nonparametric test that can be used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable. It is considered the nonparametric alternative to the one-way ANOVA and an extension of the Mann-Whitney U test to allow comparison of more than two independent groups.

To assess the reliability of the instrument, a Cronbach's alpha was utilized (Cronbach, 1951). Cronbach's alpha is a function of the number of items in a test, the average covariance between item-pairs, and the variance of the total score.

Ethical Consideration

For the purpose of this research, an informed consent was taken from all participants, i.e., the teachers (grades 10-12) and the educators (see Appendix B). Care was taken to derive consent from guardians in case participants were below the age of 18 years. This researcher ensured that the research was free of any bias. All participants were informed about the study and are told about the possible audience. It was understood that studies with human participation require ethical consideration. Care was taken to extend the ethical consideration beyond participation. Participants were assured that the study's integrity was maintained at all times.

CHAPTER IV

ANALYSIS OF RESULTS

This study was conducted to analyze the use of photography to support the learning process of science teachers of 10th to 12th grade classes. To conduct the analysis, a survey was given to high school teachers in Kuwait across six districts. Teachers' perceptions of teaching methods, teacher's efficacy and student comprehension, and demographic information such as age, gender, district, course teaching, and years of experience were collected and an analysis was conducted. Approximately 272 respondents (47% female and 53% male) participated in the survey. Concerning the age groups, 56% of the respondents belonged to the 25-34 years age group, 35% were from the 35-44 years age group, 4% were from the 45-49 years age group, and 4% belonged to the 49+ years age group. Concerning teaching experience, 44% of the respondents had 1-5 years' experience, 31% had 6-10 years' experience, 15% had 11-15 years' experience, 2% had 16-20 years' experience, and 9% had 21+ years' experience. The percentage of respondents from Mubark Alkabeer and Hawali was 16% each, 14% were from Alahmadi, and Alasemah, Aljahrah, and Alfarwaniya each had 18% of the respondents. The reliability of the survey data was assessed using Cronbach's alpha; its value was 0.66 so the data were considered reliable.

Non-parametric tests using the Kruskal-Wallis test and the Mann-Whitney test were conducted to compare the means across various groups. The Kruskal-Wallis test is

used to test whether mean ranks of the various groups are the same when the distribution of the measuring variable was not normal. On the other hand, the Mann-Whitney test is used when there are only two groups. A factor analysis was used to classify the various questions in the survey into three components.

Comparisons Among the Four Content Areas/Disciplines

Total scores were computed for all four content areas/disciplines for each sample. The mean composite scores were 42.06 for general science, 40.29 for biology, 38.6 for chemistry, and 38.2 for physics. After that, a paired sample *t*-test was conducted to compare different content areas/disciplines. The analysis illustrated the composite score for general science was greater than physics, chemistry, and biology with $p < 0.001$. A comparison between physics and chemistry illustrated no statistically significant difference between them ($p = 0.127$). The composite score for biology was statistically significantly greater than physics and chemistry with $p < 0.001$.

This comparison among the different disciplines provided valuable insight. General science had the highest mean composite score, illustrating students had a comparatively high ability to learn content, were more engaged, and enjoyed general science more than other disciplines. It was also easier to incorporate photographs in this discipline. The training requirement for teachers was comparatively less in general science. Biology had the second highest composite score among the four disciplines when compared to physics and chemistry; it was easier to incorporate photographs and students were more engaged in biology. There was no significant difference between physics and chemistry utilizing the above-mentioned criteria.

Influence of Age, Gender, and Experience on the Four Disciplines

Kruskal-Wallis tests were conducted considering the demographics of age, gender, and experience and composite scores of the four disciplines; median scores for general science, biology, chemistry, and physics were 44, 41, 37, and 36, respectively. The analysis indicated age group 2 had the highest mean rank, i.e., highest composite score, for general science (168.83 with $N = 96$). Compared to other age groups, age group 2 thought it was easier to incorporate photographs for general science and students exhibited good comprehension. Similarly, age group 5 was the most affirmative for physics (215 with $N = 12$), chemistry (211 with $N = 12$), and biology (191 with $N = 12$). The analysis was significant for all disciplines with $p < 0.001$. Therefore, analysis showed physics, chemistry, and biology teachers who belonged to age group 5 achieved better results overall. On the other hand, the mid-age group, i.e., age group 3, achieved the most affirmative results for general science.

Similar scenarios were observed for experience. Teachers with the most experience had the greatest number of affirmative opinions for physics, chemistry, and biology while those with medium experience achieved best results for general science. Further analysis indicated males provided more positive feedback than did females regarding various criteria in all four disciplines.

Research Question 1

> What were teachers' perceptions of the teaching method when using a combination of visual and text methods?

The following questions were averaged to compute the teachers' perceptions of the teaching method variable:

- How often did you use photography to teach the students in the following sciences: general science, physics, chemistry, and biology?
- How difficult did you find it to locate photos for teaching in each of the following sciences: general science, physics, chemistry, and biology
- What instructional materials should be included in the curriculum for each of the following sciences:
    - General science: photographs, visual illustrations and diagrams, texts based materials and teacher's oral instruction;
    - Physics: photographs, visual illustrations and diagrams, texts based materials and teacher's oral instruction;
    - Chemistry: Photographs, visual illustrations and diagrams, texts based materials and teacher's oral instruction;
    - Biology: photographs, visual illustrations and diagrams, texts based materials and teacher's oral instruction;

Of the teachers of general science and biology, 56% and 49%, respectively, used images or photography many times per lesson while teaching students. On the other hand, 25% of physics teachers and 32% of chemistry teachers used images or photography many times per lesson. Ninety percent of teachers found it easy, somewhat easy, or very easy to locate photos for teaching general science; this percentage declined to 66% for physics teachers, 70% for chemistry teachers, and 85% for biology teachers. More than 80% of teachers felt either photographs or visual illustrations and diagrams should be used in general science and biology curricula; this percentage declined to 75% for physics and chemistry participants' use of photographs.

The clustered bar chart presented in Figure 3 shows the perceptions of teachers regarding instructional material that should be used; 76% to 85% of the teachers preferred the use of photographs. The percentage of teachers who preferred using visual illustrations and diagrams was also high: 87% for chemistry, 84% each for biology and physics, and 82% for general science. On the other hand, the percentage of teachers who preferred text-based materials was very low: 56% for general science and 59% each for physics, chemistry, and biology. Similarly, teachers' oral instructions were preferred by 60% each for general science, physics, and biology teachers and 59% for chemistry teachers. The reliability of the questions included in the research question was assessed using Cronbach's α and its value was 0.77; thus, the data could be considered moderately reliable.

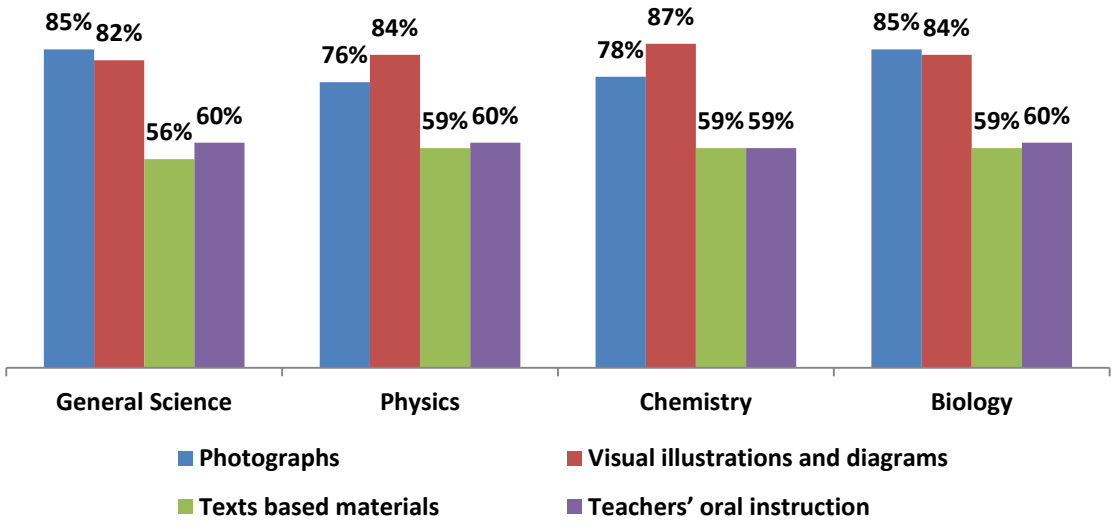

Figure 3. Clustered bar chart for the four options: general science, physics, chemistry, and biology.

Group Comparison Using the Mann-Whitney Test

Regarding gender, the Mann-Whitney test showed a statistically significant difference between perceptions of teaching methods used (U = 6528, $p < 0.01$); the mean rank of male participants was higher at 155.17 than female participants at 115.50. Therefore, male participants were more affirmative than were female participants about the effectiveness of the teaching method used. Male teachers held more positive views on the ability of students to learn content with the teaching methods used.

Group Comparisons Using the Kruskal-Wallis Test

Age. The Kruskal-Wallis test showed a statistically significant difference among the perceptions of teachers for teaching methods used according to age ($\chi^2[3] = 57.85$, $p < 0.01$); the mean rank for the 49+ years age group was the highest at 257.83. The mean rank for perception of teaching methods was lowest for the 25-34 years age group at 109.34, followed by 149.17 for the 45-49 years age group, and 162.75 for the 35-44 years age group. Therefore, teachers with the most experience had more optimistic views on the ability of students to learn content with the teaching methods used.

Teaching experience. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teaching methods used ($\chi^2[4] = 67.97$, $p < 0.01$), with the mean rank of 11-15+years teaching experience being the highest at 200.7. The mean rank of perceptions of teachers' teaching methods was lowest for those with 1-5 years teaching experience at 100.83, followed by 136.8 for 6-10 years, and 196.79 for 16+ years. Therefore, teachers with the most experience had more positive perceptions regarding the teaching methods used.

School district. The Kruskal-Wallis test showed a statistically significant difference among the perceptions of the teaching methods used on the basis of the school district ($\chi^2[5] = 41.44, p < 0.01$); the mean rank of Hawali was the lowest at 80.86. The mean rank of perceptions of teachers' teaching methods was highest for teachers from Aljahrah (181.5), followed by Alahmadi at 150.5, Alfarwaniya at 146.5, Alasemah at 134.17, and Mubark Alkabeer at 121.95. Therefore, teachers in Aljahrah had the most affirmative perceptions of teachers' teaching methods.

Research Question 2

What were teachers' perceptions of their efficacy when using a combination of visual and text methods?

The following questions were averaged to compute the teachers' perceptions of their efficacy variable:

- How difficult was it to teach using photographs and images in the following sciences: general science, physics, chemistry, and biology?
- How difficult did you find it to incorporate photographs in your curriculum?
- Please rate the degree to which you agree with the following statement: As the teacher, I enjoy using photographs in the lesson for the following sciences: general science, physics, chemistry, and biology.
- Please rate the degree to which you agree with the following statement: Teachers should be trained through the use of photographs and images for each of the following sciences: general science, physics, chemistry, and biology.

Nine percent of general science teachers and 12% of biology teachers found it *difficult* to teach using photographs and images. On the other hand, 22% of physics

teachers, 19% of chemistry teachers, 12% of general science teachers, and 15% of biology teachers found it *difficult* to *somewhat difficult* to teach using photographs and images. On the other hand, 27% of physics teachers and 25% of chemistry teachers found it *difficult* to *somewhat difficult* to teach using photographs and images. Furthermore, the results showed more than 95% of teachers felt they should be trained through the use of photographs and images for each of the following sciences: general science, physics, chemistry, and biology. The reliability of the questions included in the research question was assessed using Cronbach's α and its value was 0.91; thus, the data could be considered highly reliable.

Group Comparison Using the Mann-Whitney Test

The Mann-Whitney test showed a statistically significant difference between the perceptions of teacher efficacy according to gender ($U = 7224$, $p < 0.01$); the mean rank of male participants was higher at 150.33 than for female participants at 120.94. Therefore, male teachers had better perceptions on their efficacy when using a combination of visual and text methods.

Group Comparisons Using the Kruskal-Wallis Test

Age. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teacher efficacy for age groups ($\chi^2[3] = 30.462$, $p < 0.01$); the rank of the 25-34 age group was the lowest at 113.13. The mean rank for perceptions of teachers' efficacy was highest for the 35-39 years age group at 167.08, followed by 165.83 for the 39-44 years age group, and 158.5 for the 49+ years age group. Therefore, the analysis

illustrated senior teachers had better perceptions compared to young teachers on their efficacy when using a combination of visual and text methods.

Teaching experience. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teacher efficacy for teaching experience ($\chi^2[4] = 34.46$, $p < 0.01$); the mean rank for 1-5 years teaching experience was lowest at 111.2. The mean rank for perceptions of teacher efficacy was highest for those with 11-15 years teaching experience (187.7), followed by 169.1 for 16+ years teaching experience, and 137.45 for 6-10 years teaching experience. Therefore, the analysis illustrated more experience in teaching usually led to better perceptions of teacher efficacy when using a combination of visual and text methods.

School district. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teacher efficacy on the basis of school district ($\chi^2[5] = 19.42$, $p < 0.05$); the mean rank for Alahmadi was highest at 165.3, followed by 149.50 at Aljahrah, 135.83 at Alasemah, 147.17 at Alfarwaniya, 123.77 at Mubark Alkabeer, and the lowest was 97.95 at Hawali. Therefore, teachers in Alahmadi had more affirmative perceptions of their efficacy when using a combination of visual and text methods.

Research Question 3

> What were teachers' perceptions of student comprehension when using a combination of visual and text methods?

The following questions were averaged to compute the teachers' perceptions of' of student comprehension when using a combination of visual and text method variable:

- At what level did you perceive your students comprehending the science content when you taught without images?

- At what level did you perceive your students comprehend the science content when you taught with visual diagrams and photographs?
- Based on your perception, rate the students' ability to learn content in the following sciences: general science, physics, chemistry, and biology.
- Based on your perception, how engaged were your students with the following science content when you included photographs in your teaching?
- Please rate the degree to which you agree with the following statement: My students enjoy my teaching when I use photographs in the lessons for the following sciences: general science, physics, chemistry, and biology.

Ninety percent of teachers felt the students comprehended the science content *poorly, very poorly* or *somewhat poorly* when they taught without images. On the other hand, only 3% of teachers felt the students comprehended the science content *poorly, very poorly* or *somewhat poorly* when they taught with visual diagrams and photographs. Twenty-five percent of teachers felt the students found it *difficult, somewhat difficult,* or *very difficult* to learn general science content. The percentage was much higher at 49% for physics, 47% for chemistry, and 34% for biology. However, when photographs were used while teaching, the percentages of students who were disengaged or very disengaged were very low at 4% for general science, 9% for physics, 6% for chemistry, and 4% for biology. Moreover, less than 10% of teachers disagreed with the statement that students enjoyed learning when photographs were used in the lesson. The reliability of the questions included in this research question was assessed using Cronbach's α and its value was 0.9; thus, the data could be considered highly reliable.

Group Comparison Using the Mann-Whitney Test

The Mann-Whitney test showed a statistically significant difference between perceptions of teachers regarding student comprehension according to gender (U = 78888, $p < 0.05$); the mean rank of male participants was higher at 145.72 than for female participants (126.13). Thus, the analysis indicated male teachers were more positive about students' comprehension compared to female teachers.

Group Comparisons Using the Kruskal-Wallis Test

Age. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teachers regarding student comprehension when using a combination of visual and text methods ($\chi^2[3] = 43.04$, $p < 0.01$); the mean rank for the 49+ years age group was the highest at 210.50. The mean rank was 162.92 for the 35-44 years age group, followed by184.50 for the 45-49 years age group, and the lowest was 110.18 for the 25-34 years age group. When compared to young teachers, senior teachers had more optimism regarding students comprehending content.

Teaching experience. The Kruskal-Wallis test showed a statistically significant difference among perceptions of teachers regarding student comprehension when using a combination of visual and text methods with regard to teaching experience ($\chi^2[4] = 57.9$, $p < 0.01$); the mean rank was lowest for those teachers having 1-5 years teaching experience (104.97). The mean rank was highest for those with 16+ years teaching experience at 200.21, followed by 192.10 for 11-15 years teaching experience, and 133.83 for 6-10 years teaching experience. Therefore, teachers having the highest experience were the most optimistic about students comprehending content.

School district. The Kruskal-Wallis test showed no statistically significant difference among perceptions of teachers regarding student comprehension when using a combination of visual and text methods on the basis of school district ($\chi^2[5] = 7.42, p > 0.05$); Alahmadi had the highest mean rank at 156.3, followed by teachers from Aljahrah (146), Alasemah at 140.5, Alfarwaniya at 136, and Mubark Alkabeer at 125.41. The mean rank was lowest for teachers at Hawali (115.41). As indicated in the analysis, teachers in Alahmadi had the most positive opinions regarding student comprehension.

CHAPTER V

DISCUSSION

This dissertation investigated the use of images as an instructional tool in classrooms using a premise that images are an effective tool in overcoming barriers of understanding difficult words, thus allowing students to retain knowledge longer than traditional learning methods (Wirth & Dexter, 2008; Yunus et al., 2005). Passing on information through photography and other visual aids has proven useful for instruction and was identified as a possibility for improving teaching methods in classrooms. This study was based in Kuwait; the education system is at a place where change is occurring to adapt a more Western approach to classroom learning (Al Mamun, 2014; Alshammari, 2013). The direct adaptation of a Western education system has caused uncertainty and confusion among teachers on how to incorporate students' learning experiences along with local cultural contexts (Al Mamun, 2014; Roth & Lawless, 2002).

Learning and teaching processes have become more difficult in light of Western adaptation in the Kuwait education system. Therefore, this paper identified ways of incorporating images and other visual aids as means to simplifying the learning and teaching process in Kuwait. The following research questions guided this dissertation:

Q1 What were teachers' perceptions of the teaching method when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q2 What were teachers' perceptions of their efficacy when using a combination of visual and text methods and was there a statistically significant difference on the basis of age, years of experience, and school district?

Q3 What were teachers' perceptions of students' comprehension of concepts when using visual media, specifically photographs, and was there a statistically significant difference on the basis of age, years of experience, and school district?

This study utilized descriptive statistics along with a quantitative research design. The main purpose of this study was to understand the perceptions of teachers when using a new visual aid method in classroom teaching as well as to review learning patterns of grades 10-12 teachers in Kuwait. All teachers received an email from the Ministry of Education in Kuwait. A total of 2,100 teachers involved in teaching science subjects to grades 10-12 students were selected through invitation to participate in the survey. A stratified random sampling method was employed. The survey was distributed to all six school districts in Kuwait. Survey questions covered demographic information, teaching methods used in classrooms, and teachers' perceptions regarding their understanding of students' comprehension of the science subjects. All participants of the study were given one day to complete the survey. To analyze the data collected from all participants of this survey, ANOVA and Mann-Whitney U tests were employed.

Summary of Findings

A total of 272 respondents were selected for the study through voluntary participation--about 13% of the intended sample for the study. The majority of respondents were male and more than half of the respondents were between 25-34 years of age. This clearly indicated the majority of respondents were also new to teaching and most had less than 10 years of teaching experience. General science scored the highest mean compared to physics, chemistry, and biology, suggesting students were more

engaged in the general science subject than in the other three subjects. It was also found that visual aids and images were utilized more in the general science subject compared to the other subjects. The results were also positive for biology because it incorporated more images compared to physics and chemistry, making it the second most engaging subject based on the analysis of data.

These findings were consistent with the findings of De Jager (2012) who suggested the incorporation of new methods would increase the comprehension ability of students, especially in science subjects. Since science usually incorporates a high level of information dispersal from teachers to students, it is vital that teachers create an engaging learning environment with new methods to create a more stress-free environment for students. Furthermore, students should be able to understand and connect with the subject rather than merely memorizing scientific terms and meanings since this leads to zero knowledge retention. Additionally, according to Grasha (1996), learning time and style of students vary; therefore, it is necessary that teachers diversify their teaching methods to increase comprehension levels among students. The data showed incorporating images into general science and biology subjects had an impact on student engagement and was a method favored by instructors.

The results also found male lecturers were better at teaching science-related subjects. For the general science subject, teachers in the middle age group showed positive results whereas teachers in age group 5 (more than 16 years teaching experience) showed positive results for physics, chemistry, and biology. The results of the current study further showed more than 90% of teachers found it easier to incorporate pictures, images, or other forms of visual aids for general science and biology subjects. However,

close to 75% of teachers felt it was either difficult or not possible to use visual aids when teaching chemistry or physics subjects. Interestingly, a very low percentage of teachers preferred text based materials compared to visual aids in classroom teaching, thereby proving the main point that visual aids are an effective method in classroom teaching.

Ha et al. (2008) and Rasul (2011) also reported similar findings pertaining to the inclusion of visual aids and images into teaching methods in classrooms. Most teachers were fairly comfortable and found it easy to incorporate various forms of images to enhance the classroom learning experience. Furthermore, these visual aids were found to further engage students as well as enable them to comprehend the subjects better. Inclusion of visual aids in teaching methods also helped students conceptualize the lessons being taught in class, making it easier for them to understand and hence retain the information for a longer period of time (Hok-Chun, 2002). Recent findings (Ibrahim, 2011) also indicated teachers were much more able to engage students who were poor in comprehension and reading using visual aids compared to the text method of learning. It also increased the possibility of increasing students' comprehension of subject matter, thereby encouraging all students to do well in the classroom.

Although close to 75% of respondents were interested in using visual aids when teaching chemistry and physics subjects, many were not able to incorporate the aids into their teaching. Moreira and Arroio (2012) also agreed with this fact and further acknowledged the growing importance of incorporating visual aids in teaching methods, particularly for pure science subjects such as chemistry and physics; however, they also discussed the difficulty of incorporating images. On the contrary, Jammer (1974) suggested pure science subjects have to be taught without visualizations since the purpose

of science-related subjects is to understand each model and its application to reality. Therefore, visualizations might act as a form of distraction for students rather than enhancing their experiences. However, Moreira and Arroio (2012) concluded that students' understanding of the subject taught is highly influenced by each student's learning ability, the focus of the student, as well as the level of comprehension toward a concept. It was further found that supplementary materials and activities could help students to a certain extent (Moreira & Arroio, 2012).

On the other hand, in terms of teachers' ability to assist student learning in classrooms, most teachers from the current study were positive about influencing students' learning behavior. In general, most teachers reported positive perceptions toward the inclusion of visual aids to assist classroom learning. This study further reported male teachers in general were more affirmative about the effectiveness of the teaching method used compared to female teachers. Moreover, teachers with more teaching experience tended to have much more optimistic and positive views on students' learning experiences regarding the teaching method used. This result was also consistent with the findings that teachers with a higher experience in teaching tended to have a more positive perception of teaching methods used in schools. As for school districts, Aljahrah district teachers had the most positive perceptions of teachers' methods in classrooms.

Most teachers had a positive perception with regard to the use of both text and visual tools in classroom teaching as most teachers found they were more effective in class when using both tools. With regard to combining text and visual aids when teaching, most male teachers found them to be more effective in classrooms. The combination of visual and text methods increased student learning abilities compared to

the traditional text only method. Teachers with more teaching experience had more positive perceptions on combining these methods compared to traditional methods. Similar results were reported that senior teachers with more teaching experience had more positive perceptions of the effectiveness of their classroom teaching experience when using a combination of visual aids and text teaching methods. These findings were consistent with the literature (Ibrahim, 2011; Moreira & Arroio, 2012) that incorporation of visual aids into text-based teaching was favored by instructors.

Teachers found the use of visual aids improved the attention span of students since images often develop one's curiosity to see and identify the images and relate them with the text or spoken information provided. Students were also reported to be more engaged and involved in class in response to visual aids. This was interpreted by instructors to be due because student were able to comprehend more and deeper content with the use of visual aids. Although the results were positive on the inclusion of visual aids in classroom teaching, teachers have to be careful not to allow these images to distract students in class, i.e., use of moving animation in class might distract some students. Lee et al. (1996) suggested the use of short key phrases that could relate the visual image with the information being taught to the students, thus helping students link them together and increase memory retention. This idea was consistent with research findings because teachers in the current study favored the incorporation of visual aids into text based-instruction by using an integrated approach.

The third research question focused more on respondents' opinions when comparing the effectiveness of classroom learning as well as students' comprehension with and without visual aids. Interestingly, close to 90% of teachers responded that most

students failed to understand the subject without any form of visual aids or images. Students also paid less attention when no images were used in class. Therefore, it was concluded that most students were more attentive when visual aids or images were used to explain science subjects in classrooms.

This was consistent with other researchers' findings (Abbas & Seyedeh, 2011; Hwang & Embi, 2007) that incorporating a new method such as visual aids in teaching could significantly increase positive outcomes of students. Nusir et al. (2012) also concluded that some students might still prefer auditory only learning style while some would prefer audio- and visual-based learning methods. Therefore, teaching aids should gain the attention of most students in class. However, choosing the right image and visual aid is equally as important in order to not distract the student learning process in class. According to Grasha (1996), the delegator style of teaching is the appropriate method of teaching difficult subjects such as biology and chemistry. This style of teaching focuses on inquiry based learning instead of visual aid based learning.

Interestingly, although the majority of the respondents were from the 25-34 years age group, many of the respondents who found visual aid and images to be a useful tool in classroom learning were teachers who had more experience in teaching compared to the younger teachers. These results were also consistent for all three research questions analyzed in the study. This showed willingness of teachers with more experience in teaching to adapt to new teaching methods compared to younger teachers. The findings of this study were consistent with findings from recent studies that reported teachers need to have experience and existing pedagogical knowledge in order to integrate visual aid learning in classrooms (Mishra & Koehler, 2005; Shulman, 1986; Webb, 2010).

Although the teacher might have the right attitude and willingness to enhance students' learning experience in classrooms, the teacher must first be well equipped in terms of current knowledge and basic technological knowledge in order to incorporate different methods in classroom learning (Webb, 2010).

It was further discussed that combining existing pedagogical knowledge on content, e.g., such as chemistry subjects, with current knowledge could increase students' comprehension. The role of the teacher to be self-taught and self-motivating in learning new things, along with updated knowledge of latest pedagogy developments, could highly influence learning experiences in classrooms. Thus, although most of the younger teachers were more open to technology and the use of visual images, the senior teachers were more willing to accommodate changes into their teaching methods in the classroom. It was also found that senior teachers and male teachers were generally more optimistic and positive about increasing students' comprehension through the use of visual aids.

On the other hand, use of visual aids must be handled with care since material introduced in class should be appropriate to the subject and context discussed. It does take a lot of time and effort to put together every lesson plan for the whole year for students. Furthermore, since it is not a compulsory method to follow, many teachers view visual aids as an additional responsibility that increases their workload in schools due to the high volume of students (Awasthi, 2014). Although many teachers acknowledge the importance and usefulness of visual aids in teaching science subjects, many are not willing to make the effort to search and incorporate visual aids into their teaching (Awasthi, 2014). Akram et al. (2012) also agreed that the additional

requirement of visual aids in classroom teaching could be a big burden for teachers whose time is already full with classes and assignments to mark.

Therefore, Nieto (2002) suggested that teachers base the need for visual aids in their teaching according to the level of understanding of their students. For instance, if students in the class are fast learners, then including visual aids is not vital. However, if the teacher finds most students are not able to gasp the concepts of what is being taught, then the inclusion of visual aids would be essential. Therefore, the discretion of the teacher when including visual aids would be subjective. Furthermore, the level of students should also be taken into account when choosing or assessing the need for visual aids. For instance, image-based learning required for kindergarten children might be mostly based on colors, animations, and cartoon characters to keep them interested in the class. However, the same approach would not be followed at the secondary level. Instead, pictures included would be more related toward the subjects discussed in the classroom. Therefore, the selection of pictorial images is essential.

Training teachers to use visual aids is another factor that deters their use in classroom teaching (Nath et al., 2010). Some senior and junior teachers might not have had the training of incorporating new methods into their teaching materials. Thus, although some might try to include these visual aids in class, these aids might not be helpful due to inappropriate graphics, colors, or materials used. Therefore, training would be absolutely essential to ensure the right visual aid was used.

According to Awasthi (2014), other factors could also play a role in mediating the use of visual aids in classrooms apart from the teacher's willingness or consent. Parents' perceptions of visual aid use in classroom might also play an important role in whether

schools adopt this method. Some parents are ignorant about the importance of visual aid teaching in classrooms and might object to the use of visual aid teaching. In addition, Schlosser (2010) found a school's resources in supplementing visual aids for teachers were an important factor. Some schools might not have the funds while other schools might wait for the need to provide facilities to support teachers who would want to incorporate visual learning. Akram et al. (2012) also reported that although some schools were willing to invest in visual aid facilities, it was not feasible for the school to make it available for all classrooms and for all students. Therefore, it comes down to the need of the subject matter, the ability of the students to understand, the willingness of teachers to participate in the inclusion of visual aid teaching, and the ability for schools to fund the facilities.

Limitations of the Study

This study had more male respondents than female, which might have led to the findings of this study suggesting male lecturers were more positive about visual aids in classroom learning. Furthermore, this study also lacked students' viewpoints pertaining to the learning experience, particularly since they were part of the learning and teaching experience. Therefore, input from students could have enhanced the findings of this study by comparing students' perceptions with teachers' perceptions on the effectiveness of the visual aids in classroom learning of science subjects. Additionally, the questionnaire was driven by self-assessment, which is a valid method of analyzing quality of use, opinions, and skills. However, it also had a number of limitations, one of which included the interpretation of the questions. In this study, the use of visual media in schools as well as teachers' abilities when using visual media would have been

beneficial. However, this would have involved additional measuring instruments as well as further analysis of the levels associated with them. Such investigations would be very costly as well as time intensive but might be beneficial to future studies that could build on the findings of this particular research.

Implications

Throughout the research, a number of implications as well as areas for further studies were identified. Children can be taught effectively by presenting lessons through visual aids rather than through other means so they get a better understanding of the concepts taught. Also, audio visual methods of teaching are very effective in teaching students. When students are presented with visual aids, they are able to successfully develop an interest, visualize, conceptualize, participate in learning, innovate, reflect, and improve their overall knowledge of the subject. Students are also able to develop their own ideas and opinions independently while being able to develop interpersonal skills. The findings of the study confirmed these advantages regarding the use of visual media in teaching.

Visual Media Make It Easy for Students to Understand Science Concepts

It is clear that visual media such as images and photographs make it easy for the students to understand the concepts of science subjects, specifically biology, physics, and chemistry. Moreover, students enjoy and pay more attention when photographs or images are used to teach them. However, teachers should also be trained in teaching through the use of photographs and images. When visual aids are used to teach new concepts, students are motivated to study the subject and understand the concept, thus helping them learn the framework of the concept. The comprehension level of the

students when taught orally or using standard texts is poor but when taught using photographs or images, it is very good. This agreed with Akram et al.'s (2012) argument that critical thinking, reasoning, and creativity are three main elements that propel students to a high interest in the subject and these qualities can be developed significantly using visual aids in class.

Visual Media Are Easy for Teachers to Use

The study also found it was easy for teachers to use photographs and images when teaching students. This finding was congruent with Hindal (2014) who claimed that when students are presented with a picture, they start thinking of what the picture conveys, simultaneously try to relate it with what was taught earlier, and thus develop critical thinking. Reasoning helps students understand the theories and concepts clearly; hence, trying to reason the outcomes helps them perform better in the subject. As a result, it becomes much easier for teachers to explain concepts in the classroom since the students understand as well as perform better.

Further, Heinich et al. (1993) stated that visual aids could help teachers transform into creative managers who efficiently manage the learning experience they offer their students rather than being mere dispensers of knowledge and information. Teaching through pictures is one of the effective ways to keep students focused on the lessons throughout the class period. When students are shown pictures related to the lessons, they find them attractive and naturally concentrate on the lessons.

Visual Images Need to Be Used for Teaching Science Subjects

Visual aids are important when assisting students in understanding subject matter by improving their attention span. The study clearly revealed the need for using visual media in the schools since it plays an important role in ensuring that students comprehend what the teachers teach--even more so in the three science subjects under consideration. However, teachers need to use visual aids in a way that will not distract students from concentrating on the main issues. Thus, while designing an effective visual aid, it is important to consider the following attributes: a visual aid should be easily visible by the audience, aesthetically pleasing, easily handled, have clearly understood key points, and act as a supplement to the teacher's message instead of being a replacement.

Capacity Building and Skill Training

From the study, it is evident that a number of science teachers were not using visual images in teaching despite the evident merits of visual images. Mainly, this was because the teachers did not have the capacity or skills to use the visual media. Hindal (2014) noted use of visual media in teaching requires particular skills that enable the user to choose the right media as well as the correct mode.

Policy Recommendations

From the discussions in Chapter IV, the following findings are summarized:

1. Visual media such as images and photographs make it easy for the students to understand the concepts of science subjects, specifically biology, physics, and chemistry.
2. It is easy for teachers to use photographs and images when teaching students.

3. Designing curricula using a combination of oral, text, and visual media is very important.
4. Students enjoy and pay more attention when photographs or images are used to teach them; thus, teachers should be trained in teaching through the use of photographs and images.
5. The comprehension level of students when taught orally or using standard texts is poor but when taught using photographs or images, it is very good.

In an attempt to cover the above issues, the researcher offers the following policy recommendations; some are specific to the issue while others are broad and are concerned with more than one issue.

1. Setting a strategic plan on the use of visual media in Kuwait schools. The study clearly revealed the need for using visual media in the schools since it plays an important role in ensuring students comprehend what the teachers teach--more so in the three science subjects under consideration. As such, a new strategic direction should be set by the Government for teachers and schools and common ways of using visual media should be implemented in the education sector. Inherently, this might require some special training of teachers, especially those who are in process of becoming teachers. Teacher colleges should include this in the curriculum of science teachers to make them ready for service.
2. Designing the curriculum using a combination of oral, text, and visual media. The study found that designing curriculum using a combination of oral, text and visual media was crucial since each and every component

plays a specific role in ensuring students understand the concepts. None should be overlooked. Given this importance, the Government should make sure the combination of oral, text, and visual media in designing the curriculum has not only been realized but also implemented in the schools.

3. Ensuring that teachers are sufficiently skilled. The study showed most of the teachers felt the use of visual media was imperative in teaching. As a result, it is important that every teacher, especially those teaching science subjects, is well-skilled in its use. The overall aim of teaching is to ensure that students understand and can practically use the gained knowledge. Hence arriving at an easy way of making the students understand concepts in the classroom and be in a position to practically use the knowledge are in line with the aim of education. As such, use of visual media should be emphasized in schools. Although the study did not specifically measure teachers' visual media knowledge, it is important that teachers be given an audit test of their visual media knowledge with a "gap" analysis that would then be used in developing a national program of training to sufficiently deal with recognized weak areas.
4. Moving from skills to classroom. The study also revealed that although some teachers felt the use of visual media in the classroom was important, some of them did not use it (derived from the difference in the number of teachers who felt visual media was good for classroom use and those who used it for teaching purposes). As a result, the Kuwait government should place more focus on the use of the visual media in schools for teaching

purposes and approach it in several ways: from training courses, guidance to schools, and visual media champions in the Kuwait districts. Necessary tools and devices to ensure that use of visual media is easy should also be provided.

5. Auditing schools' resources. Even though the research did not seek to identify the resources of the school, this was, however, one of the shortcomings. As a result, the Kuwaiti government would need to perform an audit of the school resources to ensure that each schools has enough facilities, is in good condition, and encourages use of visual media for teaching purposes. This would also call for financial support targeting the schools that need it most.
6. Country willing to integrate this in the future. Al Hudhaifi and Aldoghaim (2005) noted that the Kuwaiti government has not been in a position to fully provide necessary policy direction and support regarding the use of visual aids/media in schools. However, the desire of the government to use visual aids in schools cannot be overlooked. For instance, Pollock (1967) prepared a report to the Kuwait Ministry of Education regarding the use of audio-visual aids in schools. The report showed the government supported initiatives to use visual aids is schools. More importantly, the Department of Audio Visual in the Ministry of Education provides necessary support to the schools on the use of visual aids. As such, the findings of this study will be very helpful in the education sector in Kuwait. By implementing the

recommendations provided in the study, the researcher believes the country will significantly improve on its education service delivery.

Conclusion

In conclusion, participants of this study had positive perceptions regarding the use of visual aids in classroom teaching. In general, the participants were willing to incorporate new methods into their teaching and were already aware of the benefits visual aid teaching provided to their students. A majority of participants also acknowledged the need for incorporating visual aid learning but were unable to utilize it for chemistry and physics subjects. Age was not a barrier for participants of the study, proving teachers were committed and dedicated to accepting new teaching methods. Many teachers made use of visual aids and images in the class and reported positive outcomes utilizing this method.

The findings of this dissertation were consistent with findings from other studies that identified visual aid or image inclusion in learning science-based subjects was useful. Visual aids could also help incorporate culture context missing from a direct adaptation of the Western approach to classroom learning. Inclusion of visual aids might also enhance students' learning experiences in the classroom as seen by the highly positive results from teacher participants in this study. Furthermore, this study also noted age was not a barrier for teachers in learning and adapting new teaching methods. Visual aid learning also has the potential to increase the understanding of science-based subjects in Kuwait, which could significantly impact career paths chosen by students later in life.

On the other hand, parents and teachers must also be given information concerning visual aids and their importance in the learning experience for students.

Ignorance of parents and teachers concerning this matter might have negative consequences for student learning experiences in schools. Furthermore, schools should also consider developing and investing in visual aid facilities so teachers who find visual aids useful can include them in teaching their subjects. Schools should also provide training for teachers on the appropriateness and need for including visual aid teaching in classrooms in order to increase awareness of the importance of this method and to be one step ahead in education. At the same time, it is essential that teachers use their own discretion pertaining to the need of visual images, the number of visual images, as well as the type and need for students to be engaged in this form of learning method. It is hoped the government and teachers benefit from this study and incorporate necessary measures to enhance students' learning experiences in Kuwait.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY of
NORTHERN COLORADO

Institutional Review Board

DATE:	April 30, 2015
TO:	Abdulaziz Alenizi
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[752038-2] Use of photography to support the learning process of science teachers of 10-12 grades in the schools of Kuwait
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS
DECISION DATE:	April 30, 2015

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Hello Abdulaziz,

Thank you so much for your careful and complete modifications. Your application is approved and good luck with your study.

Sincerely,

Nancy White, PhD, IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX B

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

UNIVERSITY of
NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: Use of photography to support the learning process of science teachers of 10-12 grades in the schools of Kuwait

Researcher: Abdulaziz Alenizi , Doctoral Candidate in Educational Technology under supervision of
Mia Kim Williams, Ph.D.
Associate Professor of Curriculum Studies and Educational Technology,
College of Education and Behavioral Sciences
Phone: 970-351-2414 (Dr. Williams) 269-267-3719 (Abdulaziz Alenizi)
E-mail: mia.williams@unco.edu; alen2059@bears.unco.edu

Purpose and Description:

The research will examine the perspectives of teachers about introducing photographic aids in their classroom. The different types of visual's formats being advocated and used as part of new curriculum and teaching resources provided by the Kuwait Ministry of Education include digital material which are web-based along with the transparencies and print materials. This is a preliminary study and is based on a descriptive research model with the primary instrumentation being an online survey.

You will be asked to provide consent of your participation in the research study. By accessing the online survey and continuing to the questions, you are providing consent for the researcher to include your responses as data for the research. A volunteer not affiliated with our research from the Kuwait Ministry of Education will distribute the consent and survey. The researchers will not know which participants consent or which ones do not consent to participate.

As a participant in this study, you will be asked to:

1. Complete questions on an online survey that includes demographic information
2. Complete questions on an online survey about your perceptions of teaching with visual methods

The survey should take approximately 10-15 minutes.

Risks or inconveniences to anyone involved:

We do not believe that this study presents any risks to anyone involved beyond the normal risks associated with the teaching profession. As the above listed activities are

normal activities for a teaching professional, participating will only present a small time inconvenience.

Anonymity of participants:
We will take all necessary steps to prevent others from knowing who the participants are in this study. First, we will store all information you give us securely in a locked file cabinet in Mia Kim Williams' office at the University of Northern Colorado or in a password protected. Only the researchers will have keys to access the data. The written notes, products, and drafts will be saved and stored by the researchers. Names of participants will be kept separate from the data and data will be presented in aggregate form with no individual participant identifiers.

Costs associated with participation:
There are no monetary costs to you to take part in this study.

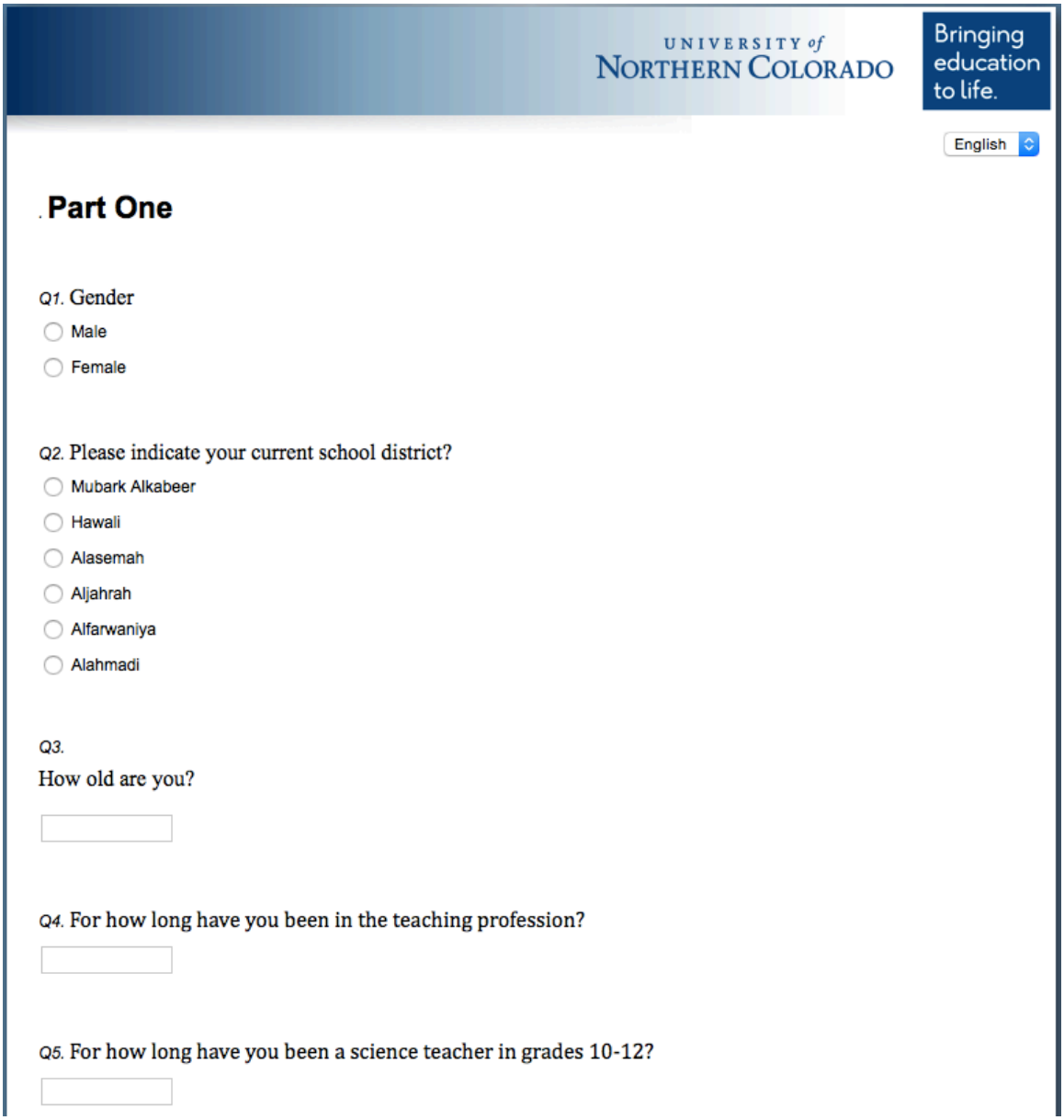
Benefits of participating in this study:
This particular study is directed to resolve the conflict of the educators and officials within the country, and answer few comprehensive questions. It is understood that limited research has been done in this context; it is believed following the results of this study the researcher would be able to create foundation for more work on this subject. Your participation provides a benefit of engaging in this process and providing information that will be used to better understand teaching in Kuwait.

Participation:
Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time by closing the online survey. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

By clicking "next" to proceed to the survey questions, you are providing your consent to participate in this research project.

APPENDIX C

SURVEY



UNIVERSITY of NORTHERN COLORADO

Bringing education to life.

English

Part One

Q1. Gender

- Male
- Female

Q2. Please indicate your current school district?

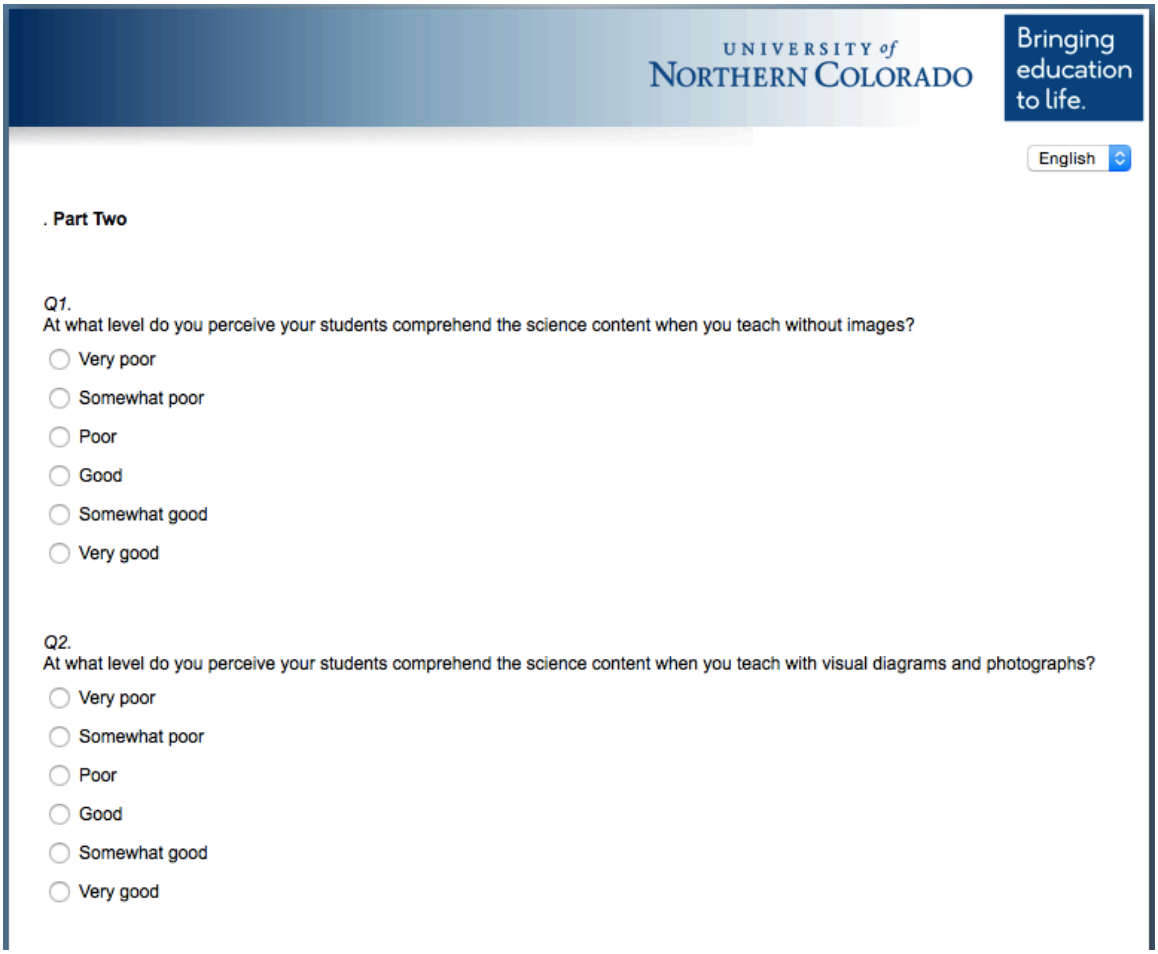
- Mubark Alkabeer
- Hawali
- Alasemah
- Aljahrah
- Alfarwaniya
- Alahmadi

Q3.

How old are you?

Q4. For how long have you been in the teaching profession?

Q5. For how long have you been a science teacher in grades 10-12?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English
. Part Two
Q1.
At what level do you perceive your students comprehend the science content when you teach without images?
Very poor
Somewhat poor
Poor
Good
Somewhat good
Very good
Q2.
At what level do you perceive your students comprehend the science content when you teach with visual diagrams and photographs?
Very poor
Somewhat poor
Poor
Good
Somewhat good
Very good

Q3.

Based on your perception, rate the students ability to learn content in the following sciences.

	Very Difficult	Somewhat difficult	Difficult	Easy	Somewhat easy	Very easy
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q4.

How often do you use photography to teach the students in the following sciences?

	Many times per lesson	Once per lesson	Several times per week	Once per week	Once per month	Never
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q5.

How difficulty is it to teach using photographs and images in the following sciences?

	Very difficult	Somewhat difficult	Difficult	Easy	Somewhat easy	Very easy
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q6.
Based on your perception, how engaged are your students with the following science content when you include photographs in your teaching?

	Very disengaged	Somewhat disengaged	Disengaged	Engaged	Somewhat engaged	Very engaged
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q7.
Please rate the degree to which you agree with the following statement: My students enjoy my teaching when I use photographs in the lesson for the following sciences:

	Strongly disagree	Somewhat disagree	Disagree	Agree	Somewhat agree	Strongly agree
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q8.
How difficult do you find it to incorporate photographs in your curriculum?

	Very difficult	Somewhat difficult	Difficult	Easy	Somewhat easy	Very easy
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q9.
Please rate the degree to which you agree with the following statement: As the teacher, I enjoy using photographs in the lesson for the following sciences:

	Strongly disagree	Somewhat disagree	Disagree	Agree	Somewhat agree	Strongly agree
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q10.
Please rate the degree to which you agree with the following statement: Teachers should be trained in teaching through the use of photographs and images for each of the following sciences?

	Strongly disagree	Somewhat disagree	Disagree	Agree	Somewhat agree	Strongly agree
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○

Q11.
How difficulty do you find it to locate photos for teaching in each of the following sciences?

	Very difficult	Somewhat difficult	Difficult	Easy	Somewhat easy	Very easy
General Science	○	○	○	○	○	○
Physics	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○
Biology	○	○	○	○	○	○