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An Exploration of the Current Trends and Uses of Technology in Early Childhood Education

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Abstract:

This research will explore the current literature focused on contemporary trends and uses of technology in early childhood education. While the benefits of technology in higher levels of education have been touted throughout research, technology use of ages 0-5 has not been as widely accepted. This research will focus on the appropriate use of technology, including touch technology, electronic communications, the Internet, multimedia tools, and educational software, on children during early stages of cognitive and social development. Further, the value technology provides to early childhood education, such as building skills of communication, autonomy, creativity, language development, the physical abilities of touching and clicking, as well as preparing students for more advanced stages of education, will be explored. This work will also evaluate the potential harmful impacts of technology use during early learning and discuss the importance of intentionality and limitations with technology use at this introductory age of learning. The research will also explore the Digital Play Framework as a theoretical framework of reference. Additionally, the impact of technology use in both formal preschool learning settings and the home environment will be discussed. The presentation will conclude with a recommendation of both future research in the field of technology use in early childhood as well as recommendations for effectively developing young digital natives through formal and informal learning settings.

Keywords: *early childhood, technology, early learning, preschool education*

Introduction

A rise in touch-screen technology ownership for personal reasons, including tablets and smartphones, has led to an increase in the use of technology for all ages in most developed countries, even including the use of touch-screen technology with babies and very young children (Blackwell, Lauricella, & Wartella, 2016; O'Connor & Fotakopoulo, 2016). Recent research indicates that more than half of early childhood classrooms utilize tablets in the United States, therefore it is important to understand how these devices are used for learning and socialization (Blackwell, Lauricella, & Wartella, 2016). While the benefits of technology in higher levels of education have been touted throughout research, technology use of ages 0-5 has not been as widely accepted. Further, the research field specific to the use of educational technology with young children is still emerging (Sundqvist & Nilsson, 2016). This article will seek to utilize the narrative literature review approach to explore and evaluate the current trends and uses of technology in early childhood education on an international level.

This research will focus on the appropriate use of technology, including touch technology, electronic communications, the Internet, multimedia tools, and educational software, on children during early stages of cognitive and social development. Further, the value technology provides to early childhood education, such as building skills of communication, autonomy, creativity, language development, the physical abilities of touching and clicking, as well as preparing students for more advanced stages of education, will be explored. This work will also evaluate the potential harmful impacts of technology use during early learning and discuss the importance of intentionality and limitations with technology use at

this introductory age of learning. The research will also explore the Digital Play Framework as a theoretical framework of reference. Additionally, the impact of technology use in both formal preschool learning settings and the home environment will be discussed. The intent of this literature review is to prepare the researcher for a more in-depth qualitative phenomenological study in the field. Therefore, the presentation will conclude with a recommendation of both future research in the field of technology use in early childhood as well as recommendations for effectively developing young digital natives through formal and informal learning settings.

Narrative Review Approach

The narrative review approach was chosen in order to identify current literature on the topic of technology use in early childhood education and to present a comprehensive look at the themes emerging from recent research on the topic. The narrative review has a selective search strategy that provides the researcher with an opportunity to identify and compose specific relevant literature in an integrated approach (Pare, Trudel, Jaana, & Kitsious, 2014).

Identifying the Researcher

Because this study is to aid in preparing the researcher for a future qualitative phenomenological study, I will also take this opportunity to identify the researcher in order for readers to understand the intent of this study. To begin with, professionally I am a professor of educational technology and psychology, therefore, I enjoy learning about learning as well as exploring the impact of technology in the field of learning. In the past, I have conducted research and worked with elementary and secondary age students, but have yet to venture into the world of early childhood education. However, in addition to my professional role, I also am a mother of two sons, ages 1 and 2. Therefore, I am invested in this subject matter simultaneously as a professional and as a parent. It is my intent to not only look at this material from strictly a scholarly viewpoint but also the viewpoint of a parent or caregiver interested in best preparing their child for the primary years of education while at the same time maintaining a sense of balance, protection, and care. Further, it is my hope that early childhood educators can benefit from this narrative review and synthesis of current research.

Literature Review

Edwards and Bird (2017) posited that “early childhood settings are characterized by the use of play-based learning and the assessment of children’s play by teachers to promote further learning” (p. 158). However, children in the modern era are now exposed to a variety of technologies, including TV, computers, toys, tablets, and smartphones, on a daily basis. Recent findings explain that young children, or young digital natives, are no longer passive receptors in the digital world and instead are active users of technology (Rosen & Jaruszewicz, 2009). Additionally, Arnott’s (2016) research explored the use of technology in two preschool settings in Scotland. Her findings revealed that “children played in clusters, exhibiting a multitude of social behaviors and interactions and varied degrees of social participation, and assumed various social status roles and technological positions” (Arnott, 2016, p. 271).

Further, Alade, Lauricella, Beaudoin-Ryan, and Wartella (2016) argued that “early exposure to STEM-related (science, technology, engineering, and mathematics) concepts is critical to later academic achievement” (p. 433). They posited that because American children in the United States continue to fall behind their peers internationally in both math and science, more efforts should be geared towards educating children in the STEM fields at an earlier age, such as utilizing technology in the classroom.

Blackwell, Lauricella, and Wartella (2016) explained that “for students, their individual needs, interests, prior knowledge and sociocultural background can influence how teachers design lessons,

including how they choose to incorporate technology in the learning environment (Blackwell, Lauricella, & Wartella, 2016, p. 58). Additionally, for teachers, their technology self-efficacy, attitudes towards technology, and general pedagogical beliefs can all influence their integration of technology into the early childhood education classroom (Blackwell, Lauricella, & Wartella, 2016).

Digital Play Framework

Edwards and Bird (2017) expressed concern about technology use in early childhood settings because “little is known about how children learn to use technologies through play” (p. 158), a vital component of early childhood learning. In order to address this problem, they developed the Digital Play Framework as an assessment tool that can help to develop new ideas regarding children’s digital play opportunities and to help educators understand how children learn to use technologies through play. The Digital Play Framework integrates Hutt’s (1971) categorization of epistemic and ludic play into Vygotsky’s (1997) conceptualization of tool mediation in the achievement of an object of activity. This assessment views digital technologies as cultural tools and utilizes the following terms to evaluate digital technologies as a tool as well as to provide a series of baseline indicators for children learning to use technologies through play: object of activity, behaviors, indicators, and description. Moreover, the Digital Play Framework “understands children’s learning to use technologies as tools associated with two forms of play as their object of activity. In the first form of play, children’s activity is oriented towards working out or exploring the functions of the technologies as a tool. In the second form of play, mastery of the tool means that the object of their activity becomes ludic play and there is increased capacity for children to use technologies in more symbolic or content generative ways” (p. 169).

Challenges in Technology Use with Young Children

Despite the benefits to technology education as a whole and the practice of preparing young children for future formal learning and working environments, the American Association of Pediatrics still cautions that “parents need to be mindful about the risks of displacing or replacing essential developmental experiences in the early years due to overuse of technology. Limits on media use for children 19 months...to 5 years can provide adequate time for young children to play and be physically active, to spend time indoors and outdoors, to have social time with friends, to enjoy one-to-one time with siblings and parents, and for family time without screen interruptions” (Donohue & Schomburg, 2017, p. 75).

Further, Rosen and Jaruszewicz (2009) explained that emerging technologies are developing at a “dizzying pace” and present “a moving target” for early childhood teachers who “continue to be challenged by the task of imagining digital possibilities that align with young children’s unique natures, interests, and emerging capabilities, while at the same time protecting their vulnerabilities and privacy” (p. 163).

Moreover, although Alade, et al.’s (2016) study provided evidence that preschool age learners can learn from interactive gaming experiences on a touchscreen device, when comparing conditions that required the student to manipulate the touchscreen, versus students in the group where the touchscreen was manipulated for them, these students did not perform as well. Their research conclusions posited that the reason for this difference is children who did not have to focus on the physical manipulation of the game were able to expend more of their working memory resources on absorbing the overall concept and responding to the task being measured. Further, their research explained that video technology may be just as impactful as the use of touch technology in the effort to support STEM learning with preschoolers.

Additionally, research indicates that there is a difference in use of technology use in the home and in preschool settings (Edwards, Henderson, Gronn, Scott, & Mirkhil, 2017). Proponents of technology often argue that use of technology in the home is frequent, creative, and generative, and therefore use of

technology in early childhood centers should be as well. Edward's et al., (2017) posited that "technology use is characterized by different imperatives in each setting so that thinking about digital differences may be more productive than continuing to focus on the concept of disconnect" (p. 1).

Discussion

The following section will include a brief discussion of important thoughts as well as empirical research to consider when implementing technology in formal learning settings as well young children's use of technology in the home. As Edward's et al., (2017) explained "elements of setting associated with technology use suggested that activity, time, place and role influenced how and why technologies were used in the home and [formal learning environment], including decision making around children's access to technologies, how long technologies would be used for and the purpose of using a given technology" (p. 6).

Technology in Formal Learning Settings

Blackwell, Lauricella, and Wartella's (2016) study concluded that teacher-level factors, expressly a teacher's positive attitude towards technology, are most influential in how technology is used in the early childhood education classroom. In addition to the teacher's attitude toward technology is also the teacher's skill level and comfort with integrating technology into their lesson plans. Due to the more traditional based education taught in preschool settings, research indicates that preschool staff and teachers often feel underprepared in utilizing technology in the early childhood education classroom (Sundqvist & Nilsson, 2016). Therefore, in addition to assessing the uses of technology with young children, preschools also need to understand the importance of training and professional development opportunities for preschool teachers. Further, Blackwell, Lauricella, and Wartella (2016) stress the importance of funding efforts moving beyond mere technology access and instead concentrating on initiatives to support on-going educator professional development and specifically preparing early childhood educators to incorporate learner-centered practices in their approaches to technology integration in the classroom.

In addition to the teacher's comfort with technology, is the importance of evaluating the effectiveness of the specific tool or program. Similar to what has been advised for all types of learning, the Fred Rogers Center asked the following questions in terms of the appropriateness of technology:

Does it...

1. Create a sense of worth?
2. Create a sense of trust?
3. Spark curiosity?
4. Have the capacity to foster you to look and listen carefully?
5. Encourage the capacity to play?
6. Allow for moments of solitude?

(Donohue & Schomburg, 2017, p. 77)

Technology in the Home

Specifically exploring the use of technology among children ages 0-3 in the home in the United Kingdom, O'Connor and Fotakopoulo's (2016) research indicates that the use of technology is on the rise, while parents still express concern about both the quantity and quality of use. Interestingly, technology is often used beyond learning means in the home with children ages 0-3. Indeed, parents often chose to utilize technology, such as tables and smartphones for communication with family (O'Connor & Fotakopoulo, 2016).

Alade, et al.'s (2016) study concluded that "interactivity is most helpful to young children when the learning context very closely mirrors the real-world setting...[therefore, it is best] to strategize by focusing their interactive efforts on skills and topics that have very similar transfer goals, while reserving broader conceptual lessons for more traditional media platforms. Likewise, parents and educators can use this information in choosing appropriate apps and technologies for their children, considering specific skills or goals for learning" (p. 439).

Further, the American Association of Pediatrics recommends that parents "create a family media plan that includes tech-free zones and times, including no media use during meals and one hour before bedtime" (Donohue & Schomburg, 2017, p. 75). Moreover, the US Departments of Education and Health and Human Services also stress the importance of families and early educators considering more than simply time when evaluating the appropriateness of technology and instead assess the content quality, context, and ability for the specific technology to enhance relationships (Donohue & Schomburg, 2017).

Conclusions and Future Research

As Donohue and Schomburg (2017) stated, "it's clear that we still have much to learn about the impact of technology on whole child development. Fortunately, one of the key findings in the reports is that the majority of children's use of technology or media includes imagining, playing, wondering, creating, and reflecting. This bolsters the notion that technology and media-when appropriately used-can improve children's readiness for school and enhance their social and emotional development" (p. 75).

At the conclusion of this literature review, the researcher intends to explore this topic in the field through a qualitative phenomenological study, similar to Arnott's (2016) study. The intent of this study will be to observe children ages 3 through 5 in a formal preschool setting as well as conduct semi-formal interviews with preschool teachers to evaluate their understanding and sense of technology use in the early childhood education classroom. Further, in order to gain a deeper understanding of the extent, use, and appropriateness of technology in children ages 2 through 5, the research also plans to conduct semi-formal interviews as well as distribute a formal survey to parents in order to gage the role of technology in the home, similar to the O'Connor and Fotakopoulo's (2016) study. The findings from this narrative review have helped to guide the researcher in this direction.

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Trial of an E-Health Observation System Employing Student Self-Checks

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Abstract:

Guidance for living, which looks at such problems as moral or ethical issues and pro- or antisocial behavior (bullying, etc.), is seen as a meaningful and worthwhile endeavor in education in Japan. However, attempting to provide this guidance places a heavy burden on teachers, who may find it difficult to observe and guide all students adequately. Therefore, the authors intend to digitize the health observations and student diaries that are performed and maintained at many schools in Japan. First, we will develop and test in a Japanese high school context an e-health observation system that can quickly, easily read and share information on students' psychological and physical health with their teachers, allowing teachers to use this information in providing living guidance. This paper presents the results of a questionnaire survey after the trial of the system, which revealed that students thought the e-health observation was superior to face-to-face educational counseling in case of shy students. Moreover, it was presumed that students with low school satisfaction would respond poorly regarding the need to reply to the system. This issue needs to be addressed in the near future.

Introduction

In Japanese schools, emphasis is placed on guiding students on “living morally.” This “guidance for living” is seen as a functional concept as important as the learning instruction (Yamamoto, et al., 2014). For example, while serving as a junior high school mathematics teacher several decades ago, I also filled the roles of badminton coach, nurse, counselor, police, parent, and so on. As you can clearly see, Japan emphasizes moral education. In addition, however, Japanese teachers are very busy, and have been for many years. This makes it difficult for teachers to prepare adequate educational materials and teach their subjects adequately. They are exhausted both physically and mentally and are unable to help their students, who may be troubled or in bad health, to the level entailed by the “guidance for living” concept. As a result, many schools conduct health observations (Ministry of Education, 2009) and use life-records (diaries) to understand the emotional and physical condition of each student. These measures have, to some degree, helped teachers to understand and grasp students' health, psychological stress, and troubles. However, because these instruments are completed by hand on paper, the information gained by them cannot be shared with teachers easily or disseminated quickly enough to be effective.

Related Research

Reflecting the ongoing informatization of school teachers' work, we uncovered the existence of a related system, which is called the School Affairs Support System (Miyata, et al., 2015). However, while this system is similar to ours in its aim of giving guidance for living, it also, unlike ours, relies on a self-checking

system. That is, teachers do not enter the results of their observations, but instead allow students to enter their own replies to question items intended to glean this information. There is also a Student’s Attitude recording system (Suzuki, et al., 2015), which gathers information on the condition of each student during lessons based on teachers’ observations; in contrast, however, our system places no such burden on the teachers. Finally, Taipei schools have a system that includes an e-health management function, from which we received beneficial insights (Adachi, 2012).

Objectives

Based on consideration of the systems mentioned, we propose and test an e-health observation system that can gather and display information on students’ physical and emotional conditions by having them enter their own self-checks into tablet terminals.

Method and Materials

Development and Usage of the E-Health Observation System

As suggested, “health observation in this research covers not only physical but also psychological condition. The Central Education Council (January 17, 2008) has said that “health observation...grasps the state of psychological and physical health.” We named our system the “E-Health Observation System.”

Configuration of Our System

The system consists of a logon page, pages for entering health conditions, a profile management page, and so on. Each student has an account, and we took measures to protect identifying information. Figure 1 indicates our system’s setup and its functioning. Furthermore, we are now reviewing the development of a new system, “Teacher Call,” wherein students can ask a question and consult AI for an answer in real time.

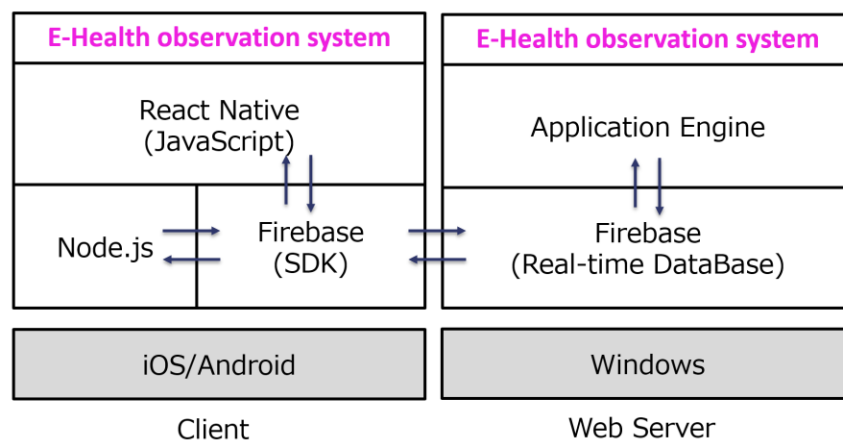


Figure 1: E-Health Observation System’s Setup and Functioning

Students’ Usage of the System

Two classes of students participated in a trial of the system, one class of 28 students in the 10th grade and one of 38 students in the 11th grade.

Timeline

The duration of the trial was from December 19, 2017 to February 9, 2018.

Trial of E-Health Observation

Students entered data regarding their physical and psychological health condition using tablet computers during their homeroom block, twice weekly. Figure 2 displays the questions regarding mental stress, and Figure 3 shows the questions regarding physical health; students were able to choose multiple items on both. These results were relayed to the homeroom teachers immediately, and they were able to use that information to assist them with guidance for living.

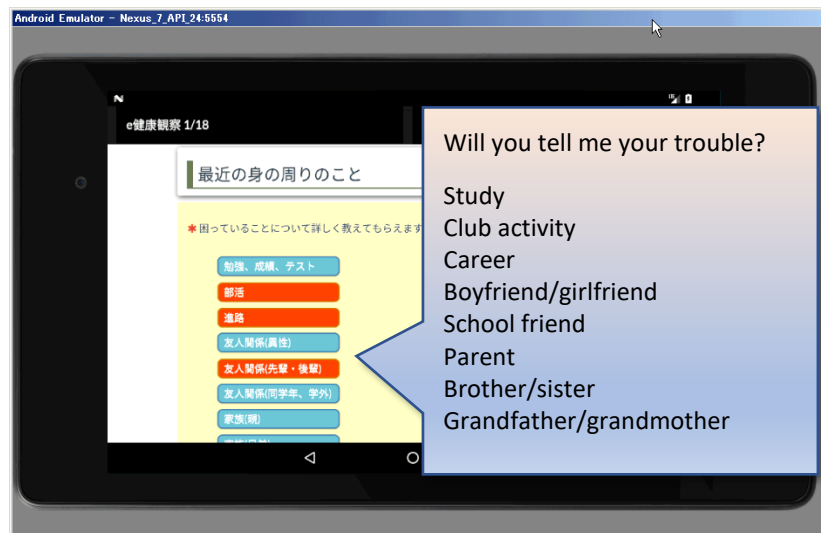


Figure 2: Self-check of students' psychological health

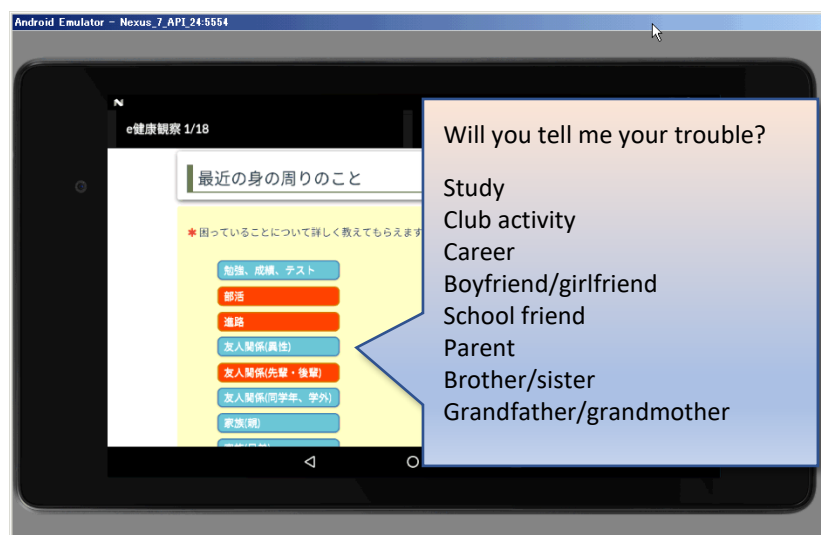


Figure 3: Self-check of students' physical health

After the trial, we conducted a questionnaire survey regarding the system, where students provided answers on a 5-point scale, and another survey using items extracted from the School Life Satisfaction Survey (Kawamura, 1999). Data were analyzed using BellCurve for Excel, version 2.15. The full questionnaires were as follows.

Evaluation of Usage of E-Health Observation System

e1 E-health observation was fun.

e2 I wanted to do more health observation.

e3 After e-health observation, I began to check and pay attention to my mental and physical condition.

e4 E-Health observation is convenient because I can inform the teacher of mental and physical troubles.

e5 It would be better for teachers to know our mental and physical troubles directly, through counseling, interviews, and so on.

e6 I was relieved to be able to enter my mental and physical troubles using the E-Health Observation System.

e7 I think e-health observation is useful for students.

e8 I think e-health observation is useful for teachers.

e9 E-Health observation is a good approach for students who are not good at talking.

e10 There was no answer item on the system that exactly fitted my mental and physical troubles, although I wanted to enter my condition.

e11 It was easy to use the E-Health Observation System.

e12 The E-Health observation system did not work well.

e13 I sometimes entered my mental and physical troubles without being serious.

e14 I think it would be good to be able to talk about troubles with AI (artificial intelligence) tools like iPhone's Siri or Google.

School Life Satisfaction Survey (Kawamura, 1999)

s1 I think that I am accepted by my school friends for study, exercise, special skills, and funny talking.

s2 I think I have presence in my class.

s3 I have the leadership in my class and club activities.

s4 I am a central member in the familiar group.

s5 I have sometimes attracted a lot of attention from school and class students.

s6 I have sometimes felt fulfillment and satisfaction in my school life.

s7 I am positively and enthusiastically working on activities in my class.

s8 I think there is a teacher who appreciates me in school.

s9 I am satisfied with my school.

s10 I have friends whom I can talk to about my real intentions and troubles in my school.

s11 I have sometimes been ignored by classmates.

s12 I have sometimes suffered terrible pranks from classmates.

s13 I have sometimes been alone because I could not join in any group when we were making groups [for group work] in my class.

s14 I am often alone at break times and so on.

s15 I have sometimes felt anxiety and tension because I worried about other students' eyes and behaviors in my class or club.

Results and Discussion

Students' Data Inputted to E-Health Observation System

The system expresses students' mental and physical conditions and troubles for teachers after processing their data. Figure 4 and Tables 1 and 2 show the results of the e-health observation; that is, the replies from students. The number of students who replied the system was not significantly different between the 10th grade and the 11th grade, nor was the average number of inputs per student.

	Student	Blue boxes indicate mind problems and green indicate body problems						Sum
December 19	ba 56	Friend (Same age)						1
December 19	ba 74	Study	Career	Boyfriend / Girlfriend	Friend (Senior, Junior)	Friend (Same age)	Other	6
December 19	ek 58	Study	Friend (Same age)					2
December 19	ek 65	Study	Boyfriend / Girlfriend	Friend (Same age)	Stomachache	A cold		5
December 19	ek 81	Friend (Senior, Junior)	A cold					2
December 21	ba 56	Friend (Same age)						1
December 21	ba 74	Study	Career	Boyfriend / Girlfriend	Friend (Same age)	Parent		5
December 21	ek 58	Nothing						0
December 21	ek 65	Study	Boyfriend / Girlfriend					2
December 21	ek 81	A cold	Injury					2

Figure 4: Example of e-health observation results (translated)

	Dec. 19	Dec. 21	Jan. 11	Jan. 18	Jan. 22	Jan. 26	Jan. 29	Feb. 1	Feb. 8
1A (persons)	12	9	12				15	11	
(ratio)	0.48	0.36	0.48				0.60	0.44	
2A (persons)	15	19	13	18	16	12	15		9
(ratio)	0.45	0.58	0.39	0.55	0.48	0.36	0.45		0.27

Table 1: The number of students who input data to the system and class ratios

	Dec. 19	Dec. 21	Jan. 11	Jan. 18	Jan. 22	Jan. 26	Jan. 29	Feb. 1	Feb. 8
1A (total)	26	26	30				28	32	
(per person)	2.17	2.89	2.50				1.87	2.91	
2A (total)	34	53	28	53	37	49	45		21
(per person)	2.27	2.79	2.15	2.94	2.31	4.08	3.00		2.33

Table 2: Total input data, overall and average per student

Questionnaire Survey After Trial

The questionnaire on the use of the system yielded the following results. First, the 10th-graders highly appreciated the E-Health Observation System compared to the 11th graders, as seen in Figure 5, with

significant differences ($p < .05$) shown by t-test for all items on the first questionnaire except e5, e10, e11, e13, and e14. Significant differences were also confirmed on items s7 ($p < .01$), s8 ($p < .05$), and s9 ($p < .05$), on satisfaction with school life, as seen in Figure 6, with s10 also of marginal significance ($p < .1$). These results show that 11th-graders were not satisfied with school life compared to 10th-graders and had difficulty adapting to school. They also may imply that the 11th-graders did not view e-health observation as useful.

Second, one-way analysis of variance (ANOVA) revealed differences within the 10th-grade class on 14 e-health items (Figure 5) ($F(13, 312) = 8.5065, p < .01$); multiple comparisons by Bonferroni t-test also showed significant differences on e5 and e9, suggesting that among 10th-grade students, shy students in particular approve the use of e-health observation rather than face-to-face counseling.

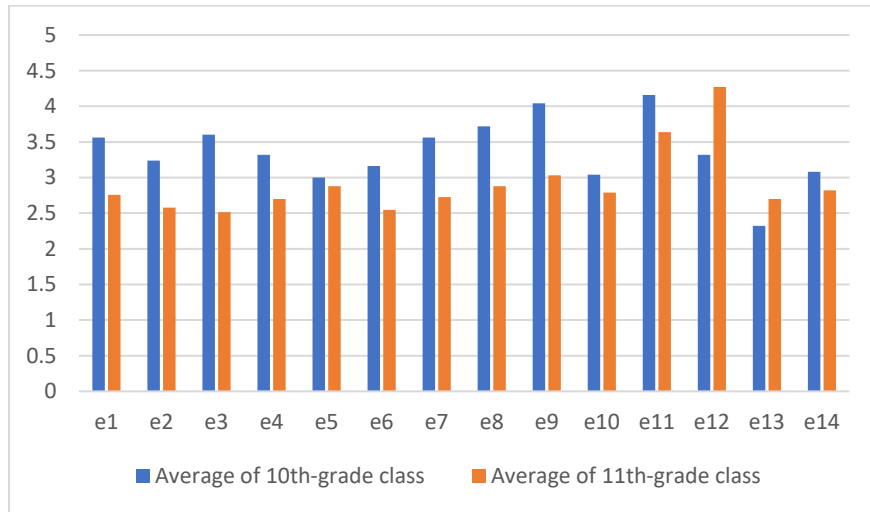


Figure 5: Evaluation of the e-health observation

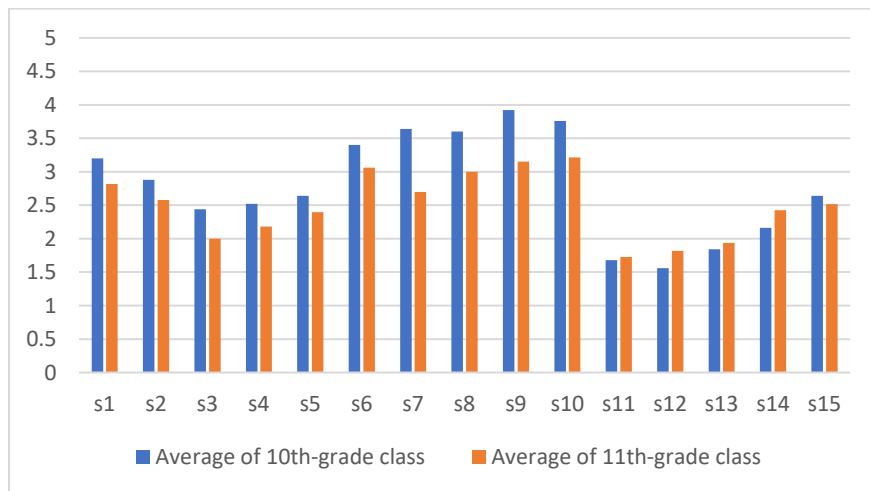


Figure 6: Results of the satisfaction survey on school life

Thus, taken as a whole, 11th-graders scored low the value of the e-health observation system low compared to 10th-graders, perhaps because of their lower satisfaction with and adaptation to school life (Figure 6). We will investigate this problem using correlation analysis. First, let us look at the results for 11th-graders.

11th-graders	e4	e6	e7	e8	s12
Mental health (number of inputs)	-0.2962	-0.2311	-0.3250	-0.2512	0.1915
Physical health (number of inputs)	-0.1633	-0.1787	-0.1770	0.0379	-0.4650*
Total (number of inputs)	-0.4824*	-0.4046*	-0.4906**	-0.3925*	-0.0625

Table 3: Relationship between number of inputs and the system evaluation and so on (p<.01, *p<.05)**

Table 3 shows that 11th-graders who thought e-health was useful had fewer inputs (e4, e6, e7, e8), and that the number of inputs on physical health decreased if they thought they had been bullied (s12). Thus, dissatisfaction and maladaptation in school life may interfere with e-health reporting on mental and physical problems and degrade the effectiveness of the system. On the other hand, among 10th-graders, as shown in Table 4, students who actively participate in school life and feel fulfillment and satisfaction have fewer inputs concerning mental and physical problems. This finding seems quite reasonable. It is necessary to consider how to induce reply actions among students who are not satisfied with school life in the near future.

10th-graders	s6	s7
Mental health (number of inputs)	-0.3333	-0.3485
Physical health (number of inputs)	-0.1762	-0.0844
Total (number of inputs)	-0.5572*	-0.5510*

Table 4: Relationship between number of inputs and school life satisfaction (*p <.05)

Finally, interviews with the school principal and vice-principal showed that they also appreciated the system because they could easily, quickly assess the condition of their students. However, some teachers had negative comments regarding the use of system for living guidance. One of their concerns was that, teachers cannot cope with and resolve all troubles entered by their students, because the system would also gather small ones. Another criticism was that living guidance should be conducted face to face.

Conclusions

We developed the e-Health Observation System and conducted a trial in a Japanese high school over two months. Students responded to questions about their psychological and physical health condition on tablet computers. The results showed that 10th-grade students highly appreciated the e-health observation as a whole, and that 10th-graders in particular said it was superior to face-to-face educational counseling in case of shy students. However, both satisfaction with the system and school life satisfaction were somewhat lower in 11th-grade students, the latter perhaps influencing the former. We need to consider this further in the future. Moreover, while school administrators appreciated the system, some teachers had certain concerns. We need to use the system longer term to enhance these trial data and ascertain the effectiveness of the system, using quantitative and qualitative research methods.

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New Digital Literacies: Visual Arts Education Using 3D Printing Technologies

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Abstract

Equipping with digital literacy and skills related to the latest digital technologies and integrating the new contents into the conventional curricula have been in high demand in recent years. Despite the potential educational benefits addressed by scholars, many pre-service teacher education programs in visual arts still have not established a revised curriculum which is designed to strategically integrate the new digital tools going beyond screen-based multimedia. This exploratory case study was conducted in a pre-service teacher program in visual arts in Hong Kong to measure the effect of 3D modeling software and digital fabrication technologies in developing creativity and problem-solving skills. The participants learned fundamental design theories, digital and physical crafting skills. Then, they were asked to create a functional design for daily life with a 3D prototype using digital technologies and hand-craft skills. The results of this study provide evidence for potential advantages in using 3D digital technologies both in virtual and physical dimensions. Despite the steep learning curve in learning 3D modeling software for the first few lessons, the participants' level of motivation and engagement increased gradually. The participants' response revealed that an understanding how things are made to work functionally helped them develop problem-solving skills and expanded the scope of creativity. The shortcomings such as going beyond technical tooling, equipping with sufficient devices and lack of resources for further application were addressed.

Keywords: *Digital literacy; 3D modeling and 3D printing; Visual arts education; Pre-service teacher education*

Introduction

New technology has always made an impact on education to at least some extent (Cuban, 1986). Design education has been particularly affected by the increasing complexity of digital fabrication technologies which are now available for use in classrooms, encouraging educators and stakeholders to completely restructure design curricula to accommodate the technological changes. Digital fabrication technologies, which are also known as rapid prototyping (RP), include computer-aided design (CAD) software as well as computer aided manufacturing (CAM) hardware like 3D printers, laser cutters, and computer numerical control (CNC) milling machines, the latter of which have previously been relegated to industrial use. Because of the improved accessibility and affordability of these technologies in recent five years, it is now easier than ever for an individual to turn an idea into a physical entity, and this has strong potential implications for education (Bilkstein 2013; Eisenberg, 2013; Halverson & Sheridan, 2014; Papavlasopoulou et al., 2017; Peppler & Bender, 2013).

Studio art and design education are deeply rooted in a “learning through making” constructionism approach. (Bilkstein 2013; Eisenberg & Buechley 2008; Harel & Papert, 1991; Papert, 1980). The process of creating a prototype is an integral part of design education, especially at the tertiary and vocational levels. An understanding of the design and manufacturing processes is an essential skill for students to master in order to become professionals in the field. Students therefore learn how to create physical models by hand or with digital tools, using various media to illustrate design ideas; they then receive feedback from others, to check

for any errors and problems, and revise the model if necessary (Alley, 1961; Gibson et al., 2002). In addition, research shows that RP can support the study of form and can help students develop spatial recognition abilities within and beyond design education (Huang & Lin, 2017; Sass and Oxman, 2005).

Whereas in the past every prototype was made by hand, various types of digital fabrication technologies have now enabled a wide variety of fabrication methods and material choices in educational settings. Generally, industrial and product design education is now being implemented with the use of CAD technologies at the university level, since the visualization of ideas and the manufacturing processes inevitably involve making 2D and 3D prototypes. Since this substantially decreases the cost and time required to make a prototype, designers and students can test their ideas by quickly creating a physical 3D model to investigate and fix problems.

To some extent, these new digital fabrication technologies can also be applied in K–12 design education. However, more refined and detailed instructions need to be considered in order to integrate professional and university design practices into K–12 classrooms. Design education in K–12 in Hong Kong has become marginalized as an independent subject, and is typically only implemented as a small part of different subject domains such as Information Communication Technology (ICT), Design and Technology(D&T), Science Technology Engineering and Mathematics (STEM), and Visual Arts (Siu, 1999; Siu, 2008). Thus, unlike design curricula at the university level, K–12 design curriculum and content vary immensely between schools depending on national and infrastructural circumstances.

In Hong Kong, the most recent art curriculum guide (2017) developed by the Education Bureau acknowledges the impact of science and technology advances on art education and provides students with novel means for communication, artistic expression, and learning. The guide also addresses the necessity of restructuring school curricula to empower students with STEM and IT competency. In addition to discussing the need to teach students technical skills, the curriculum guide emphasizes the impacts of technology on the conception of art, in terms of fabrication methods, media, and other socio-cultural issues, which it addresses as part of art appreciation and criticism in context. However, the most common technologies to have been adopted in design-related subjects in Hong Kong are Web 2.0 technologies, along with basic 2D graphic software and video-editing tools (Siu, 2008). Very few schools employ 3D CAD technologies and there is lack of empirical research on effective ways to integrate digital fabrication technologies into existing curricula in K–12 design education.

Therefore, this research aims to investigate how creative processes using digital fabrication technologies can benefit design education, particularly in the context of a pre-service visual art teacher program in Hong Kong. By implementing new curricula with RP technologies in a 3D-design course for pre-service teacher students, this pilot study attempts to identify changes in learning outcomes, along with the affordances and constraints of the technologies, and to understand what contents and skills are essential for meaningful learning experience and teaching practices in the future.

The research questions in this study are as follows:

1. What benefits can pre-service teachers achieve from learning to use digital fabrication technologies in design classes?
2. What are the affordances and constraints in integrating digital fabrication technologies into design education in K–12 settings, and what do pre-service teachers need to prepare for their future implementation?
3. What are the most efficient pedagogical approaches for integrating new digital technologies into traditional instruction-based design education for pre-service teachers?

Method and Materials

The exploratory study consisted of several data collection methods, including document analysis, participant observation, artifact evaluation, and review of student response questionnaires and university-wide teaching evaluation forms for the duration of a full semester (13 weeks). The researcher, who had been the course lecturer for two consecutive years, observed participants and recorded field notes. The learning outcomes were measured by participants' portfolios, including research data, 2D and 3D sketches, and 3D prototypes, as well as written reports.

The participants in the pilot study were 80 visual arts students from two classes in their fourth or fifth year of a pre-service teacher education program in Hong Kong. During the first class of a compulsory design course, all potential participants were informed about the aim of the study and that the study would not affect their performance and assessment. A compulsory 3D product design course called "Design for Living" was selected for this study. The course consists of three-hour classes once a week for 13 weeks, for a total of 39 hours of class time. The curriculum covers design history and theory, and students then apply the theoretical knowledge to develop their own projects, within assignment guidelines, that start from initial development of 2D designs and finish with the creation of 3D prototypes. In previous years, digital technologies were not used for creating visual outputs in this course and most of the course contents were based on theory-based design thinking process and visual research; students were asked to develop a self-driven 3D prototype. In the pilot course, students were required to use 3D printing or laser cutting methods at least once during the semester. Hand construction or use of hybrid methods were also encouraged. A summary of the syllabus, including briefs for in-class activities and the final project guidelines, is listed in table 1.

Although digital fabrication technologies may affect different phases of course projects, this research mainly focused on the documentation of the 3D modeling and fabrication process in order to focus on the effect of hands-on practices in developing design thinking and visualization processes. 3D printers and laser cutters were used for creating physical objects; the types of hardware used was limited to equipment that was accessible at the host institution. The software used included Tinkercad and 123D Design, which are well-established free 3D modeling programs developed by Autodesk.

Upon completion of the course, a survey form using a five-point Likert-type scale was distributed to participants to identify variables that affected their implementation of digital fabrication technologies. The survey also included open-ended questions to identify course strengths, and weaknesses as well as student suggestions for improvement. Additionally, the university-wide general teaching evaluation results were reviewed. Participants were informed that the surveys were anonymous and would not affect their course grades.

A limitation of these research methods is that there was no control group within the experiment; thus, direct observation between groups who learned digital fabrication design methods and another group who learned only conventional handmaking studio methods was not possible. However, the learning outcomes from the previous year's class, before the course outline was revised, were compared with results from the pilot study group in order to identify differences.

Table 1. Summary of the Design For Living course syllabus.

Assessment Criteria	Assignment Tasks	Learning Areas	Grade Weight
Process Portfolio	<ul style="list-style-type: none"> Collect documentation to illustrate a substantial design process undertaken, and other development possibilities for the concept(s). (20%) Complete and document in-class assignments. (20%) 	<ul style="list-style-type: none"> Design history Design thinking Design visualization & prototyping 	40%

Final Project	Present one piece/set of a product model based on the given topic and design brief, that demonstrates clear design concepts and shows appropriate execution of materials and production techniques. (40%)	Presentation of ideas Design visualization & prototyping	40%
Teaching Activity Plan	A teaching/activities plan (for 2–3 lessons) to enable students to understand the functional, aesthetic, and creative aspects of product design.	Develop teaching contents and pedagogies	10%
Essay	An introduction (500–600 words) to product design, elaborating on its significance in support of background ideas and design concepts.	Design criticism and reflection	10%

Results and Discussion

The course featured a redesigned curriculum to teach students to flexibly apply theory (research and ideation) to practice (2D and 3D visualizations). Over 13 weeks, students completed two mini-projects (Projects 1 and 2) and one final based on assignment guidelines. Although all projects had specified guidelines, there was flexibility for students to choose from various options to execute their designs.

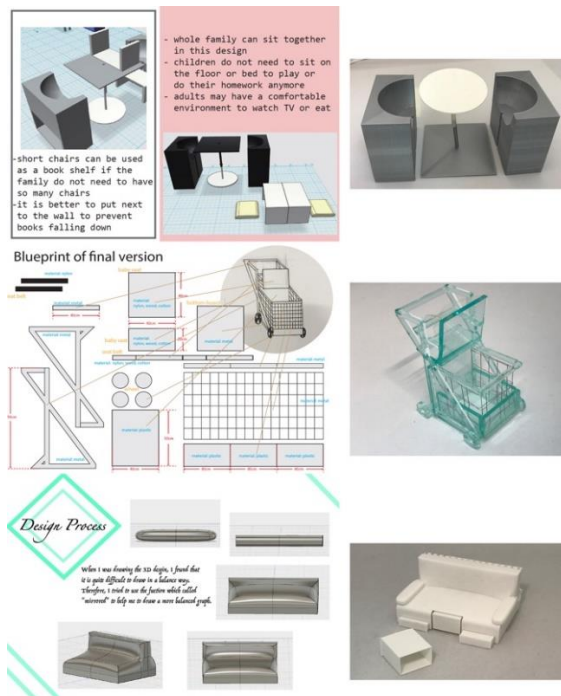
Project 1 and 2 each accounted for 20% of a student’s total grade and were designed to provide an opportunity for students to re-think 2D and 3D spatial relationships and how they relate to each other, as well as to articulate what it means to make things “functional.” Students were asked to make a functional object, according to their own interpretation, using specific fabrication methods: (1) 2D graphic design software to design and materialize an idea with 2D planes, followed by assembly of a 3D object; (2) 3D graphic software to design and materialize an idea using chosen 3D materials. It was compulsory for students to use digital fabrication methods (either a laser cutter or a 3D printer) at least once for any of the three projects and to submit a digital drawing/modeling file.

For both Projects 1 and 2, the lecturer began by introducing a brief history of design, with a focus on product design and theories pertaining to design research and design thinking. Afterward, two weeks were allocated for the lecturer to demonstrate how to use 2D and 3D graphic software, and how to prepare files for the laser cutting machine and the 3D printer. Students also learned how to use other machines and tools such as woodshop facility tools, a plastic forming machine, hand-held rotary tools, a Styrofoam cutter, etc., in case students wanted to use hand-making methods to create their prototypes.

Despite students’ initial reluctance to use digital modeling and fabrication methods for the first several weeks, students’ final motivation to learn digital fabrication technology turned out to be high: more than 80 percent of students chose to use laser-cutting or 3D printing to produce their prototype for the final project. Since most students already had foundational skills in 2D graphics software such as Photoshop and Illustrator from prerequisite courses, although the competency level varied, most of them were able to comfortably learn to use 2D CAD drawing with Illustrator and Inkscape software to sketch ideas and virtual models. However, preparing a file for laser cutting involved many trials and errors. Since laser cutting removes any extra length from the given material, precise calculations for the right fit for joint parts were necessary, and this was challenging for many students.

For 3D modeling, Tinkercad and 123D Design were primarily taught. During the first lesson, some students found it hard to visualize their ideas in virtual 3D, but nonetheless managed to follow instructions. When the design was 3D printed, most first-attempt designs had technical errors. These technical problems included structures that require excessive supports, were not water-tight, or were too thin to print. Due to the limited time and student-teacher ratio, most designs were limited to simple geometric forms with minimal modifications. However, students who had prior experience in working with 3D design were able to resolve more complicated engineering problems and challenged themselves to create complex forms that had no technical errors. The idea of functional design was thus approached from various angles (Figure 1).

Figure 1. Some examples of student portfolios.



There were three critique sessions for each project. Students presented their ideas to peers at the research and development, 2D sketches, and 3D mock-ups stages to share problem-solving processes (Dannels, 2005). By sharing their trial and error processes, students learned about various aesthetic and engineering issues encountered in the process of turning designs into functional objects. Students found that illustrating ideas using various visual means, from hand sketches, to CAD drawings, to 3D-rendered models, were effective. Instead of using a solely instruction-based approach, student-led discussion was encouraged, and each presenting student had to respond to comments from their peer group (Orr et al. 2014).

In sum, the produced artifacts, self-reported design processes, and class observations all showed outstanding student progress as compared to students from the previous year who only used traditional handmade processes to visualize and produce designs and objects. The pilot class led to notable improvements in student understanding of the engineering aspects of the design and fabrication processes in professional design practices, as well as student improvements in sophistication in presenting ideas and higher student motivation to experiment through trial-and-error processes. The findings aligns with the benefits of maker-centered education addressed in the literature (Halverson & Sheridan, 2014; Greenhalgh, 2016; Martin, 2015).

The student survey and the university-wide general teaching evaluation also showed increased student satisfaction with the course content. Students felt that the knowledge and skills learned in this course would be very useful for their teaching practice. However, suggestions for improvements revealed a considerable number of suggested reforms to improve the learning environment and applied pedagogies. Students' responses revealed that more accessible facilities are needed and that one semester (13 weeks) is not long enough for them to become sufficiently competent with the new technologies to apply them in their teaching practices after graduation. Furthermore, students questioned the feasibility and applicability of the course

contents in K–12 settings based on their firsthand experience in learning design at the primary and secondary levels in Hong Kong.

Conclusion

This pilot study aimed to investigate effective ways to integrate digital fabrication technologies into a pre-service design education course and attempted to identify benefits and shortcomings. Overall, there was a notable improvement in students' learning outcomes and evaluations of the course content as compared to students who took a more traditional version of the class. The digital fabrication technologies expanded the scope of tools available to visualize ideas and enhanced the accuracy and sophistication of the completed 3D prototypes. The new pedagogical approach also allowed for student-led projects and peer critiques. However, despite these benefits, the survey results showed that the curriculum needs further revision to provide more in-depth skill learning sessions for students to become competent in the new technologies, and to reflect the reality of K–12 art education in Hong Kong. Insufficient facilities were another major issue raised by students.

Due to the absence of a control group within this study, the transferability of the analysis is limited. Students' prior experiences in modeling using hand construction methods and digital fabrication technologies varied widely. Also, because the given assignment guidelines were semi-open to allow students to choose their own topics, criteria for assessing the creative outcomes were subjective, although an assessment rubric was used. These limitations could therefore yield different results in further studies. The findings from this study thus suggest that more investigation is needed to develop flexible in-depth curricula which accurately reflect the availability of equipment and teachers in K–12 environments. Additionally, the potential to use design education as a cross-disciplinary subject and to apply project-based and student-centered learning approaches (Clapp et al, 2016; Hafeli et al. 2005) in design education across different topics should be further investigated.

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Critical thinking formation in the early childhood on the fairy tales' resources

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Abstract

The technology of critical thinking is used widely in pre-graduate, graduate and post-graduate education. This is due to the fact that critical thinking is disciplined, self-directed thinking (Richard Paul, 1990). This article discusses the possibility of critical thinking skills' formation in the early childhood according to educational basic principles: environmental friendliness, safety, expediency. We associate this possibility with the research of fairy tales. We assume that children form the skills of critical thinking while asking questions about fairy tales' plots, characters' behavior, causes of events, answering questions. Indeed, children like to reason, ask questions and answer them. However, we have faced two problems during the experiment: the improvement of kindergarten teachers' critical thinking skills and existence of violence in the content of tales in different editions. We have decided to train kindergarten teachers on critical thinking strategies using original fairy tales preserving their cultural message. These are popular stories of Cinderella, Sleeping Beauty, The Beauty and the Beast and others. Original tales usually contain many cruel moments: robbery, violence, murder, execution. However, original folktales have hidden cultural meanings, the rules of relations in the family and more. Changing tales, removing cruelty from them, if possible, leads mostly to the destruction of values. In this article we analyze the fairy tale of the Russian folktale "Morozko" in its original and edited forms.

Keywords: *questions, the skills of critical thinking, kindergarten teachers, fairy tales.*

Introduction

In 2016, we started working with nursery teachers of two kindergartens (total 36 people) on using elements of fairy tale therapy to create a collaborative environment among 3-5 years old children, as well as correcting their aggressive behavior. In the course of the experimental work, we have planned to train the nursery teachers to make a selection of folk tales, author's tales or independently compound fairy tales depending on the tasks of regulating relations between children or children and the nursery teachers. The experimental and control groups were determined. We began to conduct training in the experimental group, which essence was to teach nursery teachers the following types of work with a fairy tale:

- 1) expressive story or a fairy tale reading;
- 2) writing a fairy tale in a sandbox;
- 3) fingered shadow and puppet show;
- 4) staging a fairy tale involving children.

However, in the process of trainings, we have faced with the fact that nursery teachers find it difficult to recall the right tale, to find the right strategy for working with a tale, and it is almost impossible to compound own fairy tale. We came to the conclusion that it is necessary to work with nursery teachers on development of critical thinking skills for the successful implementation of the experiment. Our conclusion was based on the idea that in order to adequately assess the situations of communication with children, their emotions, judgments, actions and choose or compound fairy tales according to the problem, nursery teachers need skills of self-reflection, reflection on children, mind discipline, the ability to perceive the ideas of children. Thus, we have identified the need to work on the skills of critical thinking

of nursery teachers, since we believe that the nursery teachers who have a critical thinking culture in context of natural, ease and simultaneous interaction with children, create favorable conditions for the natural development of critical thinking skills of children, because it is known that children learn by imitation.

Method and materials

Following Richard Paul, by “critical thinking” we mean: “Critical thinking is disciplined, self-directed thinking, which exemplifies the perfections of thinking, appropriate to a particular mode or domain of thought. It comes in two forms. If disciplined to serve the interests of a particular individual or group, to be the exclusion of other relevant persons and groups, it is a sophistic or weak sense. Critical thinking if disciplined to take into account the interests of diverse persons or groups; it is fair-minded or strong sense critical thinking” [1, p.4]. This definition enables us to distinguish the signs of strong critical thinking: disciplined directional thinking, which takes into account the interests of different people and groups. In fact, it is about the intention and ability of objective perception, integration and systematization of information coming from different sources, in particular, people. Such phenomenon is possible if the subjects are united by interest on the topic, object and subject of communication.

The communication as any activity has an aim, which is manifested through the interlocutors' questions to each other. In his book “Critical Thinking: What Every Person to Survive in a Rapidly Changing World” Richard Paul calls the so-called questions of Socrates, one of the founders of rhetoric and a great master of discussion, as one of the methods of forming critical thinking. Richard Paul believes that “Socratic discussion allows students to develop and evaluate their thinking in comparison to that of other students. Since inevitably students respond to Socratic questions within their own points of view, the discussion inevitably becomes multi-dimensional” and results in the following taxonomy of Socratic questions: “ ... questions of clarification, questions that probe assumptions, questions that probe reasons and evidence, questions about viewpoints or perspectives, questions that probe implications and consequences, and questions about the question” [1, p.10]. It is known that there is a system of questions used in school practice along with the Socratic questions. In the article of the Russian scientist, teacher Zagashev I.O, it is described the experience of forming critical thinking in one of the Russian schools with the help of a system of questions developing the thinking skills of pupils on B. Bloom's taxonomy, as he called “Bloom Camomile”.

This technique is a flower with six different colored petals, which comprise questions. The scientist discovered the following problem in the course of working on the questions: “... we were disappointed: it was often difficult to clearly and unambiguously determine which type this or that question belongs to according to B. Bloom's taxonomy” [2]. As a result, the shape of the chamomile was preserved, and the questions were borrowed “... from the speech of the American colleagues James and Carol Beers” [2]. We have decided to use these questions to conduct classes with kindergarten nursery teachers on the formation of critical thinking, since the questions from “Bloom Camomile” are focused on the learning process: simple questions (enable to reveal knowledge of factual material, knowledge of the text, etc.); clarifying questions (enable to clarify the course of thoughts of the interlocutor, correctly understand the ideas); interpretative questions are aimed at clarifying cause-effect relationship; creative questions are related to the assumptions such as how events would develop under different conditions; evaluation questions are aimed at elucidating the criteria, grounds for evaluative judgments of the interlocutor; practical questions are connected with clarifying the applied (practical) value of knowledge.

Therefore, one of the methodological foundations of the formation and development of critical thinking skills among kindergarten nursery teachers was the system of questions from “Bloom Camomile” technique. Next, we analyzed the text of “Morozko” folk tale (1857) as the material [3, p.113-115]. It should be noted that there are two versions of “Morozko” in Afanasyev's collection of fairy tales. We will consider a more complete version. At the beginning of the tale, the relationship between the main

characters is described: the old man, the old woman, a daughter of the old man, two daughters of the old woman. The old woman does not like the old man's daughter, since she is her stepdaughter. The old woman is strict with her, she forces her to work hard, moreover she does not praise her for well-done job. However, she loves her own daughters, cares of them, gives them opportunity to rest, praises for their job. The old man is afraid of the old woman, because he is physically weak. Such situation is described at the beginning of the fairy tale. Then the following events happen. The old woman decided to marry her stepdaughter. The old man agreed until he found out that the old woman wanted to give his daughter in marriage with Morozko. Morozko means “frost”. In fact, the old woman sent her stepdaughter to certain death. Early in the frosty morning, the old man drove his daughter into the forest and left her there. He did everything as the old woman required. He only said to his daughter: “Be soft with Morozko”. In other words, he advised his daughter to show meekness.

And this is a very important element of the fairy tale. The fairy tale was written by Afanasyev in 1875 at the pre-revolutionary period of tsarist Russia, when the values of Orthodox Christianity were observed throughout the country. Meekness is one of the Christian virtues. When Morozko came and froze the girl, she behaved meekly and politely answered all his questions. As a result, Morozko took pity, warmed and gave her expensive gifts, horses and sleighs, and the old man's daughter returned to the house as a rich and beautiful bride, and then married a good man. What happened to the old woman and her daughters? Seeing that her stepdaughter alive and became even rich, the old woman told the old man to take her daughters into the forest. The old man took them silently and said nothing. Girls as usual got angry with each other, and when Morozko appeared, they behaved rudely with him, being impatient with the cold. In the end, they were frozen up. Next morning the sleigh brought two frozen bodies to the old woman. This is the storyline of the fairy tale.

The nursery teachers were suggested to ask questions to each other based on “Bloom Camomiles” questions to help better understand the meaning of the fairy tale. As a result, it was found that the interpretative, creative and practical questions were compiled by the participants of the training relatively easy, and simple, precise, evaluation questions were the same. The questions on “Morozko” compound by the listeners – the kindergarten nursery teachers are presented in the Table 1 below.

Table 1. Questions to “Morozko” fairy tale

No.	«Bloom Camomile» question type	Question	Total number of listeners' answers
1	Simple questions	Who wrote the fairy tale? (in fact, the question is incorrect, because it's a folk tale) What “Morozko” fairy tale is about? Who is the main character of the fairy tale? (despite the simple questions, it is not easy to answer them)	3
2	Clarifying questions	Did I understand correctly that it was a fierce winter? Did I understand correctly that the stepmother did not like her stepdaughter? Did I understand correctly that the old man voluntarily took his daughter to the forest? Did I understand correctly that the old woman also sent her daughters to the forest?	4

3	Interpretative questions	Why is fairy tale called Morozko? Why did the stepmother not love the stepdaughter? Why did the old man left his daughter in the forest? Why did the girls not live happy together? Why did Morozko freeze the daughters of the old woman?	5
4	Creative questions	What would have happened if the old man did not take his daughter to the forest? What would have happened if the girl's mother was alive? Would she be meek? What would have happened to the girls if they did not meet Morozko? What would have happened to the stepmother's daughters if they were not taken to the forest?	5
5	Evaluation questions	Has the old man done well by listening to the old woman and taking his daughter to the forest? Why the stepdaughter is better than the stepmother's daughters?	2
6	Practical questions	How can we apply the story of the evil stepmother in our life? How can we use the advice of the old man to be meek? What message has the idea of frost and meekness? What does the tale teach us?	4

Results and discussion

In this article, we have described only a part of the training, the results of the exercise on questions formulation that develop critical thinking. As a measurement of the assignment results, we have developed the following criteria:

1. Close reading (whereby the text is understood as information in general, whether it is expressed graphically - a text, video or audio record, picture, photo, etc.). Do the simple questions help more attentive and detailed perception of the text?

2. Understanding and interpreting the meanings in the text. Moreover, questions on understanding and interpretation can relate to different semantic levels:

- 1) understanding and interpretation of characters' actions and events;
- 2) understanding and interpretation of the idea, the philosophy of the text;
- 3) understanding and interpretation of those meanings that the interlocutors see in the text.

Consequently, the interpretative questions can be asked at different stages of text discussion.

3. In our opinion, creative questions enable to understand the relativity of any idea. Unfortunately, among the questions of the listeners, there was no such option: "If the stepmother did not bring up the stepdaughter strictly, then she would not be meek?" In other words, paradoxical nature questions can be the creative ones.

4. The system of values of the interlocutor can be determined by means of evaluation questions.

5. Practical questions enable to understand the meanings conveyed by the text.

6. Clarifying questions has a great importance for establishing mutual understanding between the interlocutors. The use of clarifying questions at all stages of the discussion: from an understanding of the text contents to an understanding of the meaning, it indicates a fairly developed critical thinking, since clarification is a manifestation of attention to the process of reasoning the interlocutor.

If we examine each question of the participants, indicated in the Table from the perspective of the criteria described above, the degree of the critical thinking formation becomes evident. As for the participants, it can be said that it is necessary to pay more attention to interpretation, clarifying, creative and evaluation questions, since the questions compound by nursery teachers are formal in essence and do not contain the obvious intention of comprehending the images and meanings of the fairy tale.

Conclusion

Our experience on the formation and development of critical thinking of kindergarten teachers was considered in the article. The system of questions of the so-called “Bloom Camomile” was used as a technique for the critical thinking development. In order to interpret the results of the work on the questions, we have developed and described the criteria for evaluating the results of the application of “Bloom Camomile”. As a material for the work, the original text of “Morozko” folk fairy tale was used.

As a conclusion, the followings can be drawn: in order to form critical thinking of kindergarten teachers, it is necessary to use fairy tales with ambiguous plot and character behavior (this will allow developing deeper thinking skills, not being afraid of paradoxes), “Bloom Camomile” questions system and the criteria for evaluating the questions’ effectiveness. This allows us to determine the perspectives for further work on the critical thinking formation and development.

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Principals Attributes as determinant of Teachers Job Performance in Secondary Schools in Ekiti State, Nigeria.

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Abstract

This study investigated the principals' attributes as determinants of teachers' job performance in secondary schools in Ekiti State, Nigeria. The research adopted a descriptive design of the survey type, two research questions and two null hypotheses guided the study. The population of the study consist of 7,536 teachers and 203 principals in the public secondary schools in Ekiti state. The sample size for the study comprised of 210 respondents' which comprises of 200 teachers and 10 principals selected using simple random sampling techniques. Two research instruments titled Principals Attributes Questionnaire (PAQ) and Teachers Job Performance Questionnaire (TJPQ) were used. The instruments were validated by experts. The reliability co-efficient values of 0.72 and 0.81 were obtained respectively for the instruments. The major findings revealed that the level of principals' attributes and teachers' job performance were moderate. It was also revealed that there was significant relationship between principals' attributes and teachers' job performance in secondary schools in Ekiti State, Nigeria. It was recommended that the principals in secondary schools should be more committed to their work to prevent non-challant attitude of some teachers toward their work in the school for better job performance and principals should exhibit effective leadership style through enforcement of teachers' compliance to rules and regulations during teaching and learning activities for better job performance in the schools.

Keywords: *principals, Job performance, competence, commitment*

Introduction

Education could be regarded as an instrument for achieving socio-economic and technological growth and development of any nation. It is also seen as an instrument par-excellence and the means of developing human intellect, technical skills, character and effective citizenship for self-reliance and effective national development. A simple way of appreciating education is that it is a tool or a necessary weapon that is needed by every human being to effectively navigate this complex world (Aguba, 2009). Balogun (2010) opined that education is the light, without which, the world would be in darkness. Fabunmi (2005) defined Secondary school education as the form of education, which children receive after primary education and before the tertiary level. It is the second level of education in Nigeria headed by a school administrator called principal.

Teachers' job performance could be described as the duties performed by teachers at a given time in the school system in achieving school goals. In this regard, Adeyemi (2010) defined teachers' job performance as the ability of the teachers to combine relevant inputs for the enhancement of teaching and learning process. It implies that it is not just the school structures, facilities and teaching aids that matters, but other valuable variables are also essential in enhancing the job performance of the teachers. In Ekiti State, many parents avoid sending their wards to public secondary schools, because their products are mostly unable to read and write effectively. Among observed problems affecting the job performance of teachers in the public secondary schools in Ekiti State appears to be lack of commitment to duty, poor leadership style, indiscipline, incompetence, laziness among teachers, among others. Some teachers are deficient in the preparation of lesson notes while some of the teachers have been deficient in lesson presentation and mastery of their subject matter. Some of them cannot teach without reading from the textbooks. This was evident in series of lesson sessions watched by the virtue of the researcher as a lecturer.

The repercussion of this unwholesome attitude of some teachers has led to their poor performance in the classroom. The mass failure of students in both internal and external examinations also shows that the job performance of teachers is poor. The observed low performance of teachers could be linked with the principals' attributes. The principals attributes are the inner or personal qualities that constitute effective leadership. These attributes include a large array of characteristics such as values, character, motives, habits, traits, competencies, motives, style, behaviours, and skills. These principals' attributes influence how the principals live their lives both professionally and personally. They include commitment, competence, humility, and creativity among others.

Competence is the quality of being competent; adequate; possession of required skill, knowledge, qualification, or capacity. It was defined by Siddiqui (2007), as good, ability to complete assignment and responsibility. It is the ability in executing duties which are related to necessary activities. Competence is defined as the potential or ability of a person in handling his jobs and producing the best results. Competence is a criterion possessed by an individual which involves good behaviour, knowledge and an attitude which can present excellent results.

The present scenario in the schools revealed a lot of deficiencies and laxities particularly in areas giving directions to students, controlling the students, maintaining discipline in the classroom, preparing lesson note, teaching classes and evaluating students' progress with the use of appropriate ICT materials. Laxities occur because of the principals' inability to control the activities of the school and lack of interpersonal communication skill. Besides, Muhammad (2015) examined the Influence of Competence, Motivation, and Organisational Culture to High School Teacher Job Satisfaction and Performance. The finding proves that competence has positive and significant effect on teacher performance. It means that higher competence may increase teacher performance.

Also, Boyatzis (2008) also analyzed managerial competencies and defined competencies as an underlying characteristic of a person; that could be a motive, trait, skill, aspect of one's self-image, social role, or a body of knowledge which he or she uses. These characteristics are revealed in observable and identifiable patterns of behaviour, related to job performance and usually include knowledge, skill and abilities. The principals' inability to do their job to a satisfactory standard gives room for laziness, lateness, irregularity in preparation of lesson note, carelessness, and so on, among the teachers. In a situation where principals seem to be incompetent in managing the teachers and the school activities, the teachers' morale tend to diminish, hence, affecting their job performance negatively.

Commitment refers to a person's dedication to another person, job or organization. Soliven (2009) defines commitment more strongly as a sacred covenant, without which life is unimaginable. Commitment has always been seen and known as the driving force behind a person's success. A person who has committed himself to a task will pursue it until its completion, even if he experiences obstacles during the process. It is the principals and teachers' commitment that will drive them to rise above the school challenges. McMahon (2007) claimed that commitment is what binds an employee to the organization. Liou (2008) attributes the success of an organization to the employees' commitment and participation.

In the public secondary schools in Ekiti state, the principals who seem not to be actively committed to the daily activities of the school tend to have teachers who involved in chronic and persistent procrastination in the preparation of their lesson note, mastery of subjects matters problem, persistent lateness to school and tardiness, hence leading to poor job performance of their job. The study of Jamal (2011); Fu & Deshpande, (2014) also found that organizational commitment had a significant direct impact on job performance. This implies that principals with high level of commitment to work tend to take greater efforts to perform in the daily activities of the school and enhancing better job performance of the teachers.

The problem of the study is therefore to investigate the principals' attributes as determinants of teachers' job performance.

Purpose of the study

The purpose of this study is to examine principals' attributes as determinants of teachers' job performances in secondary schools in Ekiti State. It is also to investigate the relationship between principals' commitment to work, competence and teachers job performance.

Research Question

1. What is the level of principals' attributes on the job performance of teachers in secondary schools in Ekiti?
2. What is the level of teachers' job performance in secondary schools in Ekiti?

Research Hypotheses

1. There is no significant relationship between principals' attributes and teachers job performance.
2. There is no significant relationship between principals' commitment to work and teachers job performance in secondary schools in Ekiti state.
3. There is no significant relationship between principals' competence and teachers job performance.

Methodology

The study adopted a descriptive design of the survey type. Survey design is appropriate for this study because it focuses on the opinions of the teachers on the principals' attributes as a determinant of teachers' job performance in secondary schools in Ekiti state.

The sample for this study consisted of 210 respondents made up of 200 teachers and 10 principals selected from 5 public secondary schools in Ekiti state. The sample was selected using multistage sampling procedure.

The instruments used to collect data for the study were two sets of questionnaire titled Principals Attributes Questionnaire (PAQ) and Teachers Job Performance Questionnaire (TJPQ). They were made up of section A and B. Section A consisted of teachers' information and Section B consisted of 10 items answered by the respondents.

Both face and content validity of the instruments were established by giving it to experts. Test-retest method of reliability was used to determine the reliability co-efficient and a co-efficient of 0.71 and 0.82 were obtained respectively.

The research questions were answered using frequency count and percentage, while, hypotheses 1-2 were analysed using Pearson Product Moment Correlation Analysis. All the hypotheses were tested at 0.05 level of significant.

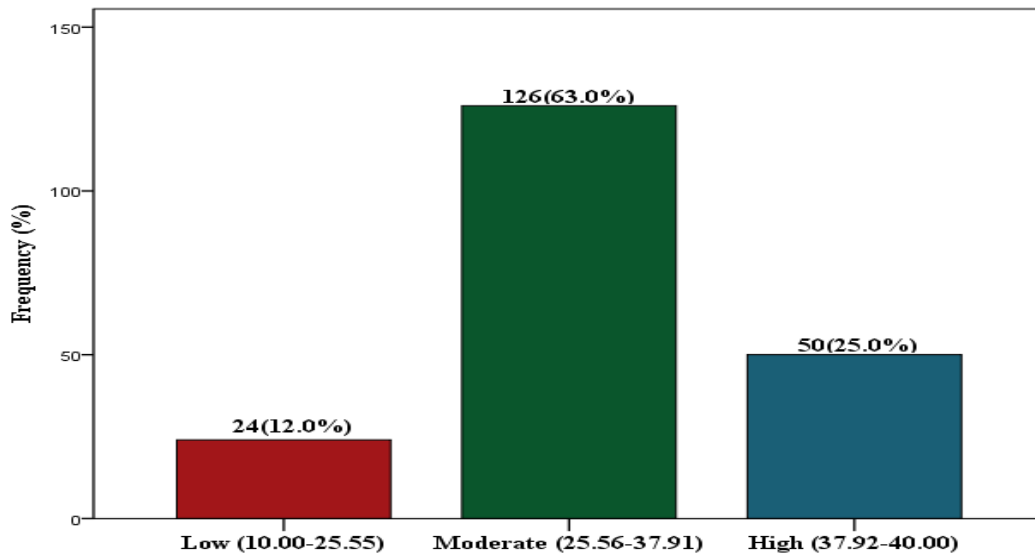
Results and Discussion

Research Question 1: What is the level of principals' attributes on the job performance of teachers in secondary schools in Ekiti?

Table 1: Level of principals' attributes on the job performance of teachers in secondary schools in Ekiti

Levels of Principal attributes	Frequency	Percentage
Low (10.00 – 25.53)	24	12.0
Moderate (25.54 – 37.93)	126	63.0
High (37.94 – 40.00)	50	25.0
Total	200	100.0

Figure 1: Level of principals’ attributes on the job performance of teachers in secondary schools in Ekiti



Level of principals’ attributes in secondary schools in Ekiti State.

Table 1 result showed that out of the 200 respondents sampled, 24 representing 12.0% rated their principals as having low level of attributes. Those who rated their principals as having moderate level were 126 representing 63% while the rest of the respondents, 50 (25%) of them rated their principals as having high level of attributes. This showed that the level of principals’ attributes in secondary schools in Ekiti State is moderate.

Research question 2: What is the level of teachers’ job performance in secondary schools in Ekiti state?

Table 2: Level of teacher’s job performance in secondary schools in Ekiti State

Levels of teachers’ job performance	Frequency	Percentage
Low (6.00 – 20.00)	20	10.0
Moderate (21.00 – 23.82)	140	70.0
High (23.90 – 24.00)	40	20.0
Total	200	100.0

Figure 2: Level of principals’ attribute domain on Job performance of secondary school teachers in Ekiti State

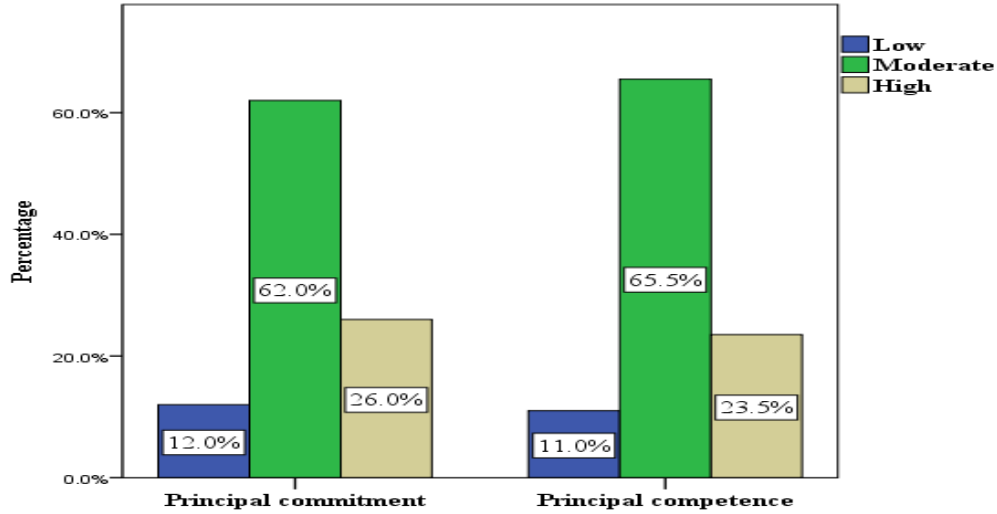


Table 2 result showed that out of the 200 respondents sampled, 20 representing 10.0% rated their teachers as having low level of job performance. Those who rated their teachers as having moderate level of job performance were 140 representing 70% while the rest of the respondents, 40 (20%) of them rated their principals as having high level of job performance. This showed that the level of teachers' job performance in secondary schools in Ekiti State is moderate.

Research Hypothesis 1:

There is no significance relationship between principals' attributes and teachers job performance in secondary schools in Ekiti state.

Table 3: Pearson's Product Moment Correlation showing Principal attributes and teacher job performance

Variables	No of schools	Mean	SD	r-cal	r-tab
Principal attributes	10	31.73	6.2	0.732*	0.237
Teacher job performance	10	22.90	1.9		

* $p < 0.05$

Table 3 showed that r-cal (0.732) is greater than r-table (0.237) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is a significant relationship between principals' attributes and teachers job performance.

Hypothesis 2

There is no significant relationship between principals' commitment to work and teachers job performance in secondary schools in Ekiti state.

Table 4: Pearson's Product Moment Correlation showing Principal commitment and teacher job performance

<i>Variables</i>	<i>No of schools</i>	<i>Mean</i>	<i>SD</i>	r-Cal	r-tab
Principal commitment	10	16.09	3.2	0.831*	0.328
Teacher job performance	10	22.90	1.9		

* $p < 0.05$

Table 4 showed that r_{Cal} (0.831) is greater than r_{table} (0.328) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is a significant relationship between principals' commitment and teachers job performance.

Hypothesis 3:

There is no significant relationship between principals' competence and teachers job performance.

Table 5: Pearson's Product Moment Correlation showing Principal competence and teacher job performance

<i>Variables</i>	<i>No of schools</i>	<i>Mean</i>	<i>SD</i>	r-Cal	r-tab
Principal competence	10	15.64	3.1	0.638*	0.237
Teacher job performance	10	22.90	1.9		

* $p < 0.05$

Table 5 showed that r_{Cal} (0.638) is greater than r_{table} (0.237) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is a significant relationship between principals' competence and teachers job performance.

Discussion

The findings showed that the level of principals' attributes in secondary schools in Ekiti State was moderate. It implies that principals' attributes (principals' commitment to work and competence) are good enough to enhance the job performance of teachers. The result also showed the level of teachers' job performance in Ekiti State was moderate. This implies that teachers are doing well in their curricular and extra curricula activities. When the principals who are the leaders of the schools have good attributes and make effective use of their attributes in the schools, good job performance of the teachers can also be guaranteed. It was revealed that there is significant relationship between principals' attributes and teachers job performance such as commitment to the school works, and competence. What could be responsible for this finding is the fact that the principals who exhibited good attributes in term of great commitment to the school works, competent in decision making in the school can encourage the teachers to perform well in their daily activities in the school, thereby improving or enhancing their job performance

The result showed that there was significant relationship between principals' commitment to work and teachers job performance. This, by implication means that if the principals, who are the leaders of the schools are actively committed to their daily activities in the schools, teachers job performance will be enhanced. This finding is a confirmation of the claims made by Allen and Myers (2007) that effective commitment is significantly related to job performance.

It was also revealed that there was significant relationship between principals' competence and teachers job performance. It implies that principals' competence influences the job performance of the teachers. It equally means that for better job performance of teachers to be enhanced, the principals' competence is of great importance. This finding resulted from the fact that the teachers believed that if the principals are competent in their work, it will promote good job performance of the teachers and academic performance of the students as well. The finding also showed that principals who focus on the development of the teachers and has the attitude and knowledge to handle his works and produce good results will obtain higher job performance of the teachers than those who do not emphasize on this aspect. However, this finding is in line with Awan and Mahmood's (2010) findings that in bureaucratic organizational setting, employees' job performance tends to be higher when the leader focuses on setting the next course of action for the future.

Conclusion

Based on the findings of this study, it was concluded that principals' attributes and teachers' job performance of secondary school were good. Principals' attributes variables such as commitment to work and competence on the job, determined the job performance of teachers in secondary school in Ekiti State; there is need for improvement on them for better job performance and achievements.

Recommendations

Based on the findings of the study, the following recommendations were made;

1. Principals in secondary schools should be more committed to the school work to prevent the non-challant attitude of some teachers in carrying out their daily activities in the school for better job performance.
2. Principals should endeavour to be more competent in effective management of the schools, as this will enhance the job performance of the teachers.
3. The teachers should always be more committed to their daily activities in the school by disengaging themselves completely from other inadequacies like engagement in personal businesses in the school.

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Strategies for Improving Online Course Interaction: Offering Possibilities

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Abstract

The purpose of this presentation is to highlight strategies utilized by Old Dominion University's Center for Learning and Teaching and distance learning program to develop online interactive learning activities that promote student engagement. The incorporation of multimedia technologies within higher education has had a profound effect on how students engage within their online learning platforms. ODU Online, like many other higher education institutions, has adopted several strategies to effectively engage students through programming design and software implementation. This presentation will showcase various examples of online interactive activities, which incorporate both hard-coded programming and eLearning software tools that ODU faculty members have utilized to encourage active learning. Categories for interactive activities include lab simulations, alternative assessment design, and gamification. Furthermore, researchers will provide some best practices based on the concept of social learning and previous pedagogical theorems that have been incorporated into ODU's Center for Learning and Teaching mission to encourage active engagement.

Introduction

The incorporation of multimedia technologies within higher education has had a profound effect on how students engage within their online learning platforms. In 2011, over 6.7 million students took one or more online courses in one fall semester (Allen & Seaman 2013). Statistics like this have played a role in the increase of learning-based software applications and learning management systems. The growth of online education is attributed to technological advancements and has led to an increase in companies who specialize in learning application development. The primary premise for this was to make college-level coursework more accessible for a workforce that could not attend a traditionally scheduled college course. However, engaging distance learning students can be a challenge. According to Andersson and Reimers (2010), the attrition rate of students in an online environment is 45 percent or more, while traditional f2f classes have an attrition rate of 5-25 percent instead. (p.28) As a means of increasing retention, universities like Old Dominion University, are including more interactive activities within their online course designs.

For over thirty years, Old Dominion University has been an active partner in increasing awareness of distance education within the higher education scope. One of its earliest adaptations was satellite delivery as a method of growing its distance learning community both locally and globally. This delivery method was called TELETECHNET and provided a temporary solution to bringing the classroom to distance learning students via satellite broadcast of live traditional f2f courses. With the advancement of videoconferencing systems and voice over internet protocol, ODU's Office of Distance Learning adopted the internet format as a more efficient method of classroom delivery and rebranded to form ODU Online in 2013. Today, ODU Online offers online courses on various platforms, to include synchronous, asynchronous, and portable media. This research will evaluate interactive activities that have been incorporated into all of these formats as a method of engagement and active learning.

Methodology

This study explores the use of different forms of multimedia technologies within the ODU Online course development process to build interactive activities in an effort to promote engagement and encourage active learning. A total of five types of interactive activities were selected for this showcase: lab simulation, JavaScript assessments, gamification design, and STEM modeling. All activities were taken from active online course production and had already been previously utilized within course development. Activity samples were taken from both online undergraduate and graduate-level courses and have been delivered on Blackboard and ODU's Personal Learning Environment – a content delivery management system developed and managed by ODU's Center for Learning and Teaching since 1999.

Discussion

In 1999, ODU's Center for Learning and Teaching founded the Personal Learning Environment, an external content delivery management system, as a solution for a more user-friendly interface. The PLE affords faculty members the opportunity to present instructional materials by incorporating design flexibility and content chunkingⁱ. Instructional content is managed through a group of multivariate assets, which can include images, text, animated videos, studio-produced videos, JavaScript/HTML programming, and software-based interactive activities. The flexibility provided by the PLE continues to provide course developers with various options on promoting student engagement and course interaction.

In a 21st century learner-centered societyⁱⁱ, curriculum development is evolving across digital spaces. A traditional classroom curriculum has a fragmented methodology of instruction that focuses on the teacher instructing and guiding how the student absorbs the content. Online courses remove the immediacy of teacher guidance and rely on self-paced active learning. Therefore, placing traditional-based instructional content on a learning management system platform is not enough of a conversion. Online curriculum development should be designed to motivate the student to engage actively through a combination of images, text, multimedia sources, and programming strategy. The PLE is the hub for several content delivery strategies and formats. A few of the many interactive formats that are being utilized include JavaScript-based assessment activities, lab simulations, and software-based gaming.

The alternative assessments that were built via JavaScript programming were adopted as a way to address the issue of student active learning prior to a formative assessment. With the understanding that the online learning community is student-centered and outcome-based, course developers and instructional designers realized that waiting for a standardized assessment, as with an f2f classroom, would not be an effective method of learning for the online learner. Therefore, instructional technologists developed a series of JavaScript-based assessments to incorporate within the PLE. The assessments that were often selected by course developers were then upgraded in design to enhance the user experience. These assessments varied in delivery from true/false, multiple choice, matching, short answer, drag/drop, identification, and fill in the blank, and step-by-step solution reveal. All assessments provide the flexibility of incorporating images within them through an asset management system.

Software application integration continues to play a role in online course development as developers find alternative ways to engage and promote active learning. The inclusion of software applications such as Adobe Captivate, and Articulate Storyline continue to serve as dominant resources within the educational technology community. Instructional technologists and designers with ODU Online are combining software application programs with hard coding to develop new interactive designs. Activities provide pacing and forward-thinking strategies to not only encourage engagement, but to provide the online learner with a dynamic experience.

Conclusions

The purpose of this study is to both showcase and highlight the variety of interactive activities that are being used in online course development at Old Dominion University in order to encourage active learning and engagement. The examples that will be demonstrated during the presentation meet two things in parallel - one is the design perspectives from the instructor's point of view, and the other one is to integrate (learners) learning objectives. Attendees will be able to get some design perspectives of developing their online (or in-class) courses as well. Furthermore, they will be able to compare side-by-side how the showcased examples are offering various possibilities. Although there are no analytics and statistics to measure the level of effectiveness for each course during the time of presentation (this part of the research is still in progress), all interactive activities were developed based around the active learning theory and 21st century learner concept. Future research methods will be to examine engagement through programming analytics and student response and/or feedback.

Endnotes

¹ "Content chunking" is a common strategy used in online learning platforms to break up content into shorter pieces to make the information easier to remember or retain.

² The concept of the "21st Century Learner" embraces the understanding of how today's students produce, digest, and evaluate content, which often times is with the aid of technological devices and virtual tools.

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Turning Linux into an Instructional Operating System

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Abstract

Both, the curriculum proposal for degrees related to Computer Science from the two main professional associations worldwide in information and communication technologies, and the curricula defined by most universities dedicate a considerable number of hours to cover Operating Systems (OS) concepts. Nevertheless, practical teaching of OS at undergraduate level is currently a controversial issue. Some universities consider the use of a real OS means a too steep learning curve and its complexity prevents an appropriate learning of main concepts. Other universities consider that the use of an educational OS or the development of a simplified one from scratch are activities too far from reality students will encounter in their professional activity.

This paper presents a solution adopted at the University of Vigo (Spain), that tries to get the advantages of both approaches and avoid their drawbacks. It is based on: (i) to combine small lab practices in order to acquire theoretical concepts and a medium sized project to deal with the complexity of a real OS; and (ii) a new laboratory environment designed for teaching OS, that greatly facilitates the development of applications to test features both provided by Linux and developed by students, minimizing effort required to create testing scenarios, and hiding, as far as necessary, unimportant OS details. We also show the results of the evaluation process carried out during last academic years.

Introduction

Since the advent of the first computers, shortly before the outbreak of the Second World War, and the first operating system (hereinafter, OS) in the early 1950's, OSs has been constantly evolving to adapt to ongoing changes in computing systems and users' requirements. Current state of the OSs is a result of the significant innovations that have emerged in electronic components technologies, computers, software development techniques and also of the social and economic impact of these innovations. There is broad agreement that an OS has three main goals: enhanced usability for the user, efficient resources usage and capacity to evolve (Silberschatz et al., 2010). The hard conciliation of these three objectives has made their weighting change over time in terms of two highly shifting factors: cost of hardware technology and users' needs and demands.

One of the fundamental targets of any degree related to information and communication technologies (hereinafter, ICT) is appropriate acquisition of concepts concerning the design of OSs. Thus, the two most prestigious professional associations worldwide in this field, the Association for Computing Machinery (ACM) and the IEEE Computer Society (IEEE-CS), published an extensive report (ACM/IEEE, 2008) which organizes the curriculum for a degree in Computer Science in 14 areas of expertise. The fact that this report devotes one of these 14 areas to OSs is a good evidence of the importance given to this knowledge in ICT curricula. We find a similar situation in the curriculum defined by these organisms for a degree in Computer Engineering, which also includes a load to the teaching of OSs, with a minimum of 20 hours.

Usually, teaching of concepts belonging to these areas of knowledge in on-campus degrees is organized into a series of lectures devoted to presentation of theoretical concepts. Since the teachings related to engineering are strongly oriented towards problem solving, i.e. how to translate theoretical concepts learned by students to practical situations similar to those they will find in their professional activity, some classes are also spent on problem solving, as a necessary complement to lectures with the aim of

improving students' ability to solve problems of practical nature. Moreover, laboratory classes are also a complement to lectures to ensure a true assimilation and permanent consolidation of contents, i.e. a stabilization of the acquired knowledge. This organization of teaching is in line with the recommendations of ACM and IEEE-CS courses that remark “*courses that cover this area will typically include a laboratory component to enable students to experiment with operating systems*”, since laboratory classes are essential part in teaching engineering and technology related degrees, allowing students to observe the real operation of existing devices and also to experiment introducing changes to modify their operation. This practical teaching will allow effective application of acquired theoretical knowledge and also further development of both technical skills (design, implementation, debugging and testing, or documentation) and cross-curricular skills (group work, communication competence, and so on).

Regarding the contents of laboratory hours for their OSs courses, many universities just teach students to develop software at application-level that uses some services of the chosen OS kernel via system calls. Another more realistic and powerful approach is to involve students in modifying the source code of an OS kernel in order to add some new functionality or modify the behavior of an existing one. The first approach is followed at many universities for its simplicity of implementation as it only requires a standard computer laboratory equipped with computers running any operating system that provides a proper system calls interface (typically Linux) and a programming environment. However, this laboratory organization only allows students to observe the external operation of the system without providing an approximate idea of the structure or complexity of an OS, because it does not allow students to go into this topic in depth. This important restriction has also been identified in the ACM and IEEE-CS curriculum proposal when they say that “*the (laboratory) topics address both the use of operating systems (externals) and their design and implementation (internals)*”, and then assert that: “*Studying internal design has relevance in such diverse areas as dependable programming, algorithm design and implementation, modern device development, building virtual environments, caching material across the web, building secure and safe systems, network management, and many others.*” Consequently, they emphasize the importance of a laboratory associated with this discipline, which should not only address the use of OSs (teachings often covered by previous laboratories of programming concepts) but should also cover aspects related to their design and implementation.

The purpose of this paper is to present and evaluate a new laboratory environment designed for teaching OS concepts, which allows the realization of more realistic practices since it involves modifications to the OS kernel source code, avoiding main problems regarding the use of real operating systems. From this background, the remainder of this paper is organized in 4 sections: In Section 2 we analyze the environments for practical teaching of operating systems used in top universities. In Section 3 we present the configuration of the environment we propose as an alternative to those introduced in the previous section, as well as those we believe are the main advantages of this environment. Section 4 describes the evaluation process we have performed during one academic year, and the main conclusions drawn from it. Finally, in Section 5 we present the main conclusions we have obtained from this work, as well as the main directions for future work we have planned.

State of the art

The large number of existing universities and the frequency which they usually update or change their curricula prevents us from performing a comprehensive analysis of the current curricula for Computer Science. For this reason, we are unable to conduct a thorough analysis about the current state of operating systems lectures and practices, or about the various work environments used in their laboratories. As an alternative to this approach, we chose to analyze only these teachings in the worldwide top universities in Computer Science.

From the analysis of the design of laboratory teaching for OSs courses at the top ten universities in the Academic Ranking of World Universities in Computer Science (Shanghai Jiao Tong University, 2017), we can conclude that both organization of practices and laboratory environments are highly heterogeneous. Thus, Stanford University students have to develop different parts of an operating system, called *Pintos*,

using a free PC hardware emulator as test environment, which can be either Bochs (Lawton, 1996) or QEMU (Bellard, 2005). Meanwhile, students at the Massachusetts Institute of Technology (MIT) incrementally develop its own operating system from source code skeletons. The resulting OS is called *jos* and runs at user level. They also use QEMU and Bochs emulators, although the final results are tested on a real PC. Moreover, students at the University of Berkeley develop several typical elements of an OS at user-level. In Princeton University students develop a full OS from scratch, testing it on the Bochs emulator and finally making a real test on a PC using USB memory devices with boot code. Carnegie Mellon University also chooses the development of a full mini-OS using the Simics (Magnusson et al., 2002) commercial hardware simulator. At Cornell University students add some functionalities to an initial version of code of an educational OS called *Portos* (Atkin & Siner, 2002) that runs at user level on Microsoft Windows. The University of Southern California also selects the option of completing a basic OS, since students have to add different elements to an educational OS named *Nachos*. The University of Texas chooses to implement code to provide some functionalities such as threads, synchronization, file systems, etc... at user level by using libraries that perform an abstraction of these functionalities. Harvard University uses its own learning environment, consisting of a machine simulator named System/161 (MIPS) and a simplified OS named *OS161*, for which students develop some elements that are not yet implemented. Finally, the University of Toronto follows the same approach as Harvard University, using the same environment.

In short, if we look at strategies and tools adopted by leading universities in the field of Computer Science, we can see they are very diverse. Regarding strategies, they can be classified into two main groups: (i) development of some functionalities for an already existing OS, simplified or not (followed by 7 universities in the list); and (ii) development of an entire OS from scratch or from a basic skeleton of code provided to students (followed by the other 3 universities in the list). Under the first option there are two possibilities, the first is to use a real OS and the second is to use an OS specifically designed for educational purposes. Although many universities choose to use OSs designed for educational purposes because it is easier to design and develop laboratory practices, this approach also has drawbacks, mainly due to limitations on learning derived from experimentation with non-real environments and therefore, detached from reality students will encounter in their professional activity. These limitations are mainly motivated by the enormous differences between working with the source code of a real system, designed under constraints of space efficiency and resource consumption requirements, and a source code designed and structured for educational purposes only. Regarding the option that students develop their own OS, while can provide a thorough understanding of the internals of an operating system, we believe that due to the limited time available, the code developed by students will be fairly away from code of a real OS. However, any of those options provides a real working environment and therefore its pedagogical value is beyond doubt.

In our case, since we have only 42 hours of practical teaching in our two courses related to teaching of OSs concepts and technologies, which correspond to 150 hours of student work, the approach of developing an OS from scratch is unfeasible since such system would necessarily be very simple, preventing students from evaluating and assimilating the scope and complexity of a real OS. Moreover, another of our main constraints is that we want to use an open development environment that is able to run on a medium performance PC with no special hardware, since we aim to ensure students can make or continue their work outside the laboratory.

A Linux-based laboratory environment

The laboratory hours allocated to operating systems teachings are intended primarily to consolidate theoretical knowledge about core concepts of this discipline developed at lectures, through experimentation with the implementation of an OS. This will let us discuss existing solutions and needs associated with practical deployments which on many occasions modify the wording of the theoretical concepts in order to achieve efficient practical implementations. As mentioned above, one of our primary requirements for the design of this laboratory was that students would be able to continue their work

outside the school facilities. It was therefore necessary that the required equipment was not too expensive, and the required software was not licensed. Since all students usually have a medium-performance personal computer, the above requirement reduces to avoid the purchase of software licenses by students. With these constraints as a general framework for laboratory practices, we have chosen to use a combination of Linux Operating System and Java development framework for the following reasons: (i) it is an open source and freely modifiable framework; (ii) it has a relatively small size and an extremely modular architecture, making it possible to know in depth some aspects of its design in the limited time available; (iii) they are elements which are well-documented with many discussion forums on the Internet; (iv) we can write applications in Java using a set of powerful APIs that enable us to solve problems in areas such as, for example, concurrent processes; and, (v) it becomes an attractive proposal for students due to the impact of Linux and Java on the market. With this configuration, each workplace in the laboratory will just consist of a computer capable of running the Java framework ad a virtual machine environment, like VirtualBox. With these elements, we define a complete environment for the development of OS laboratory practices, which forms the basis of our proposal.

The main task for students is to modify the Linux kernel source code and recompile it. But, to test, debug, evaluate, and eventually use the new features developed at kernel level, such as a new system call or a new algorithm -CPU scheduling, virtual memory management, ...- they usually need to code some application-level software. If this step is performed by coding applications directly on the OS, our experience shows that usually the amount of work to be done at the application level far exceeds that is used for modifying the kernel, especially if we want to process monitored data and display them in appropriate formats for their interpretation using, for example, a graphical format, instead of showing raw data. This situation is not desirable, because we consider that tasks at kernel level are the key element of a practice, since they comprise the concepts that students should learn.

We believe this is one of the biggest advantages of using Java in a laboratory for OSs teaching, allowing us to configure a learning environment where students can work at a low level by modifying a real OS such as Linux, focusing on this work as they can use high-level functionalities provided by Java libraries for application programming and development, minimizing effort and time required to create monitoring and test scenarios.

However, in order to take full advantage of the opportunities provided by the use of both, Linux and Java in the laboratory and to make as easy as possible the development of Java applications using both features provided by Linux and features students develop inside it, we decided to define and implement a framework for Java consisting of a set of elements aimed at OS teaching, which provides a range of additional services and features. This framework is structured around three main elements:

- A new Java package which makes all Linux system calls visible to Java applications.
- A Java package that provides a set of stubs which allows to use from Java the new Linux system calls developed by students.
- A library of widgets designed to facilitate the development of Java applications aimed at teaching and experimenting with OSs, which we call *eduwidjets*.

This last element is the most novel one. In order to expand the capabilities of our educational environment we defined a set of predesigned educational widgets focused on operating systems teaching and provided as a Java library. A widget is essentially a user interface element that supports some interaction between users and an application. Typical examples are buttons, text boxes, menus, etc. The widgets are basically characterized by two elements: its appearance and its behavior. Thus, our goal is to provide a set of widgets in our environment with associated behaviors related to some features of the Linux OS.

So, these widgets will be used to build applications that need access to some of the available functionalities at the OS level, either already existing ones or to be defined during the development of practices. Their use, as any other widget, greatly facilitates the application development process, allowing us to define graphical interfaces as a simple combination of these widgets and declaring its characteristics in an XML definition file, and therefore allowing us to separate logical components and look elements in our applications. Furthermore, because the widgets already have an associated behavior (in this case monitor or modify the behavior of some element of the OS), to access the functionalities provided by a

widget from an application is as simple as including the widget as part of its graphical interface. This is a significant step in our goal that students spend as little time as possible developing software at the application level for test or evaluation purposes, and focus on work at OS kernel level, which is the main objective of the subject. Also, these *eduwidgets* allows us to extend the possibilities for defining practices that can be proposed to students. Thus, we could define the following types of new practices:

- Demonstration: focus on the development of small GUI using the provided *eduwidgets*. For example, a button that enables/disables virtual memory encapsulated in an interface that allows to run multiple instances of an application, in order to observe how the number of concurrent instances in the system is limited when we disable virtual memory management. This type of practices is typically carried out individually for each student to improve their knowledge according to their needs.
- Adaptation: The objective of these practices is to add some functionality to one of the *eduwidgets* provided. For example, adding a new CPU scheduling algorithm to an *eduwidget* given as a combo with a set of disciplines already implemented. These practices are oriented to small groups (2 or 3 students) to encourage teamwork and to address adaptations of medium complexity, through collaborative work.
- Development: the objective is to design and develop a full set of *eduwidgets* related to some component of an OS. For example, a file system interface. These practices are designed to be carried out in medium/large groups (5-8 students) as long-term projects.

The predesigned *eduwidgets* in our lab environment cover the main elements of the OS: CPU scheduling, memory management, file system management, input/output management and inter-process communication and synchronization. The full description of all predesigned *eduwidgets*, comprising a total of 37, goes beyond the scope of this article.

Evaluation

In the academic year 2016/17 we used for first time the environment described in this article in our OS course. In order to assess the experience of using the new environment in teaching, we compare the use of the proposed environment in the new curriculum, and practices in the old curriculum, based on the use of simulators and high-level libraries to emulate the behavior of some parts of the operating system without any direct work with a real operating system in. Our goal has been to study their influence on three main aspects: (i) influence of the use of each environment on the academic performance of students; (ii) perception of the subject by students; and (iii) fulfillment of expectations of students regarding the subject.

A total of 31 students (28 men and 3 women) aged between 20 and 26 years ($M=21.62$, $SD=1.47$) were involved in the analysis of the new subject. All of them were undergraduate students enrolled in the Bachelor of Telecommunications Engineering of the University of Vigo. On the other hand, the analysis of the old subject considered the data and surveys of a total of 68 students (59 men and 9 women) aged between 20 and 29 years ($M=22.89$, $SD=2.03$). All of them were students in Telecommunications Engineering from the University of Vigo in a previous course. The three aspects to analyze mentioned above have been evaluated upon completion of the teaching period for both subjects. The first aspect was evaluated through an analysis of the academic results obtained by the students, and the other two aspects by conducting student surveys. Thus, academic performance data were obtained directly from the students' academic records, while data for the other two analyses were obtained using a questionnaire containing 19 questions that participants completed at the end of the course, which included, among others, questions related to the two aspects we wanted to analyze.

Moreover, prior to the start of the course we conducted a pre-test of ten multiple-choice questions related to the knowledge to be acquired in the practical part of the subject to check the homogeneity of the two sets of students. This analysis led us to exclude two students from the old subject set, since they exceeded the score of 5 out of 10 in the test conducted, which was considered a baseline knowledge high enough to exclude them from the sample. The average score of this pre-test was 1.24 ($SD=0.83$) for students in the new course and 1.32 ($SD=0.97$) for the old subject, after the exclusion of the two students cited. The

Levene's homogeneity test indicates that the variance results are identical ($p = 0.17$) and an ANOVA test on the results revealed no significant difference between the two sets of students.

Experiment 1: Academic performance

One factor of clear interest is the analysis of the academic results achieved by students in each of the subjects. These results can be easily measured, because the subjects are regulated ones and there exists a formal procedure for their evaluation. The results obtained were:

Course	Enrolled	Final exam	Pass(≥ 5.0)	Grade:M	Grade:SD	Pass/Final exam	Pass/Enrolled
Old program	68	47	38	5.24	1.60	0.81	0.56
New program	31	29	25	5.43	1.57	0.86	0.81

From the results shown in the table, we can conclude that there have been no significant differences in the scores of students who have each subject. However, we observed a clear difference in the number of students who have taken the course to the end, because in the old course there has been a dropout rate of 30.88%, compared to 6.45% in the subject of the new curriculum. This data indicates that the new approach to the subject has been more attractive to students, so they chose to abandon this course in a significantly lower percentage when they have to give up some subject raised by excessive workload. This conclusion will be reinforced by some of the results obtained in the other two experiments presented below.

Experiment 2: Subject perception

In this experiment we analyzed the responses of the test that is performed at the end of the course directly related the students' perception of the subject, both with regard to contents and the methodology used. The total number of students who participated in the survey, which takes place the day of the final examination was 29 (26 men and 3 women) for the new subject, and 45 students (39 men and 6 women) for the old subject. In particular, the questions analyzed are:

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- A1 Do you think the contents of this subject are interesting?
 - A2 Do you feel this subject is important for your education?
 - A3 Do you think the knowledge gained will be useful for you in the future?
 - A4 Did you find it difficult to follow the course?
 - A5 Do you think the teaching methodology followed in the practices is appropriate?
 - A6 Do you think the practical sessions properly complement the lectures?
 - A7 Would you like to enroll in an elective course that were a continuation of this one?
-

Analyzing the results, we conclude that there is no significant difference in the responses to questions A1, A2, A3 and A7.

In contrast, the most noticeable difference occurs in the answers to question A5, with a significant increase of the mean value as well as a significant reduction in the standard deviation (old subject: $M=6.34$, $SD=1.72$, new subject: $M=8.03$, $SD=0.96$), indicating that the most notable change in the perception of students is in relation to the adequacy of the methodology used in practices. This perception is also less dispersed. This result is curious, since the methodology used in both subjects did not change that much, indicating that the kind of practices that are proposed has direct influence on the subjective perception of the quality of a teaching methodology by the students.

With regard the question A6, there are also significant differences (old subject: $M=6.72$, $SD=1.05$, new subject: $M=7.66$, $SD=0.88$), indicating that students consider that the practices with the new environment best fulfill their role of complementing the theoretical contents of the course.

Finally, the question A4 reflects a significant decrease in the perception of the students about the difficulty of the subject (old curriculum: $M=7.57$, $SD=1.82$, new curriculum: $M=6.76$, $SD=1.67$).

These results suggest that the use of a practices environment supported by a real operating system, like the one we propose, compared to the use of various simulators for isolated parts of a system, provides a perception of greater connection and proximity between the theoretical concepts explained and the

practices carried out, resulting in a decrease in the perceived difficulty of the subject, as well as an improvement in the subjective perception of the methodology used, which remains practically the same.

Experiment 3: Fulfillment of expectations

In this experiment we have analyzed the survey questions related to the degree of compliance with student expectations respect to the OS subject. In particular, the questions analyzed are:

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- B1 Do you think you have gained the theoretical knowledge you expected?
 - B2 Do you think you have gained the practical knowledge you expected?
 - B3 Do you feel the knowledge and skills you have acquired are appropriate?
 - B4 Do you feel the knowledge and skills you have acquired are sufficient?
 - B5 Do you think this course has met your overall expectations?
-

In this case, the most significant differences occur in question B5 (old subject: $M=6.47$, $SD=1.44$, new subject: $M=7.97$, $SD=0.81$). This result reveals that the use of the environment proposed makes the subject much better suited to the expectations of the students, a fact that we attribute to the use of a real system whose knowledge at the user level is ever increasing and whose technical mastering is increasingly valued in the labor market. This assessment is reinforced by the results of question B2 concerning the evaluation of acquired practical knowledge, in which is also found a significant increase (old subject: $M=6.34$, $SD=1.19$; new subject: $M=7.59$, $SD=0.81$). Interestingly, there is also an increase, but smaller in the results of question B1 (old subject: $M=6.49$, $SD=1.03$, new subject: $M=7.03$, $SD=0.89$), indicating that performing the practices on an operating system that allows the observation of direct practical application of theoretical knowledge taught also improves the evaluation of this knowledge.

With regard to issues relating to the evaluation of knowledge and skills acquired, question B3 also shows a significant improvement (old subject: $M=6.66$, $SD=1.19$, new subject: $M=7.76$, $SD=0.90$), while question B4 results are similar for both subjects. We can conclude, therefore, that students from both subjects feel they have acquired a similar amount of knowledge and skills but consider that the new one provides the most adequate knowledge and skills. This assessment is a result of the use of a real environment most suited to the concepts we intend to teach.

Discussion and conclusions

The framework we have presented in this paper allows us to configure a complete and suitable environment for teaching of Operating Systems at university level, using free software technologies widely used in today's market, such as Linux and Java, giving support to the development of practices of very diverse nature, and allowing students to focus their work on the kernel of a real operating system such as Linux, without great difficult. We believe that these configure a major distinctive quality of the proposed framework with respect to other options commonly used in most universities, being also a highly appreciated feature by students. Thus, the surveys we performed indicate what students' value most positively on the subject is the ability to learn and use technologies such as real and current Linux and Java, whose knowledge is also valued in the market.

Currently we are expanding the set of *eduwidgets* to enlarge the possibilities of the environment as experience has shown us that these elements are particularly useful, greatly facilitating the development of applications for demonstrative classes by teachers and the development of their own projects by students. Within this extension of the set of *eduwidgets* we have incorporated some of them based on those developed by the students in their final projects of the subject.

Finally we mean that, given the positive experience of practical use in teaching of the proposed framework and the possibilities offered by Java to be a complete programming environment that provides multiple functionalities, such as database support, communications Web technologies, ..., we are evaluating its extension to other subjects such as Computer Networks, Telematics Services or Information Systems, so it can get to be, finally, an environment capable of supporting almost all of the practices of the subjects that make up a degree in Computer Science.

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Do Female Science Teachers Teach Science Better than Males? – A Case Study from Qatar

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Abstract-

In Qatar, public and private schools' female students outperform male students in standardized and international science tests such as PISA and TIMSS in (Males are taught by male teachers except primary school students who are taught by female teachers while female students are taught by female teachers) in contrast to the, generally known, international trend for top performing category. Female students, show similar attitude toward and interest in science subjects although less interest in science-based careers. One major factor that may contribute to this discrepancy is the difference in teaching styles between female teachers and their counterpart males. In this paper we focus on results obtained from 129 class observations conducted to 81 teachers (40 males and 51 females) selected from 50 different schools and grades as part of a wide research project to study the motivation factors and attitude toward and interest in science among Qatari students. The observations were guided using a slightly adopted "Reformed Teaching Observation Protocol" (RTOP) which provides a standardized mean for detecting the degree to which science classroom instruction is reformed through a focus on five dimensions: (a) Lesson Design and Implementation; (b) Content: Propositional Pedagogic Knowledge; (c) Content: Procedural Pedagogic Knowledge; (d) Classroom Culture: Communicative Interactions; and (e) Classroom Culture: Student/Teacher Relationships. The evaluation rubric consists of 13 teaching traits. Average % score of females outnumbers that of males in 10 traits vs. 2 traits for male teachers and comparable in one construct which indicates better delivery skills and better communication of science by female teachers. However, male teachers perform better in laboratory classes.

Keywords—*Teaching style, Attitude, Delivery skills, Male teachers, Female teachers*

I. Introduction

Teachers serve as role models for their students' learning. Students learn best from teachers whom they respect and with whom they have good relationship. Research indicated that positive relationships with teachers enhances students' confidence and feelings of competence, this in turn has a positive influence on student learning [1]. Teacher support also enhances the positive effect of challenge on student engagement. Generally, in Science, girls, especially at advanced grades, feel less competent than boys and therefore teacher's role is a critical in influencing girls' learning and engagement in science [2].

Some studies found that male teachers are perceived by students as more knowledgeable but female teachers are more student-centered style and more respectful [3], [4]. Different studies found that there is no significant difference in teaching styles [5], [6].

However, the previous mentioned studies, were based on students' perceptions when asked to rate their instructors but no study was based on direct observation by the researchers themselves

Class observations are used to characterize participant teachers' approaches to science teaching. As is well known, some limitations are associated with self-reported data, such as those generated by questionnaire or self-inventory report, that necessitate the collection of researcher-generated data to triangulate and corroborate the teacher-reported data [7], [8]. This measure focuses on generating assessments about the extent to which a participant teacher's science instruction can be characterized as traditional, transitional, or reformed. In this context, traditional instruction refers to science teaching that is exclusively teacher-centered; chalk-and-talk; non-collaborative; featuring convergent, summative-only assessments; and focused on rote learning and algorithmic problem solving. In comparison, reform-oriented science instruction is student-centered; inquiry-oriented; active; collaborative; featuring both formative (or responsive) and summative assessments; and focused on meaningful learning and heuristic

problem solving [9]– [11]. Reformed science teaching will include some opportunities for students to interact with **natural** phenomena, collect and/or examine data, make inferences and check on the validity of their inferences, as well as communicate and defend their results to their peers. Transitional science instruction is defined as teaching that features elements both from traditional and reformed approaches to structuring science learning environments.

“Reformed Teaching Observation Protocol” (RTOP) [12] is widely used to guide classroom observations of teachers. The RTOP provides a standardized means for detecting the degree to which science classroom instruction is reformed through a focus on five dimensions: (a) Lesson Design and Implementation; (b) Content: Propositional Pedagogic Knowledge; (c) Content: Procedural Pedagogic Knowledge; (d) Classroom Culture: Communicative Interactions; and (e) Classroom Culture: Student/Teacher Relationships [12].

Reference [13], explained that the effect of increasing percent female science teachers on dimensions of students’ science identities and stated that “female *science teachers introduce students into ‘figured worlds’ of school science within which they play largely supporting roles*”.

Many educators agreed that women in general are better teachers based on their experience as mothers but does this apply to teaching subjects that is more associated with cognitive knowledge and certain skills which are affected by more than one domain such as cognitive (thinking), affective (feeling) and the psychomotor (doing) domains as explained by [14] and [15] which are gender independent. However, external factors such as school environment and sociocultural factors may contribute, at least partly, to this difference in teaching skills of both genders.

In Qatar, female students perform better than their peers from male schools in national and international test despite their lower interest to study further science at tertiary education or peruse a science related career [16]. There is no evidence that female science teachers may teach better than male teachers. This paper may contribute to this difference between the two genders in students’ performance.

In this paper we present results generated from direct observations of classes for 101 teachers from 50 schools in Qatar as part of two research projects to study the factors that motivate students and enhance their attitude toward science, and to shed light on the way science is communicated at different schools and, also, to find out if the strategies of science delivery vary among different types of schools and among the two genders.

II. Method and Procedures

101 teachers from 50 schools participated as part of two projects. These two projects have different objectives but both included class observations. The projects and distribution of classes and teachers are as follows.

1. Project-1 Qatari Students’ Interest and Attitude Toward Science (QIAS) 54 teachers
2. Project-2 Development of a Framework for Practical Science in Alignment with Curriculum Standards of Grades 3-12 of Schools in Qatar. (This project is about Effective Practical Delivery in Science (EPDS) – 47 teachers

Details on distribution of observed classes are as shown in table-1 below. It should be noted that all primary school teachers in both males and females’ schools are females only.

Table 1. Sample and distribution of class observations

	No. of Teachers			
	Project -1 QIAS Project^a		EPDS Project^b	
	Females	Males	Females	Males
Primary school ^c	12	0*	11	0*
Preparatory school	10	12	6	6
Secondary Schools	10	10	12	12
Total	32	22	29	18

- a) Theory classes
- b) Theory & Practical classes
- c) All primary school teachers are females

Procedure

- I. QIAS Project: 54 science classes from 28 schools whose teachers and students, were previously surveyed, were observed using the RTOP instrument [12]. Three observers were trained by the team principal investigators. The rubric includes 4 points scale (0, 2, 4, 6) for each of the 13 traits that make the maximum score 78 points. The classes observed were classified to 3 types of school system as follows:

Public Government Schools 34 classes (20 Females and 14 males)

Private Arabic schools 8 classes (5 males & 3 females)

International schools 11 classes. (6 females and 5 males).

For the purpose of comparison, all scored point of each trait were summed up and converted to percentages. The three types of schools were compared based on average % score of each trait and on the basis of final scores. The female and male teachers of government Qatari schools were also compared separately. For the purpose of this paper only results of public schools are considered.

- II. EDPS Project: In EDPS project teachers were enrolled in a long (80-hours) training course on effective delivery of practical classes. Secondary school teachers were observed after training. Male teachers were compared with female teachers and also with equal number of non-trainees from both genders to serve as a control group. Primary and preparatory school teachers were observed before and after training to find out how training has impacted their delivery skills and both genders were compared. The RTOP observation protocol was modified to be consistent with a different class environment that is mainly a laboratory environment context. Evaluation rubric contains 19 criteria as listed in table -2 in the result section.
- III. Interviews: 28 short interviews were conducted after class observations were completed and analyzed. The interviewees were students, teachers and administration staff from some schools whose teachers participated in the projects but interviewed teachers were not part of class observations.

IV. Results and Discussion

Since the objective of this paper is to compare teachers' delivery skills of science classes of both genders, and since the EDPS project was executed in public schools only, therefore only class observations of public-school teachers are considered in this analysis of results. In addition, the number of classes observed in private and international schools were not enough to draw robust conclusions. This entails that 19 classes (out of 148) are excluded from this analysis except for the interview part.

III.1 QIAS Project

Figs. 1 and 2, compare male and female teachers from the 34 classes observed. The figures show clearly that females outperform males in delivery skills especially in the application of science that relates science to daily life contexts and in aligning reflection and meta-cognition components.

It looks that female teachers focus on giving more examples from daily life context, as daily life matters are issues that concern females more than males so connecting science to daily life by a female science teacher is more expected than from a male teacher. This is manifested clearly in the large difference in the "application of science" trait as shown in figure -2. This is in agreement with Gilmartin et al. (2006) statement mentioned before. (see also item 5 in table-2 next section).

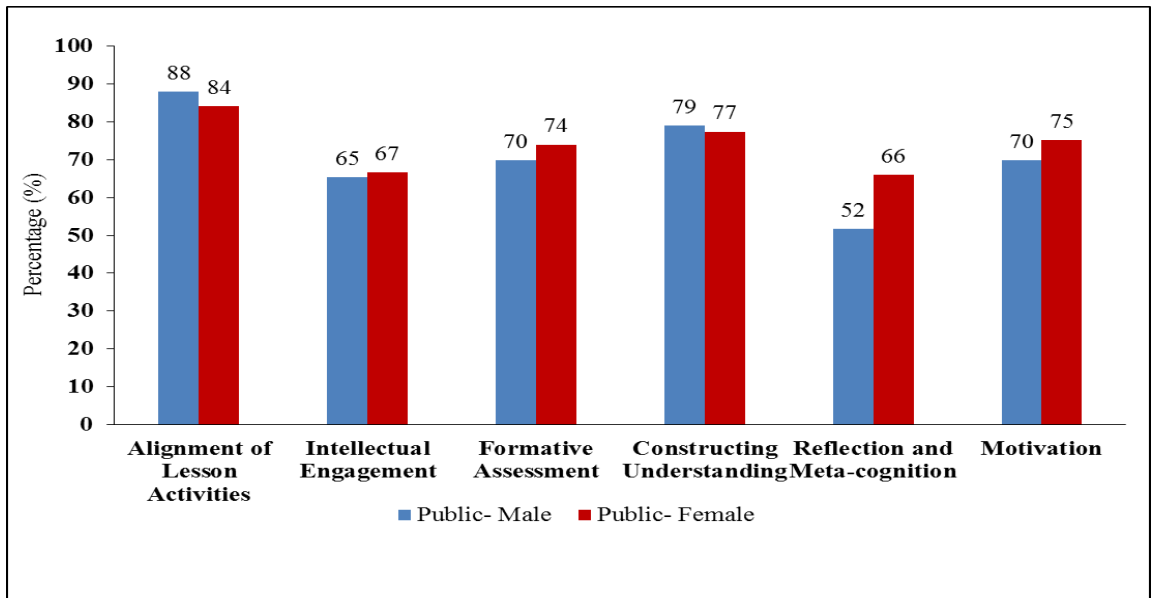


Fig. 1 Comparison of science delivery skills of male with female teachers in Qatari public schools (6 traits of lesson components) – QIAS project

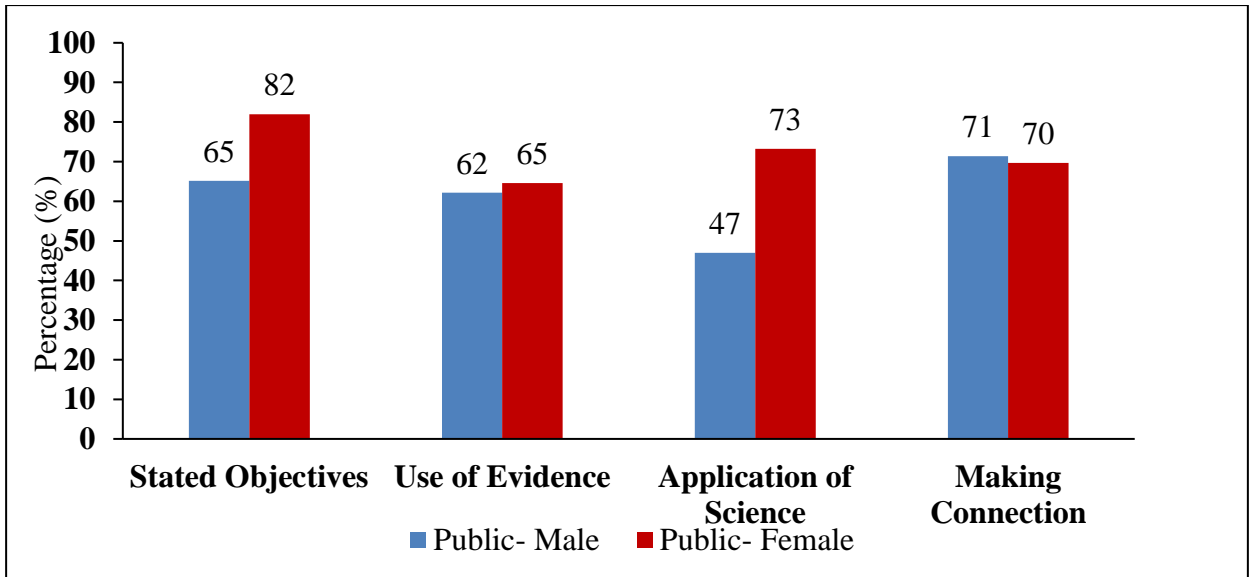


Fig. 2 Comparison of science delivery skills of male with female teachers in Qatari public schools (4 traits of lesson components) - QIAS project

III.2 EPDS Project

Table -2 and figure-3 summarize the results obtained from a total of 94 observed classes performed for 47 teachers in a 55 minutes' class period each, in science laboratories at their schools where each teacher was delivering a science lesson and directing students' performance of a "hands-on" lab activity.

The table includes the 19 traits adopted from RTOP rubric to include laboratory components of the lesson. The procedure for converting the scores for each criterion to average percentage was followed as in the QIAS project.

As can be shown from the table, both male and female teachers obtained comparable average scores in many criteria, but females scored better in certain criteria similar to those in QIAS project (items 3,5,9,13). However, males scored better in the laboratory components (items 4, 8,12,13,14). Item 8, and item 14 for example are more associated with the role of the laboratory technician and availability of materials, rather than the teacher's own skills. In fact, most girls' schools in Qatar have no certified, or, trained lab technicians for reasons related to the nature of the profession and salary scale. Skilled Laboratory technician facilitate the conduct of good laboratory procedure.

Table 2. Average scored (%) of class observation components in a lab-based" science lessons

Item	Males		Females	
	%	SD	%	SD
1 Stated objectives	73	1.21	67	1.15
2 Alignment of lesson activities to objectives	72	1.25	76	1.28
3 Clarity of application and easiness of performance	68	1.15	80	1.22
4 Understanding the theoretical principles of the activity	92	0.80	83	1.10
5 Real life application	59	1.40	67	1.29
6 Teacher engagement	75	1.16	76	1.18
7 Students' engagement	65	1.25	68	1.14
8 Lab Technician role was helpful	75	0.98	61	1.20
9 Classroom discourse	69	1.30	79	1.22
10 Efficient use of time	70	1.17	71	1.18
11 Suitability of lab for the activity	97	0.05	95	0.06
12 Safety	100	0.00	84	1.10
13 Use of technology	97	0.02	87	0.88
14 Sufficiency of materials and equipment	91	0.70	84	0.96
15 Integration with other subjects	32	2.05	54	1.60
16 Cooperative Learning implemented	87	1.01	89	1.02
17 Worksheets / Provide instructions for activity or experiment	89	1.07	89	1.09
18 Continuous feedback and assessment of learning	88	0.88	83	0.92
19 Objectives Achieved	78	1.25	77	1.28
Average	78	1.19	77	1.19

Figure-3 summarizes the comparison between results from both projects. The theory classes delivered by female teachers show outperformance of female science teachers over their peers' male teachers. In practical classes the results show equivocal delivery skills but as shown from table -2 the skills in delivery of practical part components in laboratory classes favored male teachers.

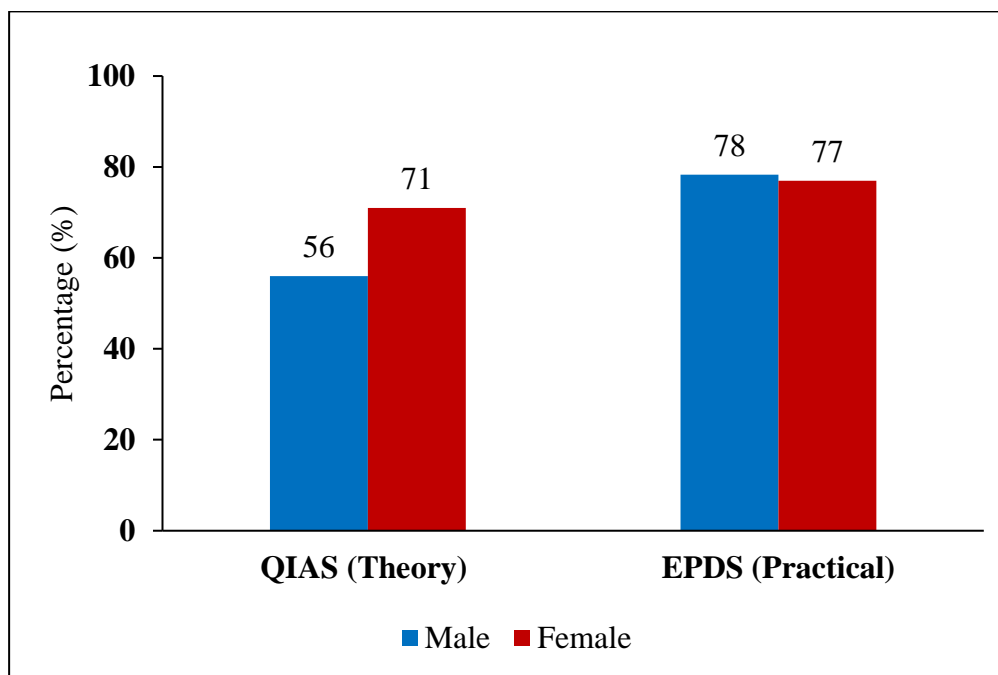


Figure 3. Comparison of science delivery skills of male with female teachers in Qatari public schools – delivery of both theory and practical classes

Interviews

After the analysis of the results from the two projects, we further interviewed few administrative staff, science subjects coordinators teachers and students from the participant schools. Few questions related to this issue were included in these interviews. The following excerpts summarize the general opinion of the interviewees on the difference between male and female teachers.

One female vice principal attributed this female teachers' skill to more commitments and hard preparation "*female teachers are more hard working and more patient*" she said.

A male science coordinator said, "*you rarely find a female teacher worried about financial issues regarding her profession, on the contrary most male teachers are concerned and look for extra earning through private tutoring; and therefore they put more efforts on private tutoring*".

A female primary school teacher who teaches in a boys' school said "*children feel that we are like their mothers and they trust us that we care about them more than male teachers, science activities for them is fun and they enjoy them more with us*".

A grade 8 male student who was taught before (during his elementary schools by female teachers only) said "*I was more interested in science lessons before, our teachers were more helpful and patient, now sometimes I don't understand some concepts but hesitant to ask my teacher. Our previous teachers listen more to us*".

One male student from grade 11 in a boys' secondary school said "*I feel better taught by a male, he said that male teachers are more skilled in the lab than female teachers, he said my sister in a female school told me that their teachers do not take them frequently to the labs especially the chemistry lab because they don't have much skills and have less confidence and afraid of accidents and chemicals*". However, he thinks that female teachers are more concerned about homework and give more feedback. A science coordinator in the same school attributed this male teachers' skill to more confidence in performing practicals and over-cautiousness of female teachers in dealing with materials and equipment.

A grade 12 female student from an international school said “I was taught by four different science teachers before, two females and two males, *I found female teachers focus on discussions and questions but they are less confident than male teachers when they answer questions or perform lab activities*”. A grade 11 male student from this school preferred the female teacher “*She discusses more often, interacts with all, answers all questions and respects students’ opinions*”. Male teacher although good in lecture, *he doesn’t encourage much discussion or answers all questions so provides less motivation*”.

A male teacher teaches grade 12 chemistry in a public secondary school said “*We have a very long curriculum that must be completed, and it is difficult to spend time on more discussions or group cooperative learning or even perform many laboratory activities. We need to balance between theory and lab and sometimes you find students get bored from lectures. Our colleague female teachers spent more time on discussion and answering students’ questions, this is why at the end of the year they try to compensate and give extra classes*”.

Some of the above opinions are in agreement with our findings, for example we found that most interviewees agreed on female teachers’ preference of discussions and questioning, patience, more respect and also the better confidence, knowledge and less practical delivery skills.

V. Conclusions

The findings from this study cannot provide a robust evidence of better teaching style of either gender, but the data indicate general common features of each of them. For example, the female teachers’ style is characterized by more questioning, discussions, more motivation and interaction with students. While, male teachers’ style is more characterized by lecturing, less homework and better performance in lab-based classes. Other factors play important role in shaping teachers’ style, these include school policy, class environment and availability of resources.

VI. Acknowledgements

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The Relationship between Lexical Tone and Melodic Contour Identification of Taiwanese Adult Cochlear Implant User

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Introduction

Mandarin Chinese is a tone language, which means changing fundamental frequency (F0) within a syllable alters its meaning. There are four tones in Mandarin Chinese, which are Tone 1 (flat F0), Tone 2 (rising F0), Tone 3 (falling-rising F0), and Tone 4 (falling F0). Existing research has indicated that cochlear implants (CIs) greatly facilitate CI users' perception in speech sound (Krueger et al., 2008). However, current cochlear implant devices have been shown to be ineffective in encoding pitch information, which poses a great challenge for CI users to perceive lexical tones and melodic pitch (Galvin, Fu & Nogaki, 2007; Tao et al., 2015).

Aims of the study

The main purpose of this study was (1) to investigate the correlation between perceptual abilities of lexical tone and melodic pitch, and (2) to examine the relationship between tone perception and production in Taiwanese adult Cochlear Implant (CI) users.

Method

Participants

30 CI recipients and 30 NH adults were included in this study. The subjects in the two groups were paired according to sex and educational level. The mean age at testing was 28 yrs (range: 20 –46 yrs) for CI participants and was 27 yrs (range: 20 – 49 yrs) for NH participants. Independent samples T-test indicated that there were no differences between the average ages of CI group and NH group.

Tasks Administered

Lexical tone recognition task and melodic contour identification (MCI) task were conducted to all subjects.

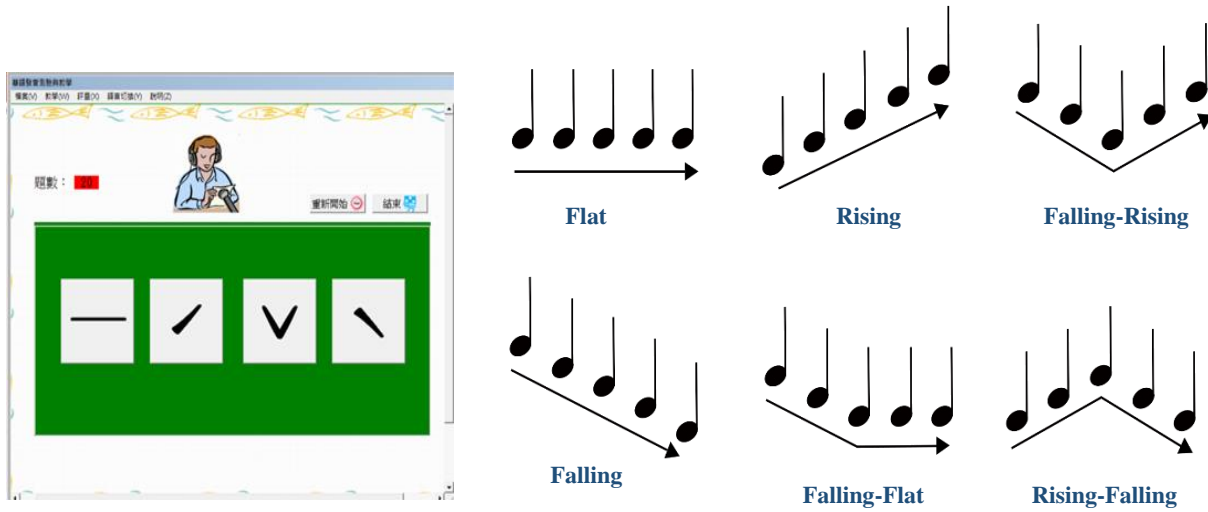
1. Lexical tone stimuli

Computerized Mandarin Tones Discrimination Test (Chang, 2007) was used to assess subjects' ability to recognize four Mandarin tonal patterns. 38 Mandarin Chinese words are included as stimuli.

2. MCI stimuli

There were 6 distinct melodic patterns used in the MCI test. Each melodic pattern was composed of five notes with equal duration (300 ms), and the interval between successive notes was 5 semitones.

A3 (220 Hz), A4 (440 Hz), and A5 (880 Hz) were chosen to be the lowest note for each pattern. Therefore, the frequency range of stimuli was from 220 to 2794 Hz.



Result

Overall, the current study indicated that the subjects performed significantly differently on both tasks ($p < 0.001$). Lexical tone-recognition performance of the CI group was 78.86% correct on average, and performance of the NH group was nearly perfect (mean = 99.30% correct).

MCI performance was also significantly better for NH group (mean = 90.37% correct) than for CI group (mean=36.48% correct).

The correlation coefficient ($r = 0.52$) was highly significant ($p = 0.003$) between CI subjects' performance in lexical tone recognition and MCI task.

For CI subjects, Tone 4 was the easiest one to be perceived, and Tone 2 was found to be the hardest one. Tone 2 was more often to be misperceived as Tone 1.

Fig. 1. Lexical tone recognition task

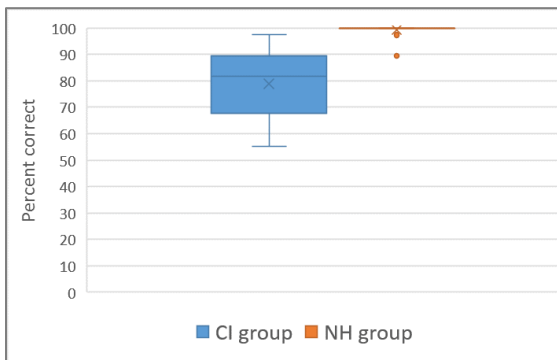


Fig. 2. MCI task

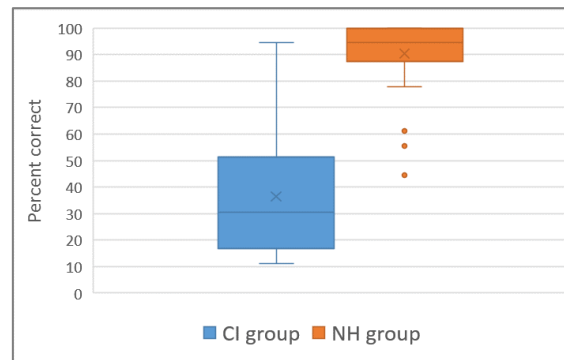


Fig. 3. Accuracy of each tone of CI group

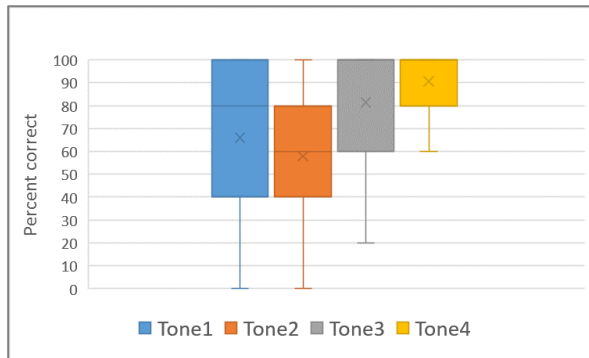
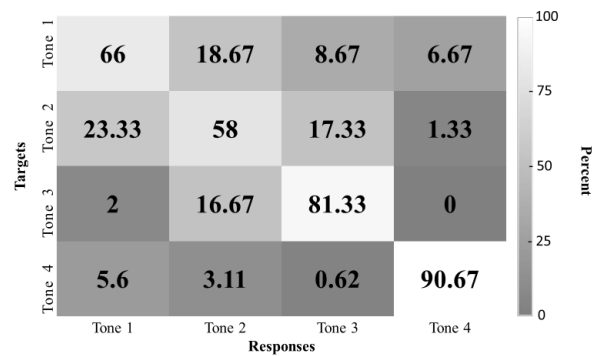


Fig. 4. Confusion matrices of tone perception by the CI group



Conclusion

The NH subjects performed significantly better than the CI group on both lexical tone recognition task and MCI test. Adult CI users' performance in lexical tone recognition and MCI test are moderately correlated, and this result implies that perception of melodic pitch and lexical pitch might share similar perceptual properties. This study results can provide speech-language pathologists of evidence-based information for counseling potential cochlear implant candidates and can be used for developing intervention programs as well.

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Development and Validation of Printed Instructional Materials (Comics) for Teaching Kinematics

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Abstract

Collaboration, Communication, Critical Thinking and Creativity are the identified competencies and skills of the 21st Century Learning. Teachers facing 21st Century learners should be well-versed and artistic in communicating ideas without compromising the hidden and evident intelligences of their students. Since learners are now living in a visual society where majority of them are surrounded by various visual media, teachers should employ instructional aides that are pleasing to students and that could elicit their drives to learn and keep their attentions longer. For this reason, this study was conducted to develop and validate printed instructional materials in a form of comics for teaching Kinematics using Research and Development Design. The content of the material was based from the least-mastered competencies of the students determined from the results of the conducted pre-assessment test. Validation of the developed material was made by the two groups of experts (5 master teachers and 10 non-master teachers) using an adapted validation tool which measures the level of acceptability of the material. Results showed that Master Teachers and Non-Master Teachers both rated the proposed comics as Very Highly Acceptable and that there is no significant difference in their mean responses in terms of Accuracy, Clarity, Appeal and Originality of the material.

Keywords: Development, Validation, Comics, Kinematics

Introduction

Pure chalk and talk are not enough teaching practice in the classroom. Instructional aids must be integrated to the teaching and learning process to attain such quality learning at a maximum level. According to Olawale (2013), instructional materials can improve, guide and make the educational process active and tangible. Arop et al. (2015) recommended that teachers should use instructional materials to deliver science concepts to learners. What the students acquire in class depends on the capability of the teacher to catch their attention and spark their drives by the use of suitable instructional materials (Nombrefia, 2009). Lupton (2013) asserted for getting back the craft of teaching and provides pedagogies for encouraging and enabling artistic education. Negrete & Lartigue (2011) consequently claimed that to impart science concepts effectively, teachers must innovate teaching styles and educational resources that enliven the drives of the students. In education, a huge portion of all teaching aids is composed of printed materials like workbooks or modules (Lardizabal, et al. 1996).

Under K-12 Curriculum, particularly in junior high school, Physics is one of the units in science discussed in a particular grading period. It is considered by many students as the most difficult subject because of its combined conceptual and computational approach. Gadea (2011) professed that materials like workbook in theoretical physics could accelerate and enhance students who have basic concepts in multilinear algebra. Hanaya et al. (2012) claimed that learners could fluently and smoothly comprehend the concept in electrical current in physics due to the presence of pictures.

Furthermore, Yulianti et al., (2016) affirmed that graphic materials in science can improve the attitude and mental feat of the learners. Abualrob & Shah (2012) also believed that printed instructional materials like modules could serve as a channel for developing learner's interest in science.

With all these claims, teachers should innovate to lighten the pressure faced by the students towards the subject by employing materials that can elicit their drive to learn and apply their higher order thinking skills.

The objective of this study was to develop and validate comics as a printed instructional material for teaching Kinematics in Banisil National High School (6.0555° N, 125.1415° E). Specifically, it sought answers to the following sub-problems: a) identify the least-mastered competencies in Kinematics, b) based on the assessment, what comics may be developed, c) identify the mean responses of the non-master teacher-evaluators of the comics in terms of the accuracy of the material, clarity of the material, appeal to the target user and originality of the comics, d) identify the mean responses of the master teacher-evaluators of the comics in terms of the accuracy of the material, clarity of the material, appeal to the target user and originality of the comics; and e) identify if there is a significant difference between the mean responses of the non-master teacher-evaluators and master teacher-evaluators in terms of the acceptability of the comics.

Method and Materials

This study utilized Research and Development (R & D) design. Research and Development procedure were divided into four stages. Figure 1 (on the right) shows the research design of the study.

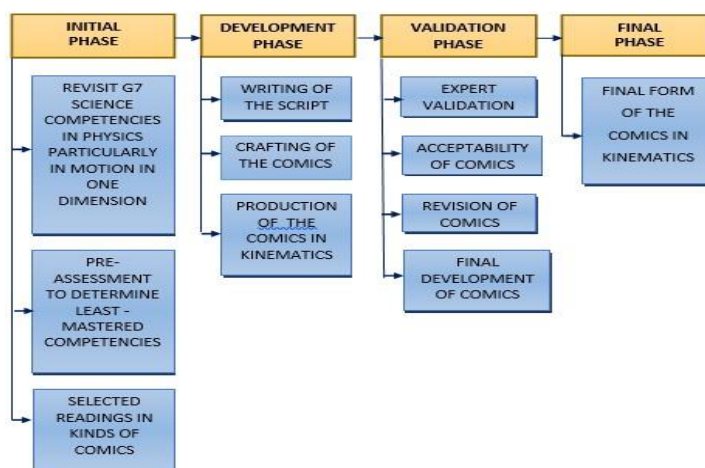


Figure 1. Research Design

In the initial phase, learning competencies in Grade 7 Science were revisited as to what were the topics and skills were included in Module 1(Motion in One Dimension), pre-assessment was also administered to determine the least-mastered competencies of the students in the said module, at the same time selected researches on the fundamentals of comics were done in this stage.

The development of printed instructional material (comics) was undertaken in the second phase. Script writing, crafting the soft copy of the comics with an IT expert and reproduction of hard copies were made during the development phase. The content of the comics was based from the least-mastered topics and skills of the students about Kinematics that was anchored on the learning competencies set by the Department of Education.

For the validation phase, specifically on expert validation, ten (10) non-master teachers and five (5) master teachers in Science from Division of General Santos City served as content validators. The developed comics was validated according to its acceptability which involved 4 criteria: accuracy, clarity, appeal and originality of the material. A five-point rubric scale was used in assessing the instructional material. The researcher personally gave the validation tool (questionnaire) including the developed comics to the validators. Retrieval of the instrument was made after 3 days as scheduled.

The remarks and recommendations of the panels were the bases of the proponent in the revision of the material to ensure quality comics. This took place in the revision phase. Final phase commenced on the final forms of the comics which was validated and ready for legitimate use.

The instrument used was an adapted and modified validation tool from Nombrefia (2009) in a form of questionnaire. The tool evaluated the level of acceptability of the comics in terms of accuracy, clarity, appeal and originality of the comics. Each criterion was composed of five indicators for accuracy, five indicators for clarity of the material, five indicators for appeal to target user and five indicators for originality in presentation.

To determine the extent of acceptability, a 5-point scale by Nombrefia (2009) was used in the study. Numerical points of 4.50-5.00 is described as very highly acceptable, 3.50-4.49 as highly acceptable, 2.50-3.49 as moderately acceptable, 1.50-2.49 as less acceptable and 1.00-1.49 as least acceptable.

Results and Discussion

The result of the pre-assessment test showed that Grade 7 students performed poorly in the subject matter. Specifically, out of a perfect score of 5 in each topic, students got low scores in Distance (\bar{x} = 2.33), Displacement (\bar{x} = 0.78), Speed (\bar{x} = 0.80), Velocity (\bar{x} = 1.13), Acceleration (\bar{x} = 1.33) and Graphical Analysis (\bar{x} =1.10). The over-all mean score of \bar{x} = 1.24 is described as poor performance. These results imply that Grade 7 students have low mastery in (a) describing the motion of an object in terms of distance or displacement, speed or velocity, and acceleration (b) differentiating quantities in terms of magnitude and direction and (c) interpreting visual representations of the motion of objects such as motion graphs. This result led to the conclusion that there is really a need to develop printed instructional materials (Comics) in teaching Kinematics to make the lessons clearer and understandable to the Grade 7 students. This led the researcher to develop the proposed comics for Kinematics (see Appendix A).

Table 1
Evaluation of Non-Master Teacher Evaluators on the Proposed Comics in Kinematics

I. ACCURACY OF THE MATERIAL	Mean	Description
1. The topics are well-arranged to provide clear sequence of understanding.	5.00	Very Highly Acceptable
2. The comics provide sufficient repetition of learning through example and illustrations to easily understand the concept.	4.60	Very Highly Acceptable
3. The comics are appropriate to the age, maturity, experience of the user.	4.40	Highly Acceptable
4. The ideas and concepts are well-expressed in the comics.	4.80	Very Highly Acceptable
5. The comics relate to the present learning on the different contents in Physics.	4.80	Very Highly Acceptable
MEAN	4.72	Very Highly Acceptable
II. CLARITY OF THE MATERIAL		
1. The concept of the comics are clear and easy to understand.	4.80	Very Highly Acceptable
2. The comics have adequate margins, legible typeface and comfortable type size.	4.60	Very Highly Acceptable
3. The size of prints for every box is readable and can easily be recognized.	4.80	Very Highly Acceptable
4. The layouts and graphics in the comics are attractive.	4.60	Very Highly Acceptable
5. The dialogues in the comics are easy to understand.	4.80	Very Highly Acceptable
MEAN	4.72	Very Highly Acceptable
III. APPEAL TO THE TARGET USER		
1. The titles used in the comics capture the interest of the user.	4.00	V Highly Acceptable
2. The comics are presented at a pace that allows for reflection and review.	4.80	Very Highly Acceptable
3. The comics stimulate the user to have interest in Physics.	4.80	Very Highly Acceptable
4. The comics are worth the time, effort and expense.	4.80	Very Highly Acceptable
5. The comics enable the user to develop his/her critical thinking and problem-solving skills.	4.70	Very Highly Acceptable
MEAN	4.62	Very Highly Acceptable
IV. ORIGINALITY OF THE MATERIAL		
1. The design and appearance of the comics are exceptionally different from other graphic illustration.	4.40	Highly Acceptable
2. The comics serve as a new basic model in teaching and learning Physics.	4.70	Very Highly Acceptable
3. The material stands out because it was not copied from the work of others.	4.60	Very Highly Acceptable
4. It is a work created with a unique style and substance.	4.70	Very Highly Acceptable
5. The older ideas were put together in new ways.	4.80	Very Highly Acceptable
MEAN	4.64	Very Highly Acceptable

Table 1 above shows the result of the validation from the first group of experts consisting of 10 non-master teachers from different public schools in General Santos City. As evaluated by the non-master teachers, the proposed comics is Very Highly Acceptable in terms of its Accuracy (\bar{x} = 4.72). The topics are well- arranged (\bar{x} = 5.00), have sufficient examples and illustrations (\bar{x} = 4.60) and are appropriate to the age of the students (\bar{x} = 4.40). The ideas in the comics are well- expressed (\bar{x} = 4.80) and are related to the different concepts in Physics (\bar{x} = 4.80). With regards to the clarity of the comics, the non-master teachers found it to be Very Highly Acceptable (\bar{x} = 4.72). The concepts are clear and understandable (\bar{x} = 4.80), very readable (\bar{x} = 4.80), attractive (\bar{x} = 4.60) and dialogues are highly comprehensible (\bar{x} = 4.80). The student appeal of the comics is also Very High (\bar{x} = 4.62). The title itself is interesting (\bar{x} = 4.00), the pacing of the topics allows for reflection and review (\bar{x} = 4.80) and can stimulate interest of students in Physics (\bar{x} = 4.80). Moreover, the comics help develops critical thinking and problem-solving skills of the students (\bar{x} = 4.70). Lastly, the non-master teachers considered the comics to be Very Highly Acceptable in its originality (\bar{x} = 4.64). The design of the comics is different from others (\bar{x} = 4.40), it was not copied from the work of other (\bar{x} = 4.60), its substance and style are unique (\bar{x} = 4.70), and ideas were put in innovative ways (\bar{x} = 4.80). To summarize, the non-master teachers evaluated as Very Highly Acceptable the proposed comics.

Table 2 shows the result of the validation from the second group of experts consisting of 5 master teachers from different public schools in General Santos City.

Table 2
Evaluation of Master Teacher-Evaluators on the Proposed Comics in Kinematics

I. ACCURACY OF THE MATERIAL	Mean	Description
1. The topics are well-arranged to provide clear sequence of understanding.	4.60	Very Highly Acceptable
2. The comics provide sufficient repetition of learning through example and illustrations to easily understand the concept.	4.80	Very Highly Acceptable
3. The comics are appropriate to the age, maturity, experience of the user.	4.40	Highly Acceptable
4. The ideas and concepts are well-expressed in the comics.	5.00	Very Highly Acceptable
5. The comics relate to the present learning on the different contents in Physics.	5.00	Very Highly Acceptable
MEAN	4.76	Very Highly Acceptable
II. CLARITY OF THE MATERIAL		
1. The concept of the comics are clear and easy to understand.	4.80	Very Highly Acceptable
2. The comics have adequate margins, legible typeface and comfortable type size.	4.60	Very Highly Acceptable
3. The size of prints for every box is readable and can easily be recognized.	4.40	Highly Acceptable
4. The layouts and graphics in the comics are attractive.	4.80	Very Highly Acceptable
5. The dialogues in the comics are easy to understand.	4.80	Very Highly Acceptable
MEAN	4.68	Very Highly Acceptable
III. APPEAL TO THE TARGET USER		
1. The titles used in the comics capture the interest of the user.	4.80	Highly Acceptable
2. The comics are presented at a pace that allows for reflection and review.	4.40	Highly Acceptable
3. The comics stimulate the user to have interest in Physics.	4.80	Very Highly Acceptable
4. The comics are worth the time, effort and expense.	4.80	Very Highly Acceptable
5. The comics enable the user to develop his/her critical thinking and problem-solving skills.	4.80	Very Highly Acceptable
MEAN	4.72	Very Highly Acceptable
IV. ORIGINALITY OF THE MATERIAL		
1. The design and appearance of the comics are exceptionally different from other graphic illustration.	4.60	Highly Acceptable
2. The comics serve as a new basic model in teaching and learning Physics.	4.80	Very Highly Acceptable
3. The material stands out because it was not copied from the work of others.	4.80	Very Highly Acceptable
4. It is a work created with a unique style and substance.	4.80	Very Highly Acceptable
5. The older ideas were put together in new ways.	4.80	Very Highly Acceptable
MEAN	4.76	Very Highly Acceptable

The results on Table 2 show that the Master Teachers gave similar evaluation as the Non-Master Teachers on the acceptability of the proposed comics in Kinematics. The Master Teachers also rated as Very Highly Acceptable the accuracy of the material ($\bar{x}=4.76$), its clarity ($\bar{x}=4.68$), appeal to the target user ($\bar{x}=4.72$), and the originality of the material ($\bar{x}=4.76$). Thus, these results indicate that master teachers and non-master teachers showed unanimity on their evaluation of the comics.

The result of the t-test in Table 3 showed that non-master teachers and master teachers did not differ significantly on their evaluation of comics in Kinematics. Specifically, they did not differ on their evaluation of accuracy of the comics ($t=0.317$, $p=0.756$), clarity ($t=0.271$, $p=0.791$), appeal of comics to the target user ($t=0.475$, $p=0.643$), and originality of the comics ($t=0.694$, $p=0.500$). This is based on their p-values which are greater than 0.05. This means both master teachers and non-master teachers are similar on their evaluation that the proposed comics on Kinematics is accurate, clear, have strong appeal to student users and shows originality in content. These results, therefore, indicate that the proposed comics is suitable for instruction in Physics class particularly on the area of Kinematics. The results of the t-tests, therefore, led to the acceptance of the null hypothesis that there is no significant difference in the mean responses of master teachers and non-master teachers on the acceptability of the comics in Kinematics.

Table 3
Difference in the Responses of Master Teachers and Non-Master Teachers on the Acceptability of the Comics

Indicators of Acceptability	Mean	t-value	p-value	Remarks
Accuracy				
<i>Master Teachers</i>	4.76	0.317	0.756	no significant difference
<i>Non-Master Teachers</i>	4.72			
Clarity				
<i>Master Teachers</i>	4.68	0.271	0.791	no significant difference
<i>Non-Master Teachers</i>	4.72			
Appeal to the User				
<i>Master Teachers</i>	4.72	0.475	0.643	no significant difference
<i>Non-Master Teachers</i>	4.62			
Originality				
<i>Master Teachers</i>	4.76	0.694	0.500	no significant difference
<i>Non-Master Teachers</i>	4.64			

Conclusions

The least-mastered competencies in Kinematics are: describing motion of an object in terms of distance or displacement, speed or velocity, and acceleration; differentiating quantities in terms of magnitude and direction; and interpreting visual representation of the motion of the objects such as motion graphs. The developed comics in Kinematics rated as Very Highly Acceptable can be used in teaching Grade 7 students (See Appendix A). Non-Master Teachers perceived the comics in Kinematics to be Very Highly Acceptable. Master Teachers also evaluated the comics in Kinematics to be Very Highly Acceptable. Master Teachers and Non-Master Teachers are similar on their evaluation that the comics in Kinematics have Very High Acceptability in terms of its accuracy, clarity, appeal and originality.

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Appendix A Comics (Left- Right)



Author's Note: The images are already adjusted to 300 dpi. But it may be blurry in this page because of too much resizing (the entire comics is 43 pages yet the maximum pages as required is only 7). Please let me know if you need actual sizes as your reference so I can email it to you.

The Impact of Cultural Diversity Awareness on Students' Digital Media Creation and Consumption

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Abstract

Meaning-making in today's digital culture raises the need for enhanced critical thinking skills and cultural diversity awareness. To be literate in digital media, it is essential to know how to use digital tools, but it is also required to develop intellectual, social, and cultural competencies to be able to interpret messages in multimodal texts, which include written texts, sounds, and images.

This research explored the experiences of two foreign students in higher education who participated in a six-week online workshop about digital media literacy. The students completed a project-based activity during the workshop in which the weekly curriculum aimed to develop particular skill of digital-media literacy to access, analyze, evaluate, and create digital materials. Throughout this study, the data was gathered and analyzed to answer the main question:

How does students' awareness of cultural diversity influence the choices they make in digital media production?

The author employed qualitative case study methods including participant-observation, field notes, questionnaires, interviews, and digital media products analysis. The analysis revealed that both participants were affected by their experience of living abroad, and this factor influenced their thinking and teaching methods. Cultural identities appeared in their thinking and choices when creating digital products as well. This study was an initial inquiry into the importance of acquiring cultural competencies along with critical digital-media literacy in order to accept the diversity in education and appreciate our differences.

Keywords: Critical Digital-Media Literacy, Cultural Diversity, and Digital Media.

Introduction

The communication opportunities increased in the digital culture due to the availability of technology. The extensive use of digital media, in particular, increased social interactions with different cultures and, accordingly, led many people to judge or misunderstand each other because of the diversity of their cultural and social backgrounds. As a result of the increased number of digital social interactions, people might be affected by the information or stereotypes available on digital media, and might form most of their opinions based on what they have seen on traditional and digital media (Wallace et. Al, 2013). Buckingham (2003) suggests that people need to be aware of how media shapes their understanding of social and cultural diversity (class, ethnicity, age and so forth); he also claims that traditional media does not offer a "transparent window on the world" (Buckingham, 2003, p.3); rather, it paints the world's image according to the perspective of professional and commercial media producers. Media and communication technology can be used for empowerment when people "who are most often misrepresented in the mainstream media receive the opportunity to use these tools to tell their stories and express their concerns" (Kellner and Share, 2007, p.9). Thus, digital media tools allow a broader audience to move from being media consumers to becoming media producers themselves.

Another issue developed with the extensive use of digital media is the acceptance of information provided in social media without thinking, especially when this information makes sense or represents shared commons to the reader (Burnage and Persaud, 2012). This issue draws attention to the importance of finding new teaching strategies to promote critical digital-media literacy in which students apply the acquired knowledge in their life, especially that the new ISTE (International Society for Technology in

Education) standards for students are concentrating on developing creative communicators through using digital media (ISTE, 2018).

Previous studies in teaching traditional media and digital-media literacy were mostly focused on K-12 students, but the participants who comment in social media are not limited to the younger generation. Some adults might fall into the trap of accepting information and making instant judgments because people need to be educated or trained to acquire a high level of literacy when learning any new technology, and not expected to achieve this high level by only being exposed to the new technology (Park, 2012, p.3). Therefore, students and educators in higher education would benefit from acquiring critical media and digital-media literacy in which they develop their intellectual and cultural skills to form digital messages. To be literate in digital media, it is not enough today to know how to use digital tools (Sheffield, 2015), but it is also required to develop intellectual, social, and cultural competencies to be able to interpret messages in multimodal texts, which include written text, sound, image, music, and so forth (Albers & Sanders, 2010; Kellner & Share, 2007; Park, 2012; Sheffield, 2015).

In this study, the author is inviting educators to teach critical digital-media literacy by engaging their students in the process of creating their own digital media content. New learners need to critically find, analyze, evaluate and use digital information (Livingstone, 2004; Park, 2012) not only by consuming messages, "but also [by] creating and sharing them," (Hobbs, p. vii). Although new learners seem generally comfortable using technology, they are not necessarily proficient when producing digital media content such as creating digital videos (Albers & Sanders, 2010). Considering the importance of developing today's students' critical evaluation of online materials in a multicultural world, this study explored the experiences of two foreign students in higher education who participated in an online workshop about digital-media literacy.

Regarding the issues mentioned above, this research study was seeking an answer to this question:

- How does students' awareness of cultural diversity influence the choices they make in digital media production?

Method and Materials

A qualitative case study design was set up to seek an answer for the research question. Qualitative research is usually conducted in participants' settings where the researcher explores and understands their perceptions, behaviors, attitudes, learning, culture, or lifestyle (Creswell, 2009; Golafshani, 2003). In qualitative research, the researcher interprets the meaning from the data collected and analyzes interviews, questions or any other complex and valuable data. Thinking and cultural elements are better understood by collecting and analyzing words, reporting detailed views of information, and observing students' performance. Qualitative inquiry, in general, focuses on meaning and understanding; thus, the results of a qualitative study are descriptive (Merriam, 1998).

The cases of two participants were studied in-depth during a six-week online workshop to understand their answers, thinking, cultural, and educational backgrounds, which led to employ case study technique. Case study assists in understanding the meaning and the process rather than only analyzing the outcomes. It helps in exploring the reasons and the background that guided the participants to their answers, perceptions, feelings, and reactions (Merriam, 1998). This study also followed Kellner and Share's suggestion (2007) to teach critical media literacy through project-based media production in order to make the analysis process more meaningful for students and help them to "gain tools for responding and making actions on texts they are critiquing" (p.9). Project Based Learning (PBL) is "a teaching method in which students gain knowledge and skills by working for an extended period to investigate and respond to a complex question, problem, or challenge" (BIE, 2018).

Research Context and Instruments

The study was applied in a fully online setting, at a large southwestern university in the United States of America. An online workshop was provided to graduate students who are either prospective or current teachers through Desire2Learn (D2L), a type of Learning Management System (LMS). The students worked on a six-week project in which each week they worked on one step toward finishing their projects. The weekly curriculum aimed to develop particular skill of digital-media literacy to access, analyze, evaluate, and create digital media materials (Livingstone, 2004; Park, 2012). During the time dedicated to this project and using recorded videos, the author taught the students the basics of digital-media literacy including how to find and analyze valid information online, and how cultural diversity might impact people's analysis and evaluation of what they read on digital media. Observing and analyzing students' assignments, projects, pre-and post-questionnaires, and discussions helped in understanding their digital media past knowledge, in addition to the new knowledge that they have developed during the workshop. Also, the researcher interviewed those students to get more in- depth analysis of their experience along with their cultural awareness and its impact on choosing and analyzing resources for their projects.

Data Analysis

Analyzing qualitative data is a non-linear process that requires three skills: "noticing, collecting, and thinking about interesting things" (Khandkar, 2009, p.1). Analyzing the data started with "open coding" technique (Khandkar, 2009), which includes marking important parts in the data, finding codes to notice, thinking about similarities, dissimilarities, and changes in answers, and finding and comparing relationships (Khandkar, 2009).

The initial categories to analyze the data regarding developing students' digital-media literacy and their intellectual skills were digital media awareness, digital media access, digital media evaluation, and digital media production (Hallaq, 2013). Hallaq (2013) states that digital media awareness refers to students' understanding of how the information is produced in digital media and their ability to make sense of this information. He also mentioned that digital media access represents the participants' ability to locate specific information on the Internet and digital media such as when using Google to find answers for specific questions. Digital media awareness and access reflected on students' critical thinking when finding online information and how they think about that content. Digital media evaluation refers to students' ability to assess digital media messages and to look at their validity, reliability, appropriateness and so forth. Digital media production, on the other hand, reflects on students' ability to present and share their new knowledge in a creative product (Hallaq, 2013).

Results

The findings represented the results of the experience of two graduate students (Nadia and Jasmine), who had successfully completed the online workshop requirements. The awareness of cultural diversity assisted the students in knowing their audiences' cultural backgrounds as well as the influence of their own cultural identities on their choices and understanding of digital media content. The influence of students' awareness of cultural diversity on their choices for digital media productions was observed in two ways. First, the impact of students' cultural identity on interpreting digital media resources and multimodal texts. Second, the impact of the awareness of audience's cultural backgrounds on the students' choices for multimodal texts used in their media products including images, sounds, and written words.

a. The participant's cultural background.

Table 1.1

Backgrounds of the two case studies

	First Case (Nadia)	Second Case (Jasmine)
Education	A PhD student in a language and culture major.	A PhD student in a language and culture major.
Teaching Experience	9 months of teaching social studies in a middle school in Saudi Arabia, in addition to one semester of teaching practice in Saudi Arabia as a pre-service teacher.	Teaching ESL in Iran in the past and currently in the USA.
Technology Background	she knew the basics of using technology, and she did not use it in her past teaching experience except for basic tools such as PowerPoint.	she had an intermediate to skillful level in technology. She is using technology in her learning and teaching, and she is working on including more technology to her classroom.
The Final Project	a blog for teacher professional development.	using animated videos to teach the sounds and shapes of letters in Persian.
Audience	Saudi teachers (adults).	second generation Iranians in USA (children)

Nadia. In the pre-questionnaire, Nadia agreed that she learned about other cultures through digital media. As an example of what she had learned, she said that cultures other than hers are usually using Google as a first option to search about something. On the other hand, in Nadia's culture, they prefer to ask someone first. This cultural background influenced her answer to the question on how she evaluates online materials. She said that she would ask people she knew first, and if they did not have the answer, then she would search it herself. She also stated that she feels comfortable using YouTube in her classrooms as the only non-academic resource she uses in academic settings. She interpreted the reason that her professors were using YouTube in their classes, which made her feel comfortable to use it as well. Her preference of asking others implies that she appreciated professionals' opinions.

Nadia's interview was rich in cultural aspects. Nadia had a problem while creating her blog in that the images did not appear on the blog.

The researcher: What is your plan to fix the images problem?

Nadia: I might come back to you and ask, or I would ask my husband because I usually ask him about technology issues.

The researcher: Is there anything else you might do other than asking?

Nadia smiled and said: I will search how to solve this problem before asking, and I want to add another lesson to my blog. I want to continue working on this blog and I will not stop, but I do not know why I say I will ask you before saying I will search. (Translated from Arabic)

Nadia unconsciously said that she would ask the researcher or ask her husband because many people in her culture would not Google for information if they know that someone has the answer.

Another example of how the cultural background affected Nadia's choices when creating her project was something happened in one of her classes as a graduate student; the whole class watched a video clip for a young singer who dressed and acted in an inappropriate way from Nadia's perspective. For Nadia, the video clip was very inappropriate, and she was embarrassed that she could not look or participate in the discussion. Nadia grew up in a conservative culture where it is not acceptable to use such videos in a classroom. Based on this experience, Nadia decided to make sure that she would not choose an image or a video that might be controversial for her audience, and she would ask them before sharing it.

Jasmine. Unlike Nadia, Jasmine's cultural background did not appear that much in her answers. In the pre-questionnaire, she agreed with the statement that she learned about other cultures through digital media, but she did not give an example of what she had learned. However, in choosing her final project, she wanted to teach her native language to second generation Iranians in the USA. During the workshop, Jasmine's cultural background did not make an appearance in her discussions or assignments except for explaining her native language because it is the main focus of her project. Her experience and educational background affected her choices more than the cultural background.

Jasmine's cultural background did not appear in her interview except when answering related questions. However, it was interesting that Jasmine and Nadia were similar in asking their husbands for assistance in their projects, but in different ways. While Nadia asked her husband when she had a technical problem, Jasmine actually worked with her husband on developing and creating the project because it is part of their work together. Jasmine's experience of living in a different country opened her eyes to things that she was taking for granted in her culture. The online workshop, on the other hand, helped to open her eyes to things that she was taking for granted when using digital media such as reading a broadcast or an image that she received or saw in social media.

Jasmine: Since I came to the US, the aspects of my culture have become stronger. Maybe my culture was taking for granted but in here it is just flashing when I want to transfer this idea of my culture to other people.

b. The Audience's cultural backgrounds

Nadia. Nadia planned to do a project related to Saudi teachers, focusing on new Saudi teachers' problems. She suggested creating a blog where these teachers could interact with each other. Nadia also aimed to offer a platform for Saudi teachers where she posted online workshops for professional development.

Nadia's interview highlighted some aspects from her cultural background and especially her audience's background. Nadia was knowledgeable about her audience as well. She considered the cultural aspects of her audience to make sure that her class was a comfortable environment for the students. As an example, some people from her culture were conservatives in which that they do not listen to music. This aspect affected some of Nadia's choices for her project, for example, when she found an interesting blog about music, she decided not to use it because music was not even a subject that she could share in Saudi public schools.

Nadia: Even though I am more open-minded since I live here, when I go back to my country, some people might be conservative, and I need to care about them. I might ask before using a song if everyone is accepting that to make sure that everyone is

comfortable with what they watch and listen to in the classroom. (Translated from Arabic)

Jasmine. Jasmine also chose a digital media project to attract the new generation from her culture who live in the USA to help them learn their native language. She decided to create an animated video because she said that the new generation, especially children, was attracted to that technology. The impact of Jasmine's awareness of her audience appeared in her choices for the theme of the animated video. She chose a zoo theme since her audience was young and from a second generation. Since Jasmine's audience for the final project was children learning Persian, she mentioned several times in the interview that today's students were "professional" in using technology and facing professional digital content. Consequently, she was not comfortable using her final project as a formal teaching tool in real life because she did not know what the Persian students would say about it. She thought that her project was "naïve" and her plan to improve it would be to hire someone "professional" to visualize her ideas in a professional product.

Discussion

The results indicated that both participants were interested in reading comments in social media and they both agreed that the reason was observing how other people think in general. Nadia added that she was particularly curious to read comments related to her home country and by people from her culture. Nadia's interview resulted in different cultural interpretations, and she was aware of what she wanted to contribute to the educational system in her country. On the other hand, Jasmine was focusing on people from her culture who immigrated to USA. She reflected that the new generation of Iranians in USA integrated into the Western culture, and that she focused more on teaching Persian, not necessarily the culture. However, Jasmine discussed that her own cultural identity and her point of view were affected by living in another country. Nadia and Jasmine were both affected by living abroad, and this factor influenced their thinking and teaching methods. However, their cultural identities still appeared in their thinking and choices in some parts of the workshop.

The influence of culture on the participants and their audience can be related to the concept of participatory culture. Participatory culture according to Garcia et al. (2013), "is emerging as the culture absorbs and responds to the explosion of new media technologies that make it possible for average consumers to archive, annotate, appropriate, and recirculate media content in powerful new ways" (p.112). Garcia et al. claim that the world today has moved from having some producers and many consumers to a world that anyone can participate and have an active stake in the culture produced by adding their own experience and culture. Teaching critical digital-media literacy is not a linear process where the teacher tells the students specific steps to follow to produce digital media; instead, every student brings her/his experiential, cultural, and educational backgrounds and presents them in the format of digital media content.

Conclusion

In a digital age, people participate in producing and consuming digital media content to which they bring their own cultures, educations, and experiences. This variation of backgrounds and information available on digital media and the Internet increases the need for enhancing the new learners' awareness of cultural diversity as well as their critical thinking skills to evaluate multimodal texts. This paper provided insights on how educators in higher education might engage their students in the process of digital media production. The goal of this engagement was to acquire critical digital-media literacy that required students to enhance their cultural diversity awareness, in which they consider their own cultural identity as well as their audiences to produce more effective products in digital media. This study was a seed to explore the importance of acquiring cultural competencies along with critical digital-media literacy to accept the diversity in education and appreciate our differences. It also encouraged the students to explore their own cultural aspects and feel proud of their uniqueness.

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An Overview of Conflict and Students-Authority Conflict Management in Nigerian Tertiary Institutions

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Abstract

While no single definition of conflict exists, the fact still remain that it is an ever-present process in human relations which is rarely resolved easily. Conflict is a “process in which one party perceives that its interests are being opposed or negatively affected by another party” and “the interactive process manifested in incompatibility, disagreement, or dissonance within or between social entities”. It is in the context of this interactive process that this paper examines an “Overview of Student-Authority Conflict Management in Nigeria Tertiary Institutions”. This study adopts the Historical-cum-Descriptive and Explanatory methods of research using the secondary sources of data collection. The observation made from this study revealed that Students and Authorities of tertiary institutions in Nigeria engage in incessant conflicts because of one reason or the other, the resultant effect of which involve destruction of life and properties, elongation of academic activities and other negative consequences which are felt beyond the immediate environment of the parties in conflict. The paper also observes that since there is significant relationship between causes and effects of student-authority conflict, authorities of tertiary institutions should be more democratic in handling such students’ cases and adopt proper and more effective conflict management strategies which would produce a “win-win” situation on campuses. More importantly, school authorities are admonished to maintain a cordial and more receptive relationship with the students and involve them in decision making process.

Keywords: *Conflict, Conflict Management, Tertiary Institution, Students*

Introduction

Conflict is an inevitable friction in any human organization. Efficient and effective management of conflicts is fundamental to the development of any educational institutions, but the prevailing situations in Nigeria constitute a reversal of this reality. Conflict in higher educational systems is inescapable (Fatile and Adejuwon, 2011).

Conflict exists at every level of our academic world. While conflict can be negative and cause deep rifts in the framework of the institution, it can also be used as a tool to take the institution and the people in it out of stagnation to the new level of effectiveness (Holton, 1998). It functions where there are two or more persons in a group (student-student, student- authority) and where institutions’ authorities have to deal with people’s lives, self-concept, ego, sense of mission or purpose (Adebayo, 2009).

In the opinion of Mwuese (2008) conflict is a normal part of man’s social relation. No human organization is immune to conflict. Thus, it is safe to say that students come to schools with different experiences, attitudes, fears, backgrounds, hopes and aspirations which may lead to conflict between groups.

Statement of the Problem

Conflicts on campuses of tertiary institutions in Nigeria, the universities, Polytechnics and Colleges of Education, are growing in number, level and complexity. The current conflict context is clearly more challenging than in the past. It has been observed that students’ crisis is becoming more

rampant in tertiary institutions and the resultant consequence has been to the detriment of the teaching-learning atmosphere (Adeyemi, Ekundayo and Alonge, 2010).

It has been a common observation in Nigerian tertiary institutions that conflicts occur despite the existence of and use of various strategies by the authorities in managing them (Adeyemi, Ekundayo and Alonge, 2010). This shows that the strategies being adopted by the authorities of these institutions in managing or mismanaging these conflicts may be closely related to the administrative effectiveness of the institutions.

Students' revolts and crises leading to breakdown of law and order, closure of schools, expulsion of students from schools and destruction of lives and property among others have been a major issue of serious concern to the school authorities, parents, government and even students themselves (Akeusola, Viatonu and Asikihia, 2012). These students' crises have resulted into some of them becoming drop-outs or die during the process thereby leading to a complete waste of human resources, while the incessant closure of schools have limited the ability of higher institutions in Nigeria to offer students a very sound and qualitative education which is a major reason for the establishment of tertiary institutions.

Despite the various measures and mechanisms taken over the years in managing students' conflicts in our tertiary institutions, the menace seems to be on the increase and becoming more hydra-headed each passing day. Therefore, the issue of Student-Authority conflict is fast becoming a hydra-headed problem to resolve by heads of tertiary institutions in Nigeria. Since the institution harbors students who are adolescents, Student-Authority conflicts are therefore, inevitable. This paper work is basically focused on how best to manage student-authority conflicts in the institutions, hence, the need to research into the history and effects, conflict causes, management strategies and proper solutions for effective management of this menace in Nigerian tertiary institutions.

Theoretical Underpinning

National Education Policy on Tertiary Education

Education in its general sense is a form of learning in which the knowledge, skills and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education frequently takes place under the guidance of others, but may also be autodidactic. Akeusola, et al (2012) see the global socio-economic and political developments as increasingly being driven by the advancement and application of knowledge (education). This corroborates the assertion of the world Bank (1999) that education in general and higher education in particular is germane to the growth and development of knowledge and economy.

This explains the premises upon which tertiary and higher educational institutions are based in Nigeria. The Nigeria tertiary educational institutions are based in Nigeria. The Nigerian tertiary educational institutions are established with the aim of giving any student who enrolls in any one of them the benefits of a very sound and qualitative education, to be able to function effectively in any environment in which he/she may find himself\herself; so as to become more productive, self-fulfilling and attain self-actualization (Federal Government of Nigeria, 2004; Ajibade, 2013).

These institutions of higher learning (both secular and non-secular) are established for the purpose of training and providing the nation with the middle and high-level manpower it needs to attain the national goals. Such institutions include universities, polytechnics, colleges of technology and colleges of education (Joseph and Adewumi, 2007).

On the other hand, Joseph and Adewumi, (2007) categorise the non-secular tertiary institutions as the religious degree awarding institutions. These are established by various Christian denominations with the goal of training religious leaders for the work of the church. Such institutions include Seminaries, Colleges of Theology, Bible colleges, Schools of Divinity and Schools of Ministry.

The goals of tertiary education as enunciated above are crucial for national development (Ajibade, 2013). However, research studies by eminent scholars like Emaikwu and Eba (2001); Nwagwu (2005); and Okebukola (2006), have shown that many of the Nigerian tertiary educational institutions are

finding it difficult to achieve the highlighted lofty goals because of the problems confronting them (Ajibade, 2013). One of such problems is that of students' crises (Alabi, 2002; Aluede, et al 2005).

Historical and Contextual Analysis of Conflict In the Nigerian Tertiary Institutions:

Conflicts on the campuses of the Nigerian Tertiary Institutions are fast becoming hydra-headed phenomena growing in number, type and complexity. The context of the current Universities, Polytechnics and College of Technologies and Colleges of Education presents a clearly more challenging picture than in the past. The range of conflicts and the forum and mechanisms available for their management are much more far-reaching than ever before (Fatile & Adejuwon, 2011). It has been observed that students' crisis, according to Adeyemi, Ekundayo & Alonge (2010), is becoming more rampant in the tertiary institutions and the resultant consequence has been to the detriment of the teaching-learning atmosphere.

An overview of the study conducted by Akeusola, Viatonu and Asikhia (2012) reveals that the origin of students' crisis in Nigeria dates back to 1944 when students protested against the British authorities' intention to build a military base in Lagos to help in the second world war. Since then, students' crises have grown to become a regular occurrence in the country. By the mid-1960s and early 1970s, the form of protest changed from its peaceful, non-violent form to violent and open confrontations with the school authorities and security agencies leading to destruction of lives and property. In 1978, the introduction of tuition fees in all tertiary institutions in Nigeria led to the students' crisis tagged 'ALLI MUST GO'. Since then, students have used several means to express their grievances (Akeusola, Viatonu & Asikhia, 2012).

The lofty goals of tertiary education for national development notwithstanding, researches by scholars like Emaikwu and Eba (2001), Nwagwu (2005); and Okebukola (2006) have shown that many of the Nigerian tertiary educational institutions are finding it increasingly difficult to achieve these goals because of the problems confronting them among which is the students' crisis (Alabi, 2002; Anifowoshe, 2004; Aluede, et al, 2005). Although, students' crisis is a global phenomenon, its occurrence in Nigeria in the recent past was on the high side and has occurred at different levels of time phases (Olamosun, 2000).

It has been observed that students' crisis is becoming more rampant in the tertiary institutions and the resultant consequence has been to the detriment of the teaching-learning atmosphere. Moreover, incessant closures of schools according to Akeusola, Viatonu and Asikhia, (2012) have limited the ability of higher institutions in Nigeria to give students a very sound and qualitative education which is a major reason for the establishment of higher institutions. Despite the measures taken over the years in curbing students' crises, the menace seems to be on the increase.

Causes of Students-Authority Conflict In Nigerian Tertiary Institutions:

As in many developing countries, Nigerian higher institutions witness series of organizational conflicts (Fatile & Adejuwon, 2011). According to Alabi (2002) the intent and manifest causes of conflict in Nigerian University, just as in other tertiary institutions, has its origin in difference in objectives, interest, effort, approach, timing, attitudes and likes.

However, scholars differed in their explanations of the sources of student's crises (Ajibade, 2013). Onyenoru, 1996 traced the sources of student' conflicts in Nigeria tertiary institutions to fire related factors viz: authoritarian governance arising from erosion of institutional authority; infrastructural collapse and social distortion due to poor fording; poor motivation of staffs who have a major obligation for the moral character and well-being of the students; the impact of the under moral crises on the tertiary institution staff and students; and the precarious socio-psychological mental state of students as youths in social change and their consequent disposition to immediacy.

However, for a clearer understanding of the phenomenon of Student-Authority Conflict in Nigerian tertiary institutions, studies already carried out are painstakingly examined and its causes and related factors are enumerated below:

Wide Communication Gap: Studies have shown that wide communication gap between students and authorities of tertiary institutions in Nigeria has been observed, among others, as a major cause conflict (Fatile & Adejuwon, 2011) which aptly corroborates the findings of Adebayo 's (2009) studies on student-authority conflict in Nigerian University where it was revealed that authorities impose decisions on students without being communicated or consulted.

Failure to Guarantee Security Of Lives and Property on Campus: The most sensitive cause of conflict as revealed by studies were when institutions' authorities fail to guarantee the security of lives and property on campus (Adebayo, 2009) likewise the study carried out by Fatile and Adejuwon, (2011) further revealed that crisis in tertiary institutions in Nigeria, over the years, have led to break down of law and order, disturbance of public peace as a result of loss of lives and properties

Incompatibility of Perceived Goal: Conflict as defined as an overt behaviour arising out of a process in which one unit seeks the advancement of its own interest in its relationship with others. The potential for conflict is likely to be high where groups or individuals perceive and interpret the same phenomenon differently such as the university system where attention needs to be focused on the critical point of contact between the teacher and the learner (Alabi, 2002). Alabi (2002) further posits that the psychology of learning suggests that students will not learn well unless they are actively involved in process and so accept responsibility for their learning activities.

Competition for Scarce Resources: Closely linked with the foregoing is the issue of scarce resources which sets groups against one another in the Nigerian tertiary institutions. Research, teaching, staff pay and other welfare services all have their claims on the limited resources at the disposal of the university (Alabi, 2002). There is therefore, relative or absolute deprivation of the needs of all the groups within the system. Alabi (2002) submits that the consequences of inadequate provision of financial resources to the university system are the decay of structures and the decline in services and production.

Politics, National Issues and Internal Problems

The study by Akeusola, Viatonu and Asikhia (2002) revealed that students' violent reaction to national issues and internal problems such as secret cultism are largely contributing to students' unrest in Nigeria. The origin of students' crisis in Nigeria dates back to 1944 when students protested against the British authorities' intention to build a military base in Lagos to help in the Second World War (Akeusola, Viatonu & Asikhia, 2012). In addition to conflicts arising from situations intrinsic to the university and other tertiary institutions, Alabi (2012) posits that some arise due to political objectives out of the University. National issues, especially with political undertones, do bring about conflict. For instance, the issue of annulled June 12, 1993 Presidential elections brought about violent demonstrations by students of tertiary institutions against the state, resulting to deaths, destruction and frequent disruptions of academic calendar (Alabi, 2002).

Management Leadership Style: Most heads of tertiary institutions in Nigeria adopt authoritarian-cum-autocratic leadership style by not listening to the yearnings and aspirations of the students and their lackadaisical attitudes in terms of provision of amenities such as water, health facilities etc (Ajibade, 2013). Ajibade (2013) further posits that all these again act as strain on the students' actualization of their dream or goals which invariably result to crisis situations in most of the tertiary institutions.

Conflict Management Strategies in Nigerian Tertiary Institutions

Conflict is an inevitable phenomenon in any human organization including the Nigerian tertiary institutions. It is impossible to eliminate conflicts completely out of these institutions considering its positive and negative dimensions. According to Alabi (2002) the real managerial challenge, therefore, is to find some methods of managing them from becoming debilitating, while still retaining the full posture of potential of competition, arena and creativity, growth and improved job satisfaction and morale.

Conflict management strategies adopted by almost all heads of tertiary institutions in Nigeria are within the reach of the crisis management model postulated by such scholars as Best (2006). These methods of managing crises are: the use of violence / coercion, bargaining and negotiation, problem solving and mediation.

Violence and Coercion: This conflict management strategy, physical or psychological form, is a win or loss style of managing crisis. It is asserting one's view point through the use of coercive state apparatus at the expense of another, Best (2006).

Closure of Institutions: Concerned authorities (government and institution) often take the form of immediate closure of institutions with an ultimatum instructing students to vacate their halls of residences and premises (Alabi, 2002; Onwurah, 2000), what followed next is the suspension or dissolution of students' unions and their executives.

Constructive Communication Process: Studies have shown that some heads of tertiary institutions adopted the use of constructive communication measure in curbing students' crises on their campuses. This is corroborated by the submission of Fatile and Adejuwon, (2011) whose study revealed that in resolving school conflict, developing a constructive communication process and influential conflict negotiator's personality are very important.

The Use of Dialogue: This is another effective way of curbing students' crises which heads of tertiary institutions in Nigeria employ (Fatile and Adejuwon, 2011). A study carried out by Adeyemi, et al (2010) revealed that maintaining a very cordial relationship between the school authorities and the students as well as involving students in decision-making process have been the most effective strategies of curbing students' crises.

In addition to the foregoing, studies have revealed there are some other conflict management strategies adopted by authorities of tertiary institutions in Nigeria to contain students' crises.

These, among others, include good government policies and adequate funding, considerable students' welfare, good government and effective social security, cultured and motivated students' unionism, cordial community relations, efficient and well-functioning teaching-learning facilities etc (Akeusola, Viatonu and Asikhia, (2012) Adebayo (2009) Lawal (2014).

Conclusion / Recommendations

This paper reviewed Students-Authority Conflict Management in Nigeria Tertiary Institutions within the historical context and identified the factors, both remote and immediate, responsible for the incessant occurrence of conflict in the country's higher institutions. The paper also examined a review of the various conflict management strategies adopted by the individuals and corporate groups involved in the administration of institutions of higher learning.

However, conflict management strategies employed by authorities of these institutions ranging from immediate closure of institutions, banning of students' unionism and suspension or expulsion of students' union leaders, the involvement of the police and other security agencies are discovered to be regulatory, assertive and aggravate the phenomenon. It is on the basis of these findings that the following suggestions / recommendations are therefore made.

Authorities of tertiary institutions are admonished to adopt situational type of conflict management strategies, that is, two or more strategies could be combined to nip conflict in the institutions. Thus, conflict management does not connote a rigid approach that suits all situations, rather, it involves a series of concerted efforts to prevent and or arrest a seemingly serious and violent conflict. This would produce a "win-win" situation on campuses of higher institutions of learning in Nigeria.

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Is Mobile Assisted Language Learning an Effective Approach to Improve the Speaking Skills of Beginner Students of Spanish as a Foreign Language?

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Abstract

This paper describes the result of research, which was carried out in a Swedish secondary school. The projects' main objective was to explore whether an educational methodology, based on MALL (Mobile Assisted Language Learning), is as effective as a more formal, face-to-face, educational setting would be, in order to improve the speaking skills of students who were studying Spanish as a foreign language. This research consisted of a quantitative, quasi-experimental study, which was conducted on an experimental group and a control group. The experimental group worked with a learning module based on MALL, while the control group worked with a teacher in a traditional classroom. The students of both groups were given a pre-test and a post-test in order to evaluate their speaking skills before and after the treatment. A t-test was applied to the students' test results in order to determine whether or not a statistically significant difference between the results of both groups existed. This test showed no statistically significant difference, indicating that the MALL based learning module was as effective as the face-to-face educational setting with regard to improving the verbal interaction skills of the students learning Spanish as a foreign language, (following a task-based communicative approach). However, the result of an effect size test that was applied as a complement to the t-test, showed that the effect size of the treatment applied to the experimental group was indeed moderate.

In conclusion, this paper emphasizes the versatility and potential of mobile devices to satisfy many of the requirements of the new paradigms in language learning, as well as the needs of younger students of foreign languages. While previous researchers focused on the use of MALL to develop reading and writing skills, this paper reveals that it is also possible and effective to use MALL to improve the learners' speaking skills.

Keywords: Mobile Assisted Language Learning, Spanish as a foreign language, innovation in language learning, development of speaking skills, research in applied linguistics.

Introduction

The teachers of today face the challenge of teaching and instructing a generation of students that have been born into, and grown up in, a highly technical world; one that makes an ecosystem of connectivity possible, where new forms of being, doing, and interrelating are constantly emerging (Van Dijck & Poell, 2013). This digital revolution has fostered and strengthened the tendency toward globalization. It is a new world order characterized by a substantial increase in international commerce, cultural exchange, and the interdependence between different countries around the world (Ferreiro, 2006).

Facing this reality, the need to re-think language teaching so that it meets the needs and expectations of both the pupils and the society in which they are immersed is crucial. The principal challenge is to provide learners an education that prepares them to respond to the demands of their environment with the capacity to adapt and to perform with a critical way of thinking, which will enable them to maintain their self-sufficiency and to develop their collaboration skills.

To address the requirements of this new social logic, in the particular field of language learning, the challenge of taking advantage of the relationship between everyday life and mobile assisted language learning, social media interactions, and the intertwining of augmented reality and real life is taken on

(Kukulska-Hulme, 2013). It is in this context that Mobile Assisted Language Learning (MALL) emerges. Two areas of knowledge converge in this new pedagogic paradigm: Foreign Language Didactics and Computer Assisted Language Learning (CALL). The study presented here pertains to this scientific field of applied linguistics.

Along with authors such as Kukulska-Hulme, Norris & Donohue (2015), Burston (2014), Sharples, Taylor & Vavoula (2007), for the purposes of this research, MALL is considered to be characterized not only by the use of mobile devices but, mainly, by the mobility of the learners and their learning environment, which entails the re-thinking of the whole learning process including the role of both the teacher and the learners. Other features that characterize MALL, and that differentiate it from traditional learning, are its possibilities of being used in both formal and non-formal settings, its power to facilitate both individual and collaborative learning, and its capacity to transform teacher-centered learning into student-centered learning (Kukulska-Hulme, 2013).

Even though MALL is a fairly new field, it has developed rapidly due to the equally rapid development of the tools that support it. The exponential development of technology and mobile devices, at the beginning of the new millennium, allowed the significant increase in MALL applications, with regard to the skills to be developed and the resources used. Thus, the lack of studies related to speaking skills is noteworthy (Sung *et al.*, 2015; Burston, 2014; and Viberg & Grönlund, 2013). Studies that focused on aspects related to oral expression (OE) only began to be carried out after the first decade of this millennium. Four studies that are relevant because of the obvious emphasis they place on OE skills by means of the production of audios and videos created with the help of mobile devices should be mentioned: Audio taped Oral Dialogue Journals (Moladoust, 2014), Digital stories (Gromik, 2015), Speaking English 60 Junior (Ahn & Lee, 2015) and Videos for Speaking K (Ibáñez, Vermeulen & Jordano, 2015).

Since previous research available only explored the learners' attitudes and perceptions, there is still a considerable void of investigation: to determine the effect that mobile learning interventions can have on learning outcomes. Furthermore, according to various authors (Sung, Chang & Yang, 2015; Kukulska-Hulme *et al.*, 2015; Burston, 2014; Kukulska-Hulme & Shield, 2008) there seems to be a lack of studies that maximize the essential characteristics of mobile technology (mobility, cooperation, and interaction); that address problems in the areas of oral expression and comprehension, particularly those that involve synchronous activities; that study the teaching and learning of other foreign languages besides English; and that work with adolescent groups.

In this context, the study presented in this paper is relevant, in that it incorporates several of the above-mentioned components that have not yet been addressed or that are just beginning to be addressed in the field of MALL. The main objective of this study was to determine the effect that a mobile assisted didactic intervention could have on improving the oral interaction (OI) skills of Spanish as a foreign language student at an A2 level, according to the criteria of the Common European Framework of Reference for Languages: Learning, Teaching, and Assessment (CEFR).

Method and materials

The core research consisted of a quantitative, quasi-experimental study in which the subjects were not assigned randomly. Convenience samples comprised of predetermined and intact groups were used (Cohen, Manion & Morrison, 2007). A controlled experiment that provided data on the improvement of the subjects' OI skills was carried out. Therefore, it constitutes a study employing both descriptive and applied research.

The main objective of this study was to reveal whether MALL could be an effective learning strategy to improve the OI skills of students of Spanish as a foreign language, in a learning environment based on the Communicative Language Teaching (CLT) approach (Wilkins, 1976, Brumfit & Johnson, 1979; Littlewood, 1981; Melero, 2008) and the Task-Based Learning (TBL) methodology (Breen, 1987; Prabhu, 1987; Nunan, 1989; Candlin, 1990; Estaire & Zanón, 1990; Willis & Willis, 2007). With this goal in mind, a didactic intervention was developed (León, 2016), which was aimed to help the students get to know, practice, and use six strategies of OI: 1) initiating a conversation, 2) changing the subject, 3) ending a conversation, 4) collaborating through comments, 5) collaborating through questions and monitoring, and 6) asking for explanations (Fernández, 2008).

With respect to the study population, a convenience sampling was used, which included a certain degree of randomization. This type of sampling is very common in studies in the field of education (Cohen *et al.*, 2007). The sample used in this study was comprised of a total of 44 ninth grade secondary education students at the Hammarlunden School in Sweden. This group was divided into an experimental group (group E) of 26 students and a control group (group C) of 18 students. Although these groups are not equivalent because they are not completely random, the sample was considered sufficient and acceptable since the subjects were in the same grade and attended the same school. Likewise, it was a homogenous group in terms of age (14 and 15 years old), social group (middle-upper), and foreign language level competency (A2).

For four weeks group C carried out the didactic intervention in a face-to-face classroom setting, while group E carried out a Mobile Assisted Didactic Intervention (MADI)¹. In both cases the didactic intervention was carried out during the time assigned to the regular Spanish as a foreign language classes (160 min per week). However, group E had the possibility to work with MADI, potentially, any time and any place.

The development of this experiment enabled the testing of the study's central hypothesis: MADI is as effective as the face-to-face didactic intervention to improve the OI skills of students of Spanish as a foreign language. Therefore, it was expected that the results obtained by the students that learned with MADI (group E) would be as good as the results obtained by the students that learned in the face-to-face classroom setting (group C).

To collect quantitative data aimed to prove this hypothesis, an oral test was given both as a pretest and a post-test to group C and group E. Following Bordón's typology (2008), this test consisted of a guided dialogue, which entailed a short conversation following a few guidelines that established its topic and duration. This oral test was designed in accordance with the postulates of the communicative and task-based approaches and, therefore, it consisted of completing a task that was as similar as possible to a real-world communicative one.

Results and discussion

As presented in table 1, the SD (standard deviation) values indicates that the dispersion with respect to the mean increased in both groups after the treatments, being even higher in group E. This shows that the learning results were less homogeneous when using MADI than when using a face-to-face setting, which could indicate that MADI enhances the learning process of certain students more than of others.

Table1. SD and mean in groups C and E.

¹ MADI consisted of an online digital module developed with VoiceThread, which presented the contents and the tasks for the students in a multimodal and non-linear way. Other digital applications and social networks were also used in order to develop the tasks and to interact: Facebook, Fronter, GoAnimate, Skype, Socrative and Glosboken (León, 2016).

Group	Pretest SD	Post-test SD	Pretest Mean	Post-test Mean
C	2.4	2.6	6.7	11.6
E	2.5	3.6	9.0	13.5

Table 1 also shows that the mean was higher in the post-test of groups C and E, which mathematically indicates that the OI skills improved in both groups. Similarly, the mean in group E was higher than the mean in group C, both in the pretest and in the post-test, which mathematically shows that students in group E achieved better results than students in group C. To demonstrate the statistical validity of these results, intergroup and intragroup analyses were carried out through the application of three tests: a t-test, an analysis of variance (ANOVA) and an effect size test.

The intergroup analysis was made using a t-test for dependent samples that was applied to group C and to group E. The results revealed that in both groups, the difference between the mean obtained in the pretest and the mean obtained in the post-test was statistically significant (group C: $t = -7.1$, $\rho = 0.0$; group E: $t = -6.5$, $\rho = 0.0$). This means that the students who carried out the face-to-face didactic intervention and the students who carried out MADI improved their OI skills.

The intragroup analysis was conducted using a t-test for independent samples in order to determine whether there were statistically significant differences between the means of groups C and E in both the pretest and in the post-test. The t-test applied to analyze the pretest data of the two groups showed that there was a statistically significant difference between the mean of the two groups, in this case favoring group E. This indicated that the OI skills of the subjects in group E were slightly better than those of the subjects in group C, before the didactic intervention. The possible inconsistency that this statistically significant difference could generate was neutralized with the ANOVA test, which is explained further on.

Regarding the post-test results, the t-test showed no statistically significant difference ($t = -1.91$ and $\rho = 0.062$). This verified the pedagogic hypothesis of the main study: that the MADI was as effective as the face-to-face didactic intervention, in improving the OI skills of students of Spanish as a foreign language.

As a complement of the t-test, a statistical analysis of variance was carried out using the ANOVA test. This is because the ANOVA test is considered to be more robust than the t-test and it is used when the results based on the variance of two or more groups of observations need to be contrasted (Cohen *et al.*, 2007). In this study the ANOVA test was applied in order to compare the percentage of improvement made by group C (2.04) with the percentage of improvement made by group E (1.84). The result of ANOVA (0.19) demonstrated that there was no statistically significant difference between the percentages of improvement made by the two groups. Besides corroborating the main hypothesis, this result eliminated the possible incongruence caused by the statistically significant difference found between the OI skills of group C and group E in the pretest since it showed equivalence in the improvement percentages of both groups.

Following the approach of Cohen *et al.* (2007) regarding the lack of significant difference being a factor for making decisions in educational research, where “statistical significance is not the same as educational significance” (Cohen *et al.*, 2007, p. 520), it is assumed that in educational research there can be relevant differences even though the statistical results indicate the opposite. This is mainly due to the fact that the cut-off point for the significance level (0.01, 0.05, etc.) is absolutely arbitrary and therefore the coefficients that fall close to it merit being checked against other parameters, such as effect size.

As previously explained, the t-test which was applied to the post-test outcomes of groups C and E showed no statistically significant difference between them with $\rho = 0.062$. Since this value was very close to the

assumed significance level of 0.050, it was possible to infer that an important effect of the independent variable (MADI) on the dependent variable (improvement in the OI skills) might exist. In order to determine the effect size of MADI on the learning achievements of group E, a Cohen's *d* test, based on mean and SD data, was carried out. The value obtained was 0.60, which means that MADI had a moderate effect according to Cohen's *d* scale: 0.00 – 0.20 = weak; 0.21 – 0.50 = modest; 0.51 – 1.00 = moderate and > 1.00 = strong effect size (Cohen *et al.*, 2007).

Unlike previous studies that prioritized qualitative analysis of the learners' perceptions, this study presents quantitative results, which refer to the learners' achievements when using MALL, namely the improvement of learners OI skills. Another important contribution of this study is that it focuses on speaking skills, which has been practically unexplored in the reviewed studies of MALL.

This study also presented some differentiating features regarding the population and the target language. The population consisted of secondary school students, –a population that was under-represented in previous studies. The target language was Spanish, which was also under-represented in previous studies.

Conclusions

This research points out that mobile learning is an effective approach to improve the speaking competency of students of a foreign language. More specifically, the main finding of this study is the fact that MADI was proven to be an effective learning method to develop the OI skills of students of Spanish as a foreign language. It is also important to take into account that this learning environment led to more heterogeneous learning results than the ones obtained in a face-to-face learning situation. This could indicate that MADI is a more beneficial learning environment for some students than for others. This finding may lead to further investigations about the possible correlation between MALL and cognitive styles.

By integrating the field of Foreign Language Didactics with the field of MALL, this study demonstrates the immense potential and versatility of mobile devices to satisfy many of the strategic and affective demands of both the new foreign language learning paradigm as well as today's student population experiencing the rapid advances in technology. In this sense, this work also emphasizes the current validity of the Communicative Approach and Task-Based Learning methodologies, whose principles and foundations can be fostered through the use of mobile technology, overcoming many of the limitations imposed by the classroom setting.

Finally, it should be emphasized that mobile technology is an intrinsic factor of daily life for a great majority of the student population, and its incorporation into their learning environments seems increasingly essential and natural. In this context, the research carried out in this study may contribute to the incorporation of mobile devices and resources into the foreign language classroom, in a responsible and innovative way. It may also encourage teachers and investigators to continue researching the possibilities offered by mobile learning in order to assist the development of the different components of the students' speaking skills.

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The nature and contextual influences of visual plagiarism: A study of perceptions among faculty and students in an art and design college

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Abstract

Plagiarism is a serious and persistent problem that has caused great concerns among educators. The digital age has presented some new challenges such as the ease of cut and paste from the Internet, a lack of knowledge of how to cite electronic information, and a reduced sense of guilt. Visual plagiarism, the act of passing off another person’s artwork and images as one’s own without proper attribution, is a unique problem among students in art and design disciplines. While there is an abundance of literature about text-based plagiarism, there has been little research about visual plagiarism. Adopting a case study approach, this qualitative study has investigated the nature and contextual influences of visual plagiarism by examining both faculty’s and students’ perceptions. Results of the study are reported as themes, revealing a great amount of uncertainty about visual plagiarism among faculty and students. The study also indicated that visual plagiarism is caused by several internal and external factors such as laziness, insecurity, lack of clarity, digital culture, and social media. The hope is that better understanding of this problem will ultimately lead to more effective strategies for institutions to uphold academic integrity.

Introduction

Academic dishonesty is a serious and persistent problem that has caused great concerns among educators. The digital age has presented some new challenges to this century-old problem such as the ease of access to information on the Internet, a lack of knowledge of how to cite electronic information, and a reduced sense of guilt for committing web plagiarism (Comas-Forgas & Sureda-Negre, 2010; Granitz & Loewy, 2007; Wang, 2008). The “cut and paste” culture is not limited to text-based plagiarism. The copyright infringement dispute over well-known graphic artist Shepard Fairey’s Barack Obama “Hope” poster is a high-profile legal case that has brought national attention to another type of plagiarism: visual plagiarism (Rosenfeld, 2011). Visual plagiarism refers to the act of passing off another person’s images, illustrations, or designs as one’s own without proper attribution. With vast numbers of images readily available on the Internet, the concern over visual plagiarism in today’s art and design colleges should not be overlooked.

There are many possible factors that contribute to the problem of visual plagiarism. For example, appropriation, collage, and homage are all traditional practices among artists, and students are often taught those skills in their foundation art classes (Garrett & Robinson, 2012; Porter, 2010; Walker, 2009). These practices often make it difficult to distinguish between plagiarism and referencing. Another factor may be the open source movement. While started as a way to foster collaboration among programmers, the movement has helped to create a culture of downloading, modifying, and sharing information and resources online, therefore, further challenging the notion of fair use (Wheeler & Anderson, 2010). There is an abundance of royalty-free images available on the Internet. It is debatable whether it is acceptable to incorporate those images or ones purchased from stock image web sites into one’s own creative projects. A lack of awareness and knowledge among faculty and a lack of institutional guidance may also be contributing factors (Garrett & Robinson, 2012).

There is an abundance of research that focuses on the nature, extent, and influences of plagiarism. McCabe and Treviño (1993) and McCabe, Treviño, and Butterfield (2002) have found in their studies that a number of factors such as university honor codes, perceptions of peers’ behavior, the understanding and acceptance of academic integrity policies, certainty of being reported, and perceived severity of

penalties all have a significant association with the decrease or increase of academic dishonesty. These studies, however, focused exclusively on text-based plagiarism, and it is unclear whether the findings also apply to visual plagiarism. Compared to the extensive body of literature on text-based plagiarism, research on the topic of visual plagiarism is almost nonexistent (Porter, 2010; Simon, Cook, Minichiello, & Lawrence, 2014). Furthermore, while there are several software tools to detect text-based plagiarism, there have been very little research and development of tools to identify visual plagiarism (Garrett & Robinson, 2012).

Methods

This study aimed to investigate the nature and contextual influences of visual plagiarism in an art and design college by examining both faculty's and students' perceptions. The overarching research question was: What is the nature and contextual influences of visual plagiarism according to the perceptions among faculty and students in an art and design college? A qualitative case study method was chosen for this study in order for the researcher to develop an in-depth analysis of a program, activity, or individuals in a specific context (Creswell, 2013)

Participants. This case study was conducted in a private art and design college in the west region of the United States of America. Three faculty members and four students participated in this study. The researcher purposefully selected faculty members who had at least 3 years of teaching experience of courses that are heavily dependent on visual materials. She also purposefully selected students majoring in creative disciplines that involved heavy usage and creation of visual materials, such as Graphic Design and Photography. The researcher also focused on upperclassmen who were in their junior and senior years, as they had taken more courses, gained a better understanding of their disciplines, and become more familiar with college policies. Additionally, this study was designed to only investigate American faculty and students' perceptions, so international faculty and students were excluded.

Instrumentation and Procedures. The instruments used in this study included naturalistic observations, face-to-face interviews, reflective journal notes, and review of relevant documents.

Observation of the natural setting is critical in providing a description of the context in a case study. In this study, the researcher observed classrooms, faculty offices, and other public areas on campus. The researcher used a Field Observation Protocol to take notes during observations. She also took photographs of various areas and artifacts of interest.

Interview is a meaning-making process because, as participants tell their stories, they inevitably reflect on their experiences in order to construct the stories (Seidman, 2013). In this study, the researcher recruited participants by emails and conducted a face-to-face interview with each participant at a location agreed upon by both the participant and the researcher. The shortest interview lasted 45 minutes, and the longest one lasted 80 minutes. All interviews were carried out in a quiet room on campus with closed doors and were audiotaped. Two separate lists of pre-determined questions, designed for faculty and students respectively, were used in the interviews. These questions are open-ended so as to allow participants to elaborate on their personal experiences and perspectives. In addition, the researcher asked some follow-up questions in order to clarify the interviewees' statements or to seek additional information. Face-to-face interviews allowed the researcher to not only document participants' responses to the interview questions but also observe their non-verbal reactions such as gestures and facial expressions.

In addition to the audiotaped interviews, the researcher also kept hand-written notes during and after each interview. These notes focused on the observation of the settings and the participants as they described their experiences with visual plagiarism. Non-verbal information that was difficult to capture in the audiotape, such as facial expressions, gestures, body language, and so forth, was written down in the journal notes. The researcher also wrote down her impression of the interview during and

immediately after each interview. Furthermore, the researcher used journal notes as a tool of reflexivity throughout the research process in order to review data collection process and examine her own bias.

Finally, the researcher also examined relevant institutional documents, such as the College Catalog, Student Handbook, Faculty Handbook, course syllabi, and faculty handouts. She first reviewed these documents broadly and used the “search” function to identify relevant sections where the keywords such as plagiarism and copyright are contained. She then reviewed the relevant sections line by line and highlighted keywords and phrases. By examining data from various sources, the researcher was able to triangulate data and ensure validity of this study.

Data Processing and Analysis. Stake (1995) suggested that qualitative data analysis is the process of taking something apart and giving meanings to observations and impressions. The researcher conducted ongoing data analysis throughout this study, which allowed her to reflect on the process immediately, be aware of data saturation, and look for patterns and themes. The researcher personally transcribed each interview immediately after the session. The data was then coded in Microsoft Word using highlights and comments. The researcher then used Post-it notes of two different colors to summarize comments from faculty and students respectively. After that, the researcher laid all the Post-it notes out on a flat surface, and arranged and rearranged them until meaningful themes and categories started to emerge. During the study, the researcher also kept journal notes and observation notes, and collected documents and artifacts. The researcher then compared the findings from all the sources in order to triangulate data. The researcher also analyzed negative cases, which helped to provide a realistic assessment of the study (Creswell, 2013). To safeguard and protect participant’s confidentiality, pseudonyms were used throughout the study.

Findings

Seven interviews with both faculty members and students were conducted over a 2-month period. Two lists of open-ended questions, designed for faculty and students respectively, were used in the interviews. The first question was designed to gather the background information of each participant. The rest of the questions were designed to investigate (a) how faculty and students defined visual plagiarism and how they compared visual plagiarism with text-based plagiarism, (b) participants’ own experiences with visual plagiarism and their perceptions of its frequency, (c) participants’ perception of why students commit visual plagiarism, (d) faculty and students’ attitude toward visual plagiarism, (e) participants’ understanding of the university policy and their perspectives on punishment, (f) the impact of visual plagiarism on academia, and (g) the challenges faculty and students faced regarding visual plagiarism. As a result of careful data processing and analysis, the following five major themes emerged.

Theme 1: Defining Visual Plagiarism: Gray Area and Intention. Most of the participants were able to provide a generic definition of visual plagiarism, but they also attempted to use a specific example in their own field or from their own experience to illustrate what visual plagiarism meant to them. Based on their descriptions, and sometimes their struggle to clarify a scenario, it can be deduced that the concept of visual plagiarism was perceived to be more ambiguous than text-based plagiarism. The participants’ answers also indicated that they held very different attitudes toward intentional and unintentional plagiarism and wanted to distinguish the two. Throughout the study, the phrase “gray area” was repeated by multiple participants to describe their perceptions of visual plagiarism. Four participants used this exact phrase in their interviews, and Media Arts instructor Mr. Johnson alone mentioned it ten times in his interview. The other participants, while not using the exact phrase, also expressed a similar opinion that visual plagiarism can be subjective. Photography student Cooper stated the following when he tried to compare visual plagiarism with text-based plagiarism.

I'd say that text-based plagiarism is, is more concrete, I think . . . just because it's more traceable back to 'here's the original text, here's your text.' Uh, but I think with visual plagiarism, it can

kinda have a blurred line . . . if you're inspired by something, quote unquote, uh, that you could have pieces from someone's work, or it's kinda what, at what point do you see it as legitimate plagiarism versus inspiration. So I think in that sense visual plagiarism is a little harder to talk about, or a little harder to define, or at least enforce maybe, uh, because it's not as, as black and white, I think.

Just like the participants in Garrett and Robinson's (2012) study, several participants in this study also tried to associate a certain percentage of modification to the definition of visual plagiarism. Mr. Johnson stated that he emphasized with his students to make 80% modification to the original artwork in order to avoid plagiarism. Mr. Sanchez, another Media Arts instructor, indicated that 70% modification was needed. Cooper was unsure but guessed 70% or 60% of change as well. Mr. Sanchez; however, admitted that even the percentage can be subjective, "If I think that 70% is this, is the judge gonna think that? And that's . . . you never know. That's the hardest part." Furthermore, based on each participant's own view of what constitutes visual plagiarism, their perceptions on how frequently it happens differed drastically. Some participants thought it rarely happens and others thought it happens all the time. Because of the ambiguous nature of visual plagiarism, faculty seemed to have adopted a cautious attitude. On one hand, they caution their students to modify existing artwork as much as possible in order to avoid plagiarism. On the other, when plagiarism is suspected, they approach it with caution and try to avoid confrontation.

It is also evident that the participants held very different attitudes toward intentional and unintentional plagiarism. All of the participants held a condemnatory attitude toward intentional plagiarism where students knowingly "stole" other people's work. Words such as "severe," "hard-core," and "bitter" were used to describe their feelings. Their attitude toward unintentional plagiarism, however, was one that is much more understanding. Faculty discussed the importance of early education and intervention, and students discussed the importance of learning and being exposed to these concepts in classes. Several students also expressed concerns about accidentally committing plagiarism, but they clearly did not consider that as severe an act as intentional plagiarism. In fact, when asked what they thought the university should do when visual plagiarism was suspected, several participants suggested that it was important to investigate first and determine whether the act was intentional or not. While participants would like to distinguish intentional and unintentional plagiarism, they also admitted that it would be difficult to judge someone's intention. Mr. Johnson stated, "Intent is not. . . I can't read minds. There's no way. A student may say one thing, and do another, as we know."

Theme 2: Internal Factors: Laziness and Insecurity. One of the objectives of this research was to better understand why art and design students commit visual plagiarism. The top two internal factors perceived to have caused visual plagiarism by both faculty and students are laziness and insecurity. The word "lazy" or "laziness" appeared in all but one interview. It was repeated a total of 19 times. For instance, Amy, a Fashion Marketing student, said, "I think visual plagiarism can stem from laziness and just not wanting to put the effort in to come up with your own ideas or to come up with your own drawings" Another reason that several participants brought up was fear and insecurity. They described the creative process as one that was difficult, time consuming, and sometimes overwhelming. They believed that, as a result, certain students who struggled to keep up with the seemingly endless demand of fresh, original ideas might resort to visual plagiarism in order to get by. For instance, Graphic Design student Lori referred to the lack of confidence as the second reason for committing visual plagiarism, after laziness, "I think lack of self-confidence in their work. You know, they, whether it's you're designing something, you're comparing it, you're using your inspiration, you're using examples, you've Googled online. Mine doesn't look as good as that one. I'm just gonna take that one and say it's mine." Sharing a similar sentiment, Photography student Betty suggested that a more lenient late work policy that the university recently adopted might have actually helped to curb the frequency of visual plagiarism as it took away some time pressure from the students.

Theme 3: External Factor: Digital Culture and Social Media. The quantitative studies McCabe and his colleagues conducted over the years suggested that university honor codes, perceptions of peers' behavior, certainty of being reported, and perceived severity of penalties were all significant factors contributing to the increase or decrease of academic dishonesty (McCabe & Treviño, 1993; McCabe et al., 2002). Participants in this study; however, did not directly refer to any of these concepts as contextual influences of visual plagiarism, although some of them were implied during the discussions. Instead, the participants focused on the digital culture as the primarily influence of visual plagiarism. All participants discussed visual plagiarism in the context of the Internet even though they were not specifically asked about it. Overall, the word Google appeared a total of 30 times in the interviews with it being mentioned by every single participant. Several participants commented on how the sheer number of images available on the Internet has made it both extremely easy for students to copy and almost impossible for faculty to track. Mr. Johnson referred to the phenomenon as an "avalanche" and a "title wave" that overwhelmed him sometimes. Cooper suggested that we were living in an age of image consumption and believed that social media had aggravated the problem, "I think a lot of people use social media like Instagram or Facebook or Pinterest especially, to, to almost fuel their inspiration, rather than having it come from them or taking elements from things and recreating, or like putting those different elements from different images together to make something that's yours . . ." Betty, the other photography student, shared the same concerns. Furthermore, they both felt that faculty members are not necessarily aware of this problem because most of them are not users of these popular social media platforms. During the interviews, Pinterest was collectively mentioned 23 times. All four students mentioned this site, but only one faculty spoke about it. Instagram was mentioned 11 times by three students, and Facebook was mentioned five times by all four students. None of the faculty members mentioned Facebook or Instagram. This pattern seems to echo Cooper and Betty's opinion that faculty members are often unaware of the role social media plays concerning visual plagiarism.

Theme 4: Leniency, Uncertainty, and Need for Support. It appears that faculty's general attitude toward visual plagiarism is less severe than that toward text-based plagiarism. For example, Interior Design instructor Mr. Ross stated that he did not require students to provide citations of images that were used as inspirations for a design project, but would require citations if the images were used in a writing assignment. Mr. Johnson believed that "the poets' words are unique," but regarding images, he stated, "In a world where the repetitive images is a part of lifestyles, it's just ridiculous; the idea that your one image is special in the sea of 10 billion images is just ridiculous." As a result, he also described his attitude toward visual plagiarism as "laissez faire." Betty described witnessing an incident with text-based plagiarism as one that she would never forget because of the severe reaction from the faculty, yet she felt the way faculty dealt with visual plagiarism was nothing more than "a slap on the wrist." The difference in attitude is probably a result of the ambiguity of visual plagiarism. Mr. Sanchez stated that the biggest challenge for him was to decide whether an act was in fact visual plagiarism and he would like to avoid confrontation because of that uncertainty.

There seems to be inconsistency among faculty members as well. Amy discussed this issue at length during the interview, pointing out that, when it comes to visual materials, some of her professors held high standard while others simply did not put much emphasis on things like citation. She felt that such inconsistency was the cause of confusion and lack of knowledge among students. The lack of consistency and clarity was also observed during document review and field observation. While the university plagiarism policy includes specific guidelines of how to paraphrase and use direct quotations, it does not have any guidelines of how to reference visual materials. The researcher also discovered that two slideshows created by two faculty members for their classes contained a number of images that were not cited. Additionally, field observation also revealed that most flyers posted around the campus contained images that were not cited.

McCabe and Pavela (2004) suggested that, to improve academic integrity, it was important for faculty to stop being a silent partner and start promoting campus-wide policies more actively. Unfortunately, it seems that the ambiguity of visual plagiarism and the lack of specific guidelines have

made it more difficult for faculty to take on such an active role. During the interviews, all three faculty participants expressed a strong need for support in dealing with visual plagiarism. Mr. Ross described the feeling of having to make a decision on the punishment by oneself as “lonely.”

Because if you're gonna take a difficult position like that, other people around you might not take that position, so for you moving forward in your decision, you're gonna feel like a lone ranger, you're gonna feel like 'I'm the tough guy. I'm the rough, tough one. I'm being mean to the students.' Whereas if it's institutionalized, you have a sense that you are not the one fully making the decision, you are initiating the process, and letting other people who might not, who might know more about it than you participate in it.

Mr. Sanchez also described confrontation as a big challenge for himself and mentioned several times that he preferred to consult his supervisor and colleagues first before making an accusation.

You just try to assess and try to get, for me, a collective assessment from others to kinda see if I'm on the right path. And so I usually try to do it with caution all the time, and just try to get consensus if you will of what others might think on the same subject, or what they might do, and that kind of helps to guide me. Plus maybe there's something that I might overlook, or somebody else might catch that I didn't.

All three-faculty commented that while there are plagiarism checkers such as Turnitin.com to assist with the discovery of text-based plagiarism, there are no reliable tools currently to track visual plagiarism. As a result, they largely relied on their experience and luck to catch visual plagiarism. Mr. Johnson suggested a three-prong approach to help faculty to overcome the challenges: (a) better education for faculty and students about fair use, (b) software tools to identify visual plagiarism, and (c) an “expert” that faculty can consult to verify and track visual plagiarism.

Theme 5: Legal Implication in the Real World. While the participants in this study were not directly asked about the concept of intellectual property, all of them associated visual plagiarism with copyright infringement. Some participants even believed that these two concepts were exactly the same. The word copyright appeared a total of 94 times during the interviews. This is not surprising considering that copyright is also a word that is repeated frequently in the university catalog, student handbook, and faculty handbook. Additionally, information about copyright and piracy is displayed on the monitors around campus, although it is designed to target the downloading and sharing of audio and video files and software programs. More importantly, all participants discussed the legal implications in the real world and felt that it was critical for students to understand the potential impact. Cooper stated, “in the real world, if we go out and try to use someone else’s images, we’re gonna get sued; we’re gonna get fired.” Similar comments were made by a student during one of the class observations as well. There were some exceptions though. Mr. Ross, for example, commented that knockoff furniture pieces were fairly common in the hospitality business. In general, the legal implication in the professional world seems to be an effective message to discourage students from committing visual plagiarism.

Conclusions, Implications, and Recommendations

This study revealed a level of uncertainty among faculty and students concerning the topic of visual plagiarism. Laziness and insecurity were attributed as the key internal factors that lead to visual plagiarism, while the digital culture and social media were attributed as the most significant external factors. Uncertainty among faculty has led them to a more cautious approach, which might be viewed as leniency and inconsistency by students; meanwhile, faculty expressed a strong desire for additional support from their peers, subject experts, and the institution. Finally, the study revealed that there is a

strong association between visual plagiarism and intellectual property infringement, and the legal implication in the real world can be a starting point of a meaningful conversation.

There are several implications of findings from this study that can be considered for practice in the field of education. The first suggestion is to provide faculty more training and support to increase their confidence in dealing with visual plagiarism. Faculty need more knowledge of this topic to model proper behavior and better educate their students. It should also help to eliminate the inconsistency in attitude and practice among faculty. This study found that visual plagiarism is often strongly associated with copyright infringement, so the second suggestion is for faculty and universities to leverage this finding by discussing plagiarism in the context of its legal implications. Having business owners or intellectual property attorneys to guest lecture is another idea that can be implemented. The third suggestion is to have an open dialogue among faculty and students about visual plagiarism. Asking students to talk about their perceptions and confusion might be more beneficial than simply reading university policies in the syllabi. Through an open dialogue, faculty and the institution can also further address the internal factors that lead to visual plagiarism. Workshops focusing on time management and self-confidence may be an effective way to provide students with tools to combat plagiarism as well. The fourth suggestion is to further address visual plagiarism in the university policy. University policies often address plagiarism in broad terms without providing specific guidelines on visual plagiarism (Economou, 2011; Porter, 2010), which may imply that the institution treats text-based plagiarism more seriously than visual plagiarism. Including verbiage in university policies to specifically address visual plagiarism can be particularly beneficial in art and design colleges. The fifth suggestion is to provide early education of visual plagiarism. As the use of electronic devices and the Internet becomes standard practice among students in secondary and even primary institutions, it is necessary to provide early education of media literacy and intellectual property laws to these students. The hope is that, as students learn how to be responsible users of digital visual content at a young age, they will be less likely to commit visual plagiarism once they are in college.

There are several limitations of this study; therefore, this researcher recommends the following areas as needing further research to better understand the topic of visual plagiarism. This study was carried out in a single private art and design college in a metropolitan area. Further research should be conducted in different types of postsecondary institutions and different areas and regions to see how results compare with those of the present study. Additionally, participants from more visual disciplines could be interviewed to provide a broader understanding of visual plagiarism. One major limitation of this qualitative study was the small sample size. To build upon the findings from this study, quantitative studies can be designed to examine the similarities and differences between faculty and students' perceptions. Further research might also benefit from expanding beyond the academic setting to include perceptions of industry professionals. By interviewing practitioners such as commercial designers, artists, photographers, and media producers, future researchers may develop a deeper understanding of how visual plagiarism is perceived in different creative industries, and the findings could further impact educational practices. Finally, future studies may also include foreign faculty and students in order to investigate the cultural impact on visual plagiarism.

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Improving poor performance of students in graphic communication

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Abstract

The purpose of this study is to ascertain the main factors contributing to students' abysmal performance in graphic communication skills and find effective and efficient strategies to deal with the problem. This research work gathered useful information on attitudes of students toward graphic communication, the role teachers must play to arouse and sustain student's interest in the subject and also the perception that people have toward the teaching and learning of the subject.

The study also considered the various methods and materials that are needed for effective teaching and learning of the subject as well as relevant Interventions that must be adopted in the teaching and learning of graphic communication.

The instruments used in collecting data were questionnaires, interviews and observation. Intervention measures were put in place which really helped in achieving the desired results.

Data gathered was carefully and systematically analyzed using tables, pie charts and bar charts for easy reading and understanding. Literature was reviewed on according to the problem identified and relevant research questions were used for the study. The opinion expressed by prominent authors was outlined. Finally, recommendations and suggestions for further studies for curbing these problems were made.

Keywords: *Graphic communication, Technical skills*

Introduction

Graphic communication involves the use of visual material to relate ideas such as drawings, photographs, slides, and sketches. The drawings of plans and refinements and a rough map sketched to show the way could be considered graphical communication.

Graphic communication (technical drawing) which is one of the major components of technical skills is increasingly becoming a major part of Junior and Senior High School curricular mainly because of the demand it makes on the intelligence of the students and the various employment opportunities available after school. This increase in popularity demands that great attention is given to the subject through effective teaching approach as well as provision of adequate tools and equipment. Blege (1986) noted that a country whose educational system only promotes the acquisition of theoretical knowledge at the expense of practical skills, merely scratches the surface of the educational process. It is dangerous to assume that application of knowledge will come automatically after one has left school. Application of knowledge has to be developed at school and not thrown to the wind of chance. Hammond and Lamar (1968), opined that student learn what they do. And if they do not perform correctly, the desired change in behavior should not be expected to take place.

The introduction of Pre-Technical Skills into the Junior High School curriculum is intended to provide students with the basic technical skills as a predisposition to technical pursuits at advanced levels. It is recognized that advancement of a country will only accelerate if a preponderant number of persons are trained in science and technology, with manufacturing as the outlet. The subject therefore offers pupils

the chance to acquire valuable technical skills (most of which are acquired through graphic communication) that will open up a wide range of opportunities for the production work.

The Background of the Study

Graphic communication an aspect of Pre-technical skills prepares students to acquire skills either for further studies or for employment.

However, student will find it difficult to acquire the intended creative and manipulative skills, if certain essential measures are not considered in the teaching and learning of graphic communication. Blege (1986) said that a country whose educational system only promote the acquisition of theoretical knowledge at the expense of practical skills, merely scratches the surface of the educational process. The end of term examination conducted on 19th July 2013, recorded low mean mark of 25.4 of form one students.

Also, the chief examiners report of the 2012/2013 basic certificate examination (B.E.C.E) revealed that student performed poorly in the subject.

The purpose of this research is to;

1. Identify the causes of poor performance of students in graphic communication.
2. Suggest practical solutions to the problem of poor performance of students in graphic communication.

Graphic Communication are composed of multiple elements that are abstractions of the real world. For students to be able to learn graphic communication, they must first have the ability to visualize and interpret drawings.

The following intervention will be helpful to eradicate the problem.

These are: Counseling,
Motivation and
Field trip

Methodology

This section deals with the methods used in conducting the study, the research design, the target population, the sample size, Data collection instruments, validity of the instrument, data collection procedure, pre-interventions, Interventions, implementation and data analysis of the study.

Research Design

The research design for this study was based on an action research, where the researcher identified a specific problem relating to teaching and learning of Graphic Communication. The researchers used constant step-by-step monitoring process over varying periods of time and by a variety of mechanisms (observation, class exercises, and assignments) for ensure feedback to be translated into modifications, adjustments, directional changes and redefinitions.

Population

The student population at the time that this research work was carried out was 110. This was made up of forty (40) form one students, thirty-nine (39) form two students and thirty-one (31) form three students.

The numbers of boys were 48 and that of girls were 62. The school has a staff of ten teachers including the headmaster.

Sampling Technique and Sample Size

The initial idea of the researcher was to conduct the research in all the classes in the school from form one to three in order to make this research more comprehensive and accurate, but due to time constraint in data collection and inadequate funds, it became more appropriate to confine the study to form 1 class only, where the problem was found to be more serious and where graphic communication was compulsory for all students.

The class has a population of Forty (40) students comprising twenty-two(22) males representing 55% of the class and eighteen (18) females also representing 45% of the class was used.

Data Collection Instruments

Data collection instruments refer to devices used to collect data such as questionnaires, tests, structured interview schedules and checklists (Seaman 1991:42).

The data collection instruments used for the study include the following: unstructured interview, observation and questionnaires. The researcher used a combination of questionnaire, interview and observation as instruments to collect data. The questionnaire was prepared for answers to be selected from options or requires simple Yes/No answer and in some cases an opportunity to express their views in writing.

Implementation of interventions

The interventions were implemented by the researcher in these various approaches: Assisting Students in setting out drawing sheets on the drawing board correctly, correct use of instruments and also manipulating drawing instrument.

Data Collection Procedure

This was to seek their views and practical abilities of the students. After that the researcher-initiated interventions data were gathered from the students.

Data Analysis

The researcher made use of tables to analyse data collected. A percentage was also used to describe the features and insights of the respondents. The pre-intervention and post intervention results were compared to verify the effectiveness of the interventions.

Results and Discussion of Findings

This section presents analysis and interpretation of data and findings of the study. It also looks at the background analysis, findings and interpretations of the data.

Figure 1 shows students' response to interview.

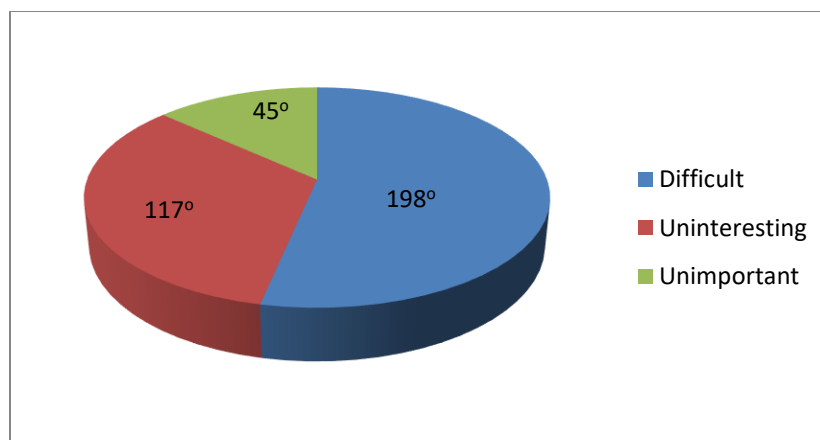


Fig. 1: Shows the results of student's interviewed.

Interview conducted on students revealed that, 22 students representing 196° said the subject was difficult, 13 students representing 115° said the subject was not interesting to them as compared to other subjects; the remaining 7 shows students representing 49° said the subject was not important to their future goals and aspirations.

TABLE 1 shows students who have drawing instruments and those who do not have drawing instruments (Questionnaire)

Drawing instruments	No. of students	Percentage (%)
1. Students who have drawing instruments.	14	35
2. Students who do not have drawing instruments.	26	65
Total	40	100

Fourteen students representing 35 percent have drawing instruments and twenty-six (26) students representing 65 percent do not have drawing instruments so they borrow from friends when they are drawing in the class. Twelve (12) students representing 60 percent responded that they know how to use the drawing equipment and the remaining eight (8) representing 40 percent said they do not know how to use the drawing instruments very well.

Table 2 Shows Pre-intervention assessment test and post intervention assessment test for students in graphic communication skills

Code	Pre-test		Post-test	
	Number of students	percentage (%)	Number of students	percentage (%)
0-4	8	20	2	5
5-9	26	65	3	7.5
10-14	10	10	5	12.5
15-20	2	5	12	30
21-24	0	-	10	25
25-30	0	-	8	20
TOTAL	40	100	40	100

Findings

The following are summary of findings of the research;

- The performance of students in graphic communication skills aspect of Pre-Technical Skills was found to be very low.
- It was realized that the level of student's interest in graphic communication skills was very low.
- Some of the student's perceive that the subject was very difficult.
- Students hold the view that the subject is not relevant to their future carrier.
- Some students find it difficult to manipulate drawing equipment.
- Some students do not have drawing instrument.
- Some of the students drawing instrument are defective.
- Few students practice drawing at home.
- Interventions helped in improving students' performance.

Conclusion

This study identified factors contributing to student's poor performance in graphic communication.

The factors include low interest of student in the subject, perception of the subject being difficult and not related to their future carrier.

However, the researcher believes that suggested interventions if put in use will help solve the problem. The limitation of the study is that it was based on only one Junior High School in the District. In spite of this its results can be generalized to all student within the District in particular and Country in general.

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Understanding Education Graduate Students' Experience with Publication

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Abstract

Graduate students are expected to participate in the publication process; however, graduate programs often do not provide formal training for students to engage in this scholarly work. Engaging in the publication process could be overwhelming for students if neither proper training nor mentorship is provided. Concerningly, there are few studies examining how to engage graduate students in the publication process, leading to limited directions for graduate programs to better mentor their students to publish. In consideration of these gaps, a peer-reviewed journal, operated by and for graduate students in education, undertook a research study to survey graduate students' experience with publication. The participants were education graduate students from a Canadian university. They completed an online survey and indicated barriers they faced that prevented them from publishing and what helped them to engage in the publication process. The authors conducted a preliminary summative content analysis on the participants' responses, which revealed that not knowing how and where to begin the publication process was one of the common barriers to publishing, while the presence of a mentor facilitated engagement in publishing.

Introduction

For many graduate programs there is an emphasis on having students conduct research, or at least being literate in its consumption. A function of this literacy is participating in the publication of scholarly work. Unfortunately, there are rarely formal opportunities in graduate programs to be involved in the research process as well as the publication process (Doran, Somerville, Harlem-Siegel, & Steele, 2014). This lack of a formal publication mentorship process leaves a gap in graduate students' training and research literacy (Ni Uigin, Higgins, & Mchale, 2015).

Scholarly journals have unique and specific requirements for publication and extended timelines from submission to publication, which understandably may discourage students from engaging in the publication process (Morese, Neilsen-Pincus Force, & Wulforth, 2007). Consequently, many students do not participate in the publication process, which leaves a plethora of scholarly work that goes unpublished (Garbati & Samuels, 2013). Critically, there are few studies empirically looking at how to engage graduate students in the publication process (Gardner & Barnes, 2007). It is important to identify the relevant training and experiential learning opportunities that graduate students find beneficial in order to help increase the efficacy of graduate training programs to facilitate student publications.

In consideration of the gaps in the literature and graduate training programs, an educational journal, based out of a western Canadian university, operated by and for graduate students undertook this research to better understand graduate students' experience with publication. Specifically, the research aimed to identify influences that helped and hindered education graduate students to publishing their scholarly work. The overarching goal of this research was to identify resources that could be incorporated into graduate education training to help encourage and facilitate graduate students to publish.

Method and Materials

Given the dearth of research related to graduate students' experiences in publishing, this study used a qualitative approach for a more open-ended exploration. Specifically, the authors created two main

research questions to guide this investigation, including (a) What were some barriers to publication during graduate training? and (b) What helped graduate students to publish? After receiving ethics approval, the authors sent an email invitation to graduate students in Education programs at a Western Canadian university to participate in an online study. Participants completed a short demographic questionnaire (i.e., gender, age, academic program), as well as the above two research questions, in open-ended text boxes. Participants received a \$10 gift card for their involvement in the study. In terms of data analysis, the authors used summative content analysis to identify and quantify keywords and phrases from the online surveys, while maintaining the meaning of the context in which they were used (Hsieh & Shannon, 2005). The authors then analyzed participants' text responses; in particular, the authors identified and created items of key words/phrases related to the research questions and counted the frequencies of participant endorsements. An independent reviewer then assessed these lists for coherence (i.e., logic in grouping) and trustworthiness (i.e., relatedness to participants' responses).

Results and Discussion

There was a total of 30 participants, 27 of whom identified as female, two as male, and one as "other". Participants had an average age of 35.03 years (*min* = 23; *max* = 49). There were 25 domestic students and five international students. Three indicated studying in a Master of Art (MA) program, six were in a Master of Education (MEd) program, nine were in a Mast of Science (MSc) program, four were in a Doctor of Education (EdD) program, and eight were in a Doctor of Philosophy (PhD) program. At the time of the survey, 11 students were taking a course-based program while 19 of them were in a research-based program. In this study, we emphasized the publication barriers of graduate students during graduate training as well as the supports that helped graduate students to publish.

Barriers to Graduate Students Publishing

According to the participants, there were several key barriers to engaging in the publication process. The most endorsed barrier was *lack of knowledge about how to start the publication process* (frequency of nine). Participants indicated lacking specific information about the publication process that made it challenging to find and choose a place to start to engage in the process. Moreover, participants also identified *lack of experience with the publication process* (i.e., no personal/professional experience to extrapolate from and guide their engagement in the publication process), *lack of opportunities* (e.g., participants were not invited, or aware of how, to engage in the publication process), and *lack of support to engage in the publication process* (e.g., mentorship; frequency of three, each). Participants also identified *lack of time* (frequency of four) as a significant barrier to engaging in the publication process. Specifically, participants indicated that other responsibilities (e.g., schoolwork, thesis writing, full time employment) took precedence and participants had little time left to dedicate to engaging in the publication process (e.g., create manuscripts). Finally, participants indicated that *lack of someone to help edit manuscripts* (frequency of two) as a barrier (e.g., converting course papers/theses into manuscript format).

These results are aligned with previous research where graduate students indicated frustration about where and how to publish their scholarship due to a lack of explicit training in this area (McClellan, Detmering, Martinez, & Johnson, 2017). Importantly, participants' responses rarely identified who they felt was responsible for helping to overcome these barriers. One participant mentioned research supervisors as a potential resource for overcoming these barriers and this is supported by Lei and Hu's (2015), who indicated that supervisors play several important roles in students' publishing endeavors such as "managers, manuscript correctors and masters" (p. 27). Based on the results from the current study, supervisors could help address the barrier of lack of time by facilitating strategic planning of academic work to create manuscripts as part of students' program. As well, for the barrier of lack of experience, supervisors can guide students to develop their publishing skills by using a parallel process to publishing when working on students' scholarly work.

Supports to Graduate Students Publishing

Shifting from barriers to supports, the participants in the current study identified *help from their research supervisors* (frequency of seven) as the most endorsed support to engaging in the publication process (e.g., encouragement to engage in, and guidance through the publication process, including feedback on and help writing manuscripts). Furthermore, participants endorsed keywords such as *professor, mentor or expert* (frequency of five, together), and *peer support* (i.e., from colleagues or more senior students; frequency of 4) as being alternative supports to supervisors that allowed them to engage in the publication process (i.e., fulfilling similar roles as supervisors). From these responses, it seems some sort of mentor who is experienced in the publication process is critical to helping students overcome barriers and get their scholarly work published.

These results mirrored those found in other studies; namely, a qualified and effective mentoring process is fundamental to assisting those who are new to academia (Karakose, Yirci, Uygun, & Ozdemir, 2016). These findings also respond to the earlier discussion regarding barriers to engaging in the publication process. Although participants did not identify who they thought was responsible for helping them overcome barriers, when identifying who was helpful in being successful in the publication process it was clear that mentorship, especially that of supervisors or another experienced faculty, is critical. In particular, mentorship to guide students through the process and to provide feedback to enrich students' writing. A unique finding from this study was that participants identified peer support as helpful in engaging in the publication process, similarly to how supervisors support students. Peer support is a reciprocal learning activity that involves knowledge, ideas, and resources sharing between participants as well as encouragement (Bound, 2014). Although less experienced than supervisors and faculty in some ways, peer support can create a learning space for students who need to publish with less psychological pressure.

Conclusions

It is important to note some limitations in this study. Primarily, the sample size is relatively small, focused on one university, and skewed female. Although a larger sample size and more diverse participants (i.e., from other institutions and more representative gender ratio) may shift the findings, the purpose of this study was to begin to shed light on the publishing experience of education graduate students. Specifically, this study highlighted a key continuum that determined the publishing success of participants in this study. In particular, students who received mentorship were more likely to overcome barriers to, and engage in the publication process, while those who lacked this mentorship were less likely to overcome barriers and did not engage in the publication process. Lack of mentorship opportunities in graduate programs may create a disconnection to the expectations of institutions for graduate students to publish. This disconnection seems to generate barriers to publishing that create negative experience for graduate students, including not having adequate training or knowledge on how to engage in the publication process effectively. An important question for future research then is, how do institutions incorporate mentorship opportunities to connect graduate students successfully to the publication process?

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The development of communicative environment in the Minecraft virtual world: experiences with Secondary School students

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Abstract

In education, the instrumental rationality has impacted interactions among teacher, student and knowledge, which have generated utilitarian and oppressive relations. Thus, this research has aimed to criticize this situation and to delineate a concept of critical formation comprised by communicative environment. The theoretical construction was grounded in the Theory of Dialogical Action of Paulo Freire, the Theory of Communicative Action of Jürgen Habermas, and assumptions of Science, Technology, Society, and Environment Education. It was proposed to discuss the development of communicative environment in the virtual world of Minecraft video game. In this way, Minecraft is understood as a space of praxis, which is possible to develop collaborative actions and problem-posing education. The work was performed in a secondary public school of Curitiba (Brazil). It was accomplished as an interdisciplinary action involving undergraduate students from PIBID (Programa Institucional de Bolsa de Iniciação à Docência) - a governmental program of incentive to teaching. The undergraduate students' discussions about the activities carried out at school were recorded in audio composing the data for this research. The analysis methodology is based on Content Analysis of Laurence Bardin and articulation with the concept of communicative environment. The results have indicated Minecraft's potential to allow the development of collaborative interactions and constructions, as well as problem-posing education, action-reflection, and the subject action in reality.

Keywords: *Communicative environment. Theory of Dialogical Action. Theory of Communicative Action. Minecraft video game.*

The instrumental notion of education

The instrumental rationality may be characterized as the utilitarian comprehension of reality, whose main purpose is to be successful or not by applying some action. This rationality is connected to the teleological action, which aims to find a suitable manner towards the realization of an end (Habermas, 1984; 1987). In technical and scientific contexts, the instrumental rationality could contribute to determinate which procedure is appropriate based on efficiency criteria. Therefore, it is a pragmatic perspective of thinking and action.

Though, when this rationality is present in the social interactions, it results in embodiment of technical assumptions in human being relations. This situation could evolve to the strategic rationality, which results in oppressive and manipulative processes through the use of force and power abuse (Habermas, 1984). In capitalist society this fact is reinforced due to its profit-motivated character. Thus, interactions become regulated by markets and administrative logical connected to money and power imperatives.

In this perspective, instrumental and strategic rationalities start to control communicative relationships, which Habermas (1987) highlights as system colonization in the lifeworld. The concepts of system and lifeworld are important to understand communicative phenomena and their structures. The lifeworld is comprised as the communicative background knowledge intersubjectively shared among people. It

aggregates several knowledges, values, social rules, ethical and personal aspects. However, when systemic imperatives of money and power invade communicative interactions, it results in loss of the communicative potential of language (Habermas, 1984; 1987).

The influence of systemic rationality in education has entailed in a technical view of pedagogical processes (Mühl, 2003). This could be observed on the prioritization of administrative planning and the commodification of teacher's labor (Giroux, 1988). The school dynamic becomes subordinated to market rules, which reduce the formative potential of education to contents acquisition. Thus, its importance is measured basically by profit and efficiency standards, losing its connotation as epistemological value and social significance (Mühl, 2003, p.277).

The relationships among teacher, student, and knowledge are also impacted by the instrumental comprehension of teaching and learning. Freire (2015) highlights this condition as a "banking concept of education". In this context, relations are structured asymmetrically intending to preserve the cycle of oppression. The teacher (oppressor) is responsible for depositing contents into students (oppressed) through a narrative process. Thus, students are understood as passive depositories that should be filled. In the banking education, processes of thinking and inquiring are denied. Therefore, it is student's duty to listen and mechanically memorizing these meaningless contents. "Implicit in the banking concept is the assumption of a dichotomy between human beings and the world: a person is merely *in* the world, not *with* the world or with others; the individual is spectator, not re-creator" (Freire, 2015, p.75).

The reality itself is comprised as static and determined, remaining outside the subject. Consequently, learning is reduced to a domesticating process, which reveals the antidialogical feature of banking education. The effects of antidialogical action in education permeate subjects' interactions cancelling out the constructive potential of the dialogue (Freire, 2015; 2015). Thus, there is a loss of the liberator character of education begetting alienation and preventing social engagement.

Communicative environment as a formative proposal

Regarding the discussion about structural problems observed in education, this work aims to present a theoretical construction of communicative environment (Schmidt, 2017). It is important to emphasize its dialectical and critical foundation, which allows the constant reconstruction based in processes of action and reflection of praxis. The concept of communicative environment is grounded in the Theory of Dialogical Action (Freire, 2015), the Theory of Communicative Action (Habermas, 1984; 1987), and assumptions of Science, Technology, Society, and Environment Education. The core of communicative environment is characterized by its critical formative focus, which is understood as collaborative and participatory processes founded on the communicative rationality (Habermas 1984; 1987). Differently of systemic rationality, communication is comprised inside the lifeworld intersubjectively shared.

The reference to the lifeworld during communication can be performed concerning the three different worlds: objective, social, and subjective. The objective world is the external nature connected to how something is represented in the reality. The social world comprehends the way that interpersonal relations are legitimated. And finally, the subjective world is characterized by internal nature, in other words, it refers to information concerning exclusively the subject.

When a subject speaks about something in the lifeworld, it is necessary to orient their actions to intersubjectively recognized validity claims. This ensure that an expression should be grounded and susceptible of criticism. There is a relation among validity claims, worlds, the type of action developed, and the rationality involved. Concerning the objective world, the validity claim associated is the propositional truth, which refers to instrumental rationality. In the case of the social world, the validity claim is the normative rightness, which allows to valid the legitimacy of human being relationships through normatively regulated actions and grounded in an interactive rationality. Finally, in the subjective world, the subjective truthfulness is the validity claim related to the dramaturgical action, which is

understood as a presentation of the self-based on an expressive rationality (Habermas, 1984; 1998). The main objective of communicative action is to reach understanding through a communicative rationality. Here, the notion of communication is comprised as the cooperative subject's union to develop rational discussions without use of force and coercion. Understanding would be the group's ability of grounding their speech in intersubjectively shared validity claims in reference to lifeworld (Habermas, 1984; 1987). "Coming to an understanding [*Verständigung*] means that participants in communication reach an agreement [*Einverständnis*] concerning the validity of an utterance; agreement [*Einverständnis*] is the intersubjective recognition of the validity claim the speaker raises for it" (Habermas, 1987, p.120). In a discussion guided by a communicative rationality it is possible to appear a conflict about a contradiction in validity claim. At this moment, it starts a process of argumentation due to the need of thematizing the validity claim and renegotiation (Habermas, 1984; 1998). Thus, the communication is elevated to the discourse level, which is crucial for arguments grounding. "The concept of *grounding* is interwoven with that of *learning*. Argumentation plays an important role in learning processes as well" (Habermas, 1984, p.18). When subjects perform argumentative processes, it is possible to develop linguistic and communicative competences (Habermas, 1984). The first one concerns to correct use of spoken language and specific vocabularies. The communicative competence is connected to the understanding-oriented communication and its relationship with the lifeworld.

The relation between individual and social communicative development is associated to the concept of collaborative learning and social transformation. Through rightful dialogue, free of manipulation and oppression, it is possible to assume a problem-posing attitude about reality (Freire, 2015). "Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (Freire, 2015, p.72).

The movements of problem-posing action are grounded in the concept of praxis, which allows constantly acknowledge and transformation of reality. These processes alternate dialectically movements of denunciation and announcement (Freire, 2001). In this context, the subject denounces systemic structures that oppress relationships, and announces the emancipatory potential of communicative rationality and dialogical action (Schmidt, 2017). In consequence of this dynamic based on praxis, it results in the development of critical consciousness, through continuous and dialectic processes (Freire, 2001; 2015). Thus, the subject evolves from a naive consciousness of reality towards a critical status that transforms the way of interaction among subject, reality, and society (Freire, 2014).

The Science, Technology, Society, and Environment (STSE) Education agrees with the theoretical discussion previously presented. Through an alliance between the formative proposal discussed and STSE Education it is possible to bring to teaching and learning a critical perspective of these relations. Thus, science and technology are reconnected to the lifeworld and inserted in the social sphere, which allows overcoming systemic imperatives as money and power (Mühl, 2003). Though, it is crucial to highlight that this process occurs mainly in the collectivity and based on communicative rationality.

Another relevant aspect is the embodiment of problem-posing action in education that enables the generation of discussion spaces with development of problem-solving and decision-making processes (Zoller, 1992). It demands to identify discussion opportunities and problem-posing action about reality aiming the development of a critical view through argumentative processes (Kolstø & Ratcliffe, 2007). In this context, students are agents of their own formation, which disrupts directly with the banking concept of education and redefines educational processes. Therefore, critical education allows the formation of active citizens in the society.

The concept of communicative environment arises of that theoretical construction as a formative proposal (Schmidt, 2017). It is comprised as an environment on which the subjects are willing to participate and to continue in a discussion grounded in the communicative rationality and oriented to understanding. Therefore, it is developed an ambience of problem-posing action of reality aiming its transformation. Based on this theoretical construction, this research has aimed to relate the concept of communicative

environment with the virtual world of Minecraft video game. It is important to highlight that the notion of technology embraced in this work comprehend it both as an element inserted in society as social construct (Schmidt, 2017). Therefore, it is connected to the lifeworld and subject to criticism and transformation.

Minecraft virtual world as a space of communicative environment development

Minecraft is a sandbox video game - open world system - and distinctive by its block build style. It is possible to play it online or offline and single or multiplayer. The game structure allows playing in competitive or cooperative ways. There are survival and creative game modes, as also the specific story mode. Another feature is that the game can be setting on the pacific mode, which monsters and villains are inexistent. There are two main categories of the game: the general commercial version and the Minecraft Education Edition.

Concerning the educational area, Minecraft enables to work with the interface human being and environment and also STSE relations. The Minecraft potential to teaching and learning processes is not restricted to content's approach, but also to relationship aspects, interdisciplinary and problem-solving actions. Furthermore, this game might give opportunity to the development of collective and collaborative constructions as also problem-posing actions (Schmidt & Sutil, 2016).

Regarding the insertion of Minecraft in educational processes, it is crucial to emphasize the importance of a critical theoretical basis. The impacts of systemic rationalities in technology - and more specifically video games industry - have begotten the commodification and instrumentalization of playing. Thus, "[...] the increasing commodification of leisure within mass consumer culture blurs the line between play and consumption" (Grimes & Feenberg, 2009, p.107). It is decisive rethinking critically technology and video games grounds in order to avoid the reproduction of systemic imperatives. Therefore, the objective of this work refers to identify conditions and characteristics of actions in Minecraft virtual world that allow the development of communicative environment.

Research description

The research was based on the referential of Participatory Action Research (Carr & Kemmis, 2004). This theoretical basis is comprised as a critical formative perspective. Its focus on a reflective pedagogical action reveals a critical core grounded in praxis. In this context, teacher education is understood as a constant formation through action-reflection of theory-practice relation. The notion of an auto reflective spiral of action - planning, acting, observing, and reflecting - is central in Participatory Action Research. This process breaks with the banking notion of education in teacher education. Thus, it is possible to change the instrumentalized teacher's action for a critical and emancipatory action.

The work was performed with an interdisciplinary group of nine undergraduate students of initial teacher education from Federal University of Technology - Paraná (Curitiba, Brazil). These students were participants of PIBID (Programa Institucional de Bolsa de Iniciação à Docência) - a Brazilian governmental internship program of teacher education support. The group was composed by students from fields as Mathematics, Physics, Portuguese, and English. Due to the participatory research core, the researcher has contributed with her field (Biology) in group actions totalizing five general areas. Besides that, the group had participation of coordinator professor. In general, the PIBID main purpose is reducing the distance between university and school. Thus, this research has embraced both instances of initial teacher education and secondary school. For this article, it aims to discuss formative process related to secondary school students due to the magnitude of the original work (Schmidt, 2017).

At university, it was accomplished theoretical discussions and practice reflections with undergraduate students. These processes occurred at the period of April to June of 2016. During this time, it was possible to develop cycles of planning, acting, observing, and reflecting (Carr & Kemmis, 2004). The actions with

secondary students were performed in three weeks (June 2016) due to school's calendar limitations. The data acquisition has involved recording undergraduate students' discussions about activities accomplished at school. The analysis methodology is based on Content Analysis (Bardin, 2007) and articulation with the concept of communicative environment (Schmidt, 2017).

Results and discussion

The work proposal for actions at school was result from group discussions. It was comprised of an interdisciplinary plan, which has aimed to develop a school construction in Minecraft video game. The actions were divided into four parts (Table 1):

Work proposal
<ul style="list-style-type: none">● <u>School space recognition</u>: students should choose and build one part of the school in Minecraft. This construction should be based on real data acquired by measurement and scale calculation;● <u>Broadening the vision</u>: students should previously research about school and neighborhood history by parents' interview. At school, they should bring these interviews in order to create a document about local history in Minecraft. After that, students will observe and analyze school's satellite images from Google Earth. Therefore, students should build school borders and surroundings based on previous scale calculations;● <u>Running at school</u>: students should run in different school spaces and calculate time, distance, and speed. After that, students should calculate the same data in Minecraft virtual world and compare with students running at school;● <u>Creating our dream school</u>: students should discuss and build in Minecraft their ideas to school's improvement. After that, students should present to the other groups their constructions in Minecraft.

Table 1: Work proposal elaborated by undergraduate students based on Schmidt (2017).

The number of secondary students' participants in the activities has varied between 8 and 23. Because of its extra class character, the participation on this project was not mandatory. Though, it was possible to develop several actions with students. All activities were accomplished with use of only four personal computers - from PIBID organization. The school didn't have functional computers available to students use. Secondary students were divided into four groups and tutored by PIBID students. It has required teamwork to problem-solving and decision-making processes. These activities were developed in Minecraft creative and pacific mode. The Table 2 below illustrates some examples of students' constructions.



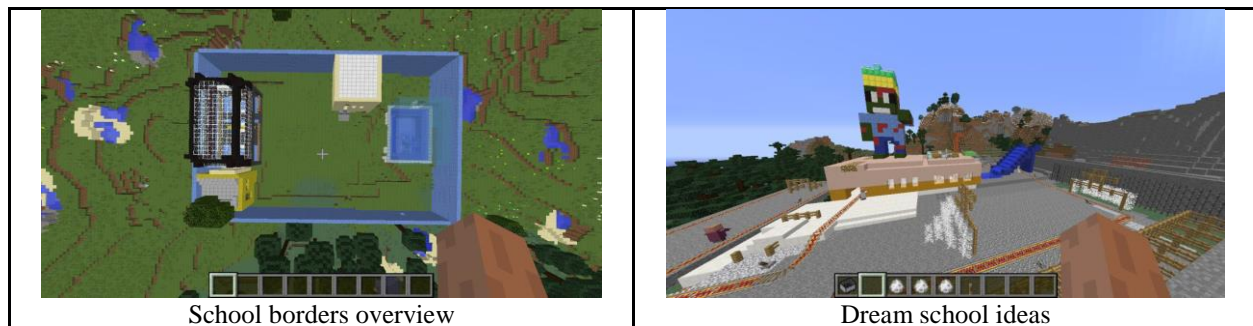


Table 2: Pictures from secondary students' Minecraft constructions. Source: Schmidt (2017).

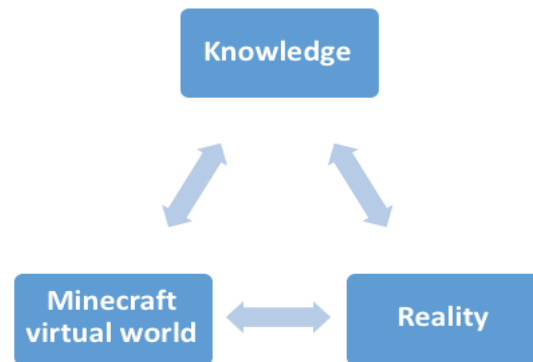
Based on the recordings of undergraduate students' discussions, it is possible to highlight indications of communicative environment development during the activities. The necessity of working together in one computer for each team has resulted in development of communicative strategies and conflict management. These are important factors when it purposes to elaborate educational activities with commercial video games. Usually, the player behavior is self-centered and impatient. However, when this player needs to work with other participants, his actions should be cooperative and collaborative. Breaking with these habits allows developing interpersonal skills and showing a new notion of playing.

Concerning communicative factors related to teamwork, it was also observed these following aspects: the respect for opinion differences; the constant seeking for agreement; the development of linguistic and communicative competences. The PIBID students have participated in these communicative processes, which have expanded their view about teacher's role as a mediator. These situations have allowed to rebuild the perspectives of student's and teacher's role in an opposite way of baking education. In this context, the relationship teacher-student is comprised as a collaborative action in knowledge construction (Schmidt, 2017).

The establishment of interactive conditions during activities was fundamental to develop a communicative environment. It is crucial to highlight that it is possible to develop these communicative relations due to its critical theoretical basis. Communicative environments aren't connected to some technology - as Minecraft video game - but to the pedagogical intentionality. Thus, Minecraft could be used as a tool for banking education. Though, if its insertion in formative process is grounded in critical assumptions, this video game stops to be a tool and turns into a formative environment (Schmidt, 2017). The development of linguistic and communicative competences is related to the increasing of problem-posing action during activities. One example of this situation was at the first activity when students have measured one school part and then built it in Minecraft. As they would do the conversion between real measures to Minecraft virtual world, PIBID students have defined a previous proportion of 1 meter for 1 block in the game (Schmidt, 2017).

However, a student has observed that the proportion adopted wasn't properly done based on their own reality. The students of the group were in average of 11 years old and their height was proper to a kid in this age. Thus, when these students have started to build a room in Minecraft, this student has realized that its avatar would have 2 meters in this logic - because he measures equivalent two blocks. Thereby, this group has started to question about the proportion established. In order to solve this situation, the undergraduate student tutor from this group has oriented them to adapt this proportion to a suitable measure. In result, students have decided to change this proportion to 0.5 meter to 1 block, which corresponds to their reality (Schmidt, 2017).

This situation is an example of problem-posing movements (Picture 1) that are understood as relations among scientific knowledge, reality, and Minecraft virtual world (Schmidt, 2017). These processes are guided by action-reflection of praxis and problem-posing action about reality. It allows the development of communicative and linguistic competences and argumentative processes.



Picture 1: Problem-posing movements. Translated from Schmidt (2017, p.135).

During problem-posing movements performed by students' group previously cited, it highlights the reference to the lifeworld instances. Students have related "[...] objective world (from reality and concepts) and social world (concepts regulation). This aspect shows evidence to communication oriented to understanding due to these references to intersubjectively shared lifeworld" (Schmidt, 2017, p.135). Therefore, at this moment it was observed the development of communicative environment.

Another important situation feature was the emergence of new concepts while activities were performed. According students' ideas, the necessity of discuss unexpected concepts started to appear. For instance, in activities involving proportion and dimensions, it has risen the need to discuss about area calculation. Other concepts that have been raised during activities were: Pythagorean theorem, basic concepts of Chemistry and Physics, density and volume, and English vocabulary. This situation shows the appearance of learning opportunities, which demands to the teacher participates of communication (Schmidt, 2017).

Conclusions

In general, Minecraft virtual world has allowed the development of communicative environment. It was possible to identify evidences of problem-posing action about reality, relations between scientific knowledge and virtual world, as well reality and virtual world. In this context, students are agents of their own formation and active communicators. During all this work, students had opportunity to act in the reality - virtual or real - and to propose new perspectives about that. Thus, it is understood that if Minecraft's insertion occurs grounded in communicative environment basis, it is possible to develop critical thinking and formation (Schmidt, 2017).

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Cultural-Related Dimensions of High School Teachers

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Abstract

The study aimed to assess the cultural-related dimensions: cultural diversity and cultural awareness of high school teachers in Creativity Private School necessary in dealing with culturally diverse population and environment. Specifically, it determined the 1. profile of high school teachers; 2. their cultural diversity awareness; 3. their cultural competence; 4. the significant difference between the cultural diversity awareness and cultural competence across their profile variables; and 5. the significant relationship between cultural diversity awareness and cultural competence.

Using a descriptive-quantitative research design with a survey questionnaire adapted from Collins (2009) and Wilson (2014), this study found out that: 1. majority of the high school teachers are 31-35 years old, married female Filipino Muslims, speak Filipino, are college graduates, have been employed in school for less than 5 years as teaching staff and have been in Bahrain for 1-5 years; 2. They are in harmony with the concepts of general cultural awareness, assessment and multicultural environment; 3. They always manage the dynamics of difference; 4. Cultural awareness of teachers greatly varies; 5. In terms of cultural competence, the teachers' proficiency level is highly diverse and 6. there is an increasing relationship between the high school teachers' cultural diversity awareness and cultural competence. It has been noted that as the level of cultural diversity awareness increases there is a matching increase in the cultural competence of the teachers and vice-versa.

Introduction

One of the most common concerns of teachers is how to manage a classroom full of students. In order to make decisions about classroom organizations and management, teachers need to understand the role of culture in human development and schooling. Understanding the role of culture is coming to see how culture shapes beliefs about learning and education. *When teachers understand cultural differences, they begin to examine and redesign their classroom organization and management in many fruitful ways.* (Fisch, C. R. et al. 2008). The study aimed to assess the cultural-related dimensions: cultural diversity and cultural awareness of high school teachers in Creativity Private School necessary in dealing with culturally diverse population and environment. Specifically, it determined the 1). teachers' demographic profile 2). their cultural diversity awareness 3). their cultural competence 4). the significant difference between the cultural diversity awareness and cultural competence and 5). the significant relationship between the cultural diversity awareness and cultural competence.

Description

A descriptive-quantitative research design was employed utilizing a total enumeration type of sampling in which 50 teachers in Creativity Private School High School Campus, Bahrain were treated as the participants. Collins (2009) described quantitative research *as a method for testing objective theories by examining the relationship among variables.* These variables can be measured on instruments so that numbered data can be analysed using statistical procedures.

The researcher used a survey questionnaire adapted from Collins (2009) and Wilson (2014) in gathering data from the respondents. The questionnaire dealt with the demographic profile of the respondents: age, sex, civil status, nationality, religion, highest educational attainment, length of

employment in the university, language spoken at home, position/ designation and length of stay in Bahrain on the first part while the second, on cultural diversity awareness outlined in the instrument utilized by Collins (2009), the Cultural Diversity Awareness Inventory (CDAI) published by Gertrude B. Henry, from the Michigan Reading Association, in October of 1986.

The 28 items of the instrument were aligned to five categories: (1) Cultural Awareness, (2) Culturally Diverse Family, (3) Cross-Cultural Communication, (4) Assessment, and (5) Creating a Multicultural Learning Environment Using Multicultural Methods, all of which contributed to identifying cultural diversity awareness. Since 1986, the questionnaire, has been proven to be reliable and valid, and has been used by several researchers, hence, the utilization of the said instrument. A five-point Likert nominal scale was adapted for the descriptive equivalent ranges: Strongly Agree, Agree, Neutral or Neither, Disagree and Strongly Disagree. The last part was structured parallel to the instrument employed by Wilson (2014), Cultural Competence Self-Assessment for Teachers (originally adapted from Cultural Competence Self-Assessment questionnaire created by Lindsey et al in 2003). It was slightly modified and reduced to 31 items which were divided into five categories: (1) assess culture, (2) value diversity, (3) manage the dynamics of difference, (4) adapt to diversity, and (5) institutionalizes cultural knowledge with the five-point Likert scale's descriptive equivalent: Always, Often, Sometimes, Seldom and Never.

Statistical Treatment of Data. The following tools were utilized to treat data statistically:

Frequency and Percentage. To determine the profile distribution of the respondents by dividing the frequencies for each of the options by the number of respondents and multiplying by 100. This is used to answer sub-problem number 1 on the profile of teachers in terms of variables.

$$P = \frac{f}{N} \times 100$$

Where: P= percentage f=frequency x=number of respondents

Weighted Mean. To answer sub-problem numbers 2 and 3 on the cultural diversity awareness and cultural competence of respondents, weighted means were computed with the formula:

$$WM = \frac{\sum R \times F}{\sum N}$$

Where: WM=Weighted Mean R=Rating F=Frequency N= number of respondents

The interpretation of the weighted mean for sub-problem numbers 2 and 3 were shown below. To determine the cultural diversity awareness, weighted means were obtained and interpreted as follows:

Point Values	Arbitrary Range	Descriptive Equivalent
5	4.21 - 5.00	Strongly Agree
4	3.41 - 4.20	Agree
3	2.61 - 3.40	Neutral
2	1.81 - 2.60	Disagree
1	1.00 - 1.80	Strongly Disagree

To determine the cultural competence, weighted mean was also employed with this interpretation:

Point Values	Arbitrary Range	Descriptive Equivalent
5	4.21 - 5.00	Always
4	3.41 - 4.20	Often
3	2.61 - 3.40	Sometimes
2	1.81 - 2.60	Seldom
1	1.00 - 1.80	Never

T-Test. To determine the significant differences between the cultural diversity awareness and cultural competence of the respondents across their profile variables, the t-test for independent samples was utilized to answer sub-problem number 4 with the formula below:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Where: t=value	X ₁ = mean of the first variable
n ₁ = no. of respondents of the first variable	X ₂ = mean of the second variable
n ₂ = no. of respondents of the second variable	SS ₁ = sum of squares of the first variable
SS ₂ = sum of squares of the second variable	

Analysis of Variance (ANOVA). This was applied to compare three or more categories of differences on respondents' cultural diversity awareness and cultural competence across their variables. This formula was used to answer sub-problem number 4.

Coefficient of Correlation (Pearson-r). To determine the relationship between the cultural diversity awareness and cultural competence of respondents and provided answer to sub- problem number 5. The formula is as follows

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2] [n\sum Y^2 - (\sum Y)^2]}}$$

Where:

r = Pearson product Moment Coefficient of Correlation	n = Sample Size
$\sum XY$ = Sum of the product of x and y	$\sum X$ = sum of the squares of X
$\sum X \sum Y$ = product of the sum of $\sum X$ and the sum of $\sum Y$	$\sum Y$ = sum of the squares of Y

Theoretical and Conceptual Frameworks

A conceptual framework was drawn using basic Organizational Behavior Model (OB) where variables were employed. Regionel (2014) defined “variable” as *anything that has a quantity or quality that varies while Robbins (2011), stated that independent variables are the factors that shape employees’ behaviors and attitude and are the presumed cause of some changes on the dependent variables.* In this research, the independent variables are the demographic profiles of the respondents while the dependent is the participant’s response, observed and measured. The teachers’ cultural diversity awareness and cultural competence in dealing with culturally diverse population and environment are the dependent variables while the demographic profile of teachers, their cultural diversity awareness and cultural competency served as the input variables.

Results

High school teachers are 31-35 years old, married female Filipino Muslims, speak Filipino, are college graduates and have been employed in school for less than 5 years designated as teaching staff and have been residing in Bahrain for 1-5 years (T1A and T1B).The teachers are in harmony with the concepts of general diversity awareness, assessment and multicultural environment however they are neutral to ideas about cultural diverse families and cross-cultural communication (T2F).The teachers always manage the dynamics of difference but only often assess culture, value diversity, adapt to diversity and institutionalize cultural knowledge (3F).Cultural awareness of teachers greatly varies if they are grouped according to age (T4A), civil status (T4C), years of employment (T4G), position/ designation (T4I) and length of stay in Bahrain (T4J). Highest educational attainment (T4F) also alters the level of the educators’ awareness. However, if categorized in terms of sex (T4B), nationality (T4D), religion (T4E) and language at home (T4H), the cultural awareness of the teachers are comparable. In terms of cultural competence, the teachers’ proficiency level is highly diverse among other teachers with different age (T4A) , number of years of employment (T4G), and length of stay in Bahrain (T4J). Single, married and widowed teachers also have varied levels of cultural competence (T4B). On the other hand, male and female teachers with diverse nationalities (T4D), religion (T4E), educational level (T4F), language (T4H)

and designation (T4I) have similar level of cultural skills. There is an increasing relationship in the high school teachers' cultural diversity awareness and cultural competence. (T5).

Tables

Table 1.A Personal Data Profile of High School Teachers in Creativity Private School

A. Personal Profile		Frequency	Percentage (%)
Age (Years)	25-30	12	24.0
	31-35	15	30.0
	36-40	6	12.0
	41-45	8	16.0
	46-50	4	8.0
	51-55	3	6.0
	56-60	2	4.0
Total		50	100
Sex	Male	15	30.0
	Female	35	70.0
	Total	50	100
Civil Status	Single	17	34.0
	Married	30	60.0
	Widowed	3	6.0
	Total	50	100
Nationality	Bahraini	5	10.0
	Filipino	20	40.0
	Pakistani	5	10.0
	Indian	17	34.0
	American	3	6.0
	Total	50	100
Language Spoken at Home	Arabic	5	10.0
	Filipino	20	40.0
	Urdu	5	10.0
	Indian	17	34.0
	American English	3	6.0
	Total	50	100

Table 1.B Personal Profile of High School Teachers in Creativity Private School

B. Education and Work-Related Profile		Frequency	Percentage (%)
Highest Educational Attainment			
	College Level	1	2.0
	College Graduate	20	40.0
	With Master's Degree Units	17	34.0
	Master's Degree Graduate	9	18.0
	Doctorate Degree Graduate	2	4.0
	Others (Non-related Degree Course)	1	2.0
Total		50	100
Years of Employment in the School			
	0-5	28	56.0
	6-10	10	20.0
	11-15	8	16.0
	16-20	2	4.0
	21-25	2	4.0
Total		50	100
Position/Designation			
	Non-Teaching Staff	10	20.0
	Teaching Staff	33	66.0
	Middle Admin/Coordinator	5	10.0
	Higher Administration	2	4.0
Total		50	100
Length of Stay in Bahrain (Years)			
	1-5	22	44.0
	6-10	15	30.0
	11-15	5	10.0

16-20	2	4.0
21-25	3	6.0
More than 25	3	6.0
Total	50	100

Table 2.F Summary of Cultural Diversity Awareness of High School Teachers

Qualifying Statements	Weighted Mean	Descriptive Rating
1. General Diversity Awareness	4.19	Agree
2. Culturally Diverse Families	3.33	Neutral
3. Cross Cultural Communication	3.04	Neutral
4. Assessment	3.44	Agree
5. Creating a Multicultural Environment	3.51	Agree
Overall Mean	3.50	Agree

Rating	Mean Scale	Descriptive Rating
1	1.00 – 1.80	Strongly Disagree (SD)
2	1.81 – 2.60	Disagree (D)
3	2.61 – 3.40	Neutral (N)
4	3.41 – 4.20	Agree (A)
5	4.21 – 5.00	Strongly Agree (SA)

Table 3.F Summary of Cultural Competence of High School Teacher

Qualifying Statements	Weighted Mean	Descriptive Rating
1. Assessing Culture	3.79	Often
2. Valuing Diversity	4.06	Often
3. Managing the Dynamics of Difference	4.24	Always
4. Adaptation to Diversity	4.12	Often
5. Institutionalizing Cultural Knowledge	4.14	Often
Overall Mean	4.07	Often

Rating	Mean Scale	Descriptive Rating
1	1.00 – 1.80	Never (N)
2	1.81 – 2.60	Seldom (Se)
3	2.61 – 3.40	Sometimes (S)
4	3.41 – 4.20	Often (O)
5	4.21 – 5.00	Always (A)

Table 4.A Difference Between Cultural Diversity Awareness and Competence Across Teachers Age Profile

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Age Groups	42.003	6	7.000	8.983**	0.000
Awareness	Within Groups	33.508	43	0.779		
	Total	75.511	49			
Cultural	Age Groups	19.143	6	3.191	4.694**	0.001
Competence	Within Groups	29.226	43	0.680		
	Total	48.369	49			

** - highly significant at 0.01

Table 4.B Difference Between Cultural Diversity Awareness and Competence Across Sex Profile of Teachers

Category	Compared Group	N	Mean	Mean Difference	t-value	Sig.
Diversity	Male	15	3.6667	0.4896 ^{ns}		0.180
Awareness	Female	35	3.1771		1.373	
Cultural	Male	15	4.3733			0.101
Competence	Female	35	3.9371	0.4362 ^{ns}	1.679	

** ns – not significant

Table 4.C Difference Between Cultural Diversity Awareness and Competence Across Civil Status of Teachers

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Civil Status	17.447	2	8.723	7.061**	0.002
Awareness	Within Groups	58.064	47	1.235		
	Total	75.511	49			
	Civil Status	7.190	2	3.595	4.103*	0.023

Cultural Competence	Within Groups	41.179	47	0.876
	Total	48.369	49	

** - highly significant at 0.01, * - significant at 0.05

Table 4.D Difference Between Cultural Diversity Awareness and Competence Across Nationality of Teachers

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Nationality	9.180	4	2.295	1.557 ^{ns}	0.202
Awareness	Within Groups	66.331	45	1.474		
	Total	75.511	49			
	Nationality	3.509	4	0.877	0.880 ^{ns}	0.484
Cultural	Within Groups	44.860	45	0.997		
Competence	Total	48.369	49			

**ns – not significant

Table 4.E Difference Between Cultural Diversity Awareness and Competence Across Religion of Teachers

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Religion	1.885	3	0.628	0.392 ^{ns}	0.759
Awareness	Within Groups	73.627	46	1.601		
	Total	75.511	49			
	Religion	1.247	3	0.416	0.406 ^{ns}	0.750
Cultural	Within Groups	47.122	46	1.024		
Competence	Total	48.369	49			

**ns – not significant

Table 4.F Difference Between Cultural Diversity Awareness & Competence Across Teachers Educational Attainment

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	HEA	19.968	5	3.994	3.164*	0.016
Awareness	Within Groups	55.543	44	1.262		
	Total	75.511	49			
	HEA	7.601	5	1.520	1.641 ^{ns}	0.169
Cultural	Within Groups	40.768	44	0.927		
Competence	Total	48.369	49			

**significant at 0.05; ns – not significant

Table 4.G Difference Between Cultural Diversity Awareness and Competence Across Years of Employment

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Years of Employment	39.675	4	9.919	12.455**	0.000
Awareness	Within Groups	35.836	45	0.796		
	Total	75.511	49			
	Years of Employment	18.661	4	4.665	7.066**	0.000
Cultural	Within Groups	29.708	45	0.660		
Competence	Total	48.369	49			

** - highly significant at 0.01

Table 4.H Difference Between Cultural Diversity Awareness and Competence Across Language Spoken at Home

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Language	9.180	4	2.295	1.557 ^{ns}	0.202
Awareness	Within Groups	66.331	45	1.474		
	Total	75.511	49			
	Language	3.509	4	0.877	0.880 ^{ns}	0.484
Cultural	Within Groups	44.860	45	0.997		
Competence	Total	48.369	49			

ns – not significant

Table 4.I Difference Between Cultural Diversity Awareness and Competence Across Position/Designation

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Position	16.562	3	5.521	4.308**	0.009
Awareness	Within Groups	58.949	46	1.282		
	Total	75.511	49			

	Position	4.535	3	1.512	1.586 ^{ns}	0.206
Cultural	Within Groups	43.834	46	0.953		
Competence	Total	48.369	49			

** - highly significant at 0.01; ns – not significant

Table 4.J Difference Between Cultural Diversity Awareness and Competence Across Years in Bahrain

Categories	Source of Variation	Sum of Squares	Df	Mean Square	F-value	Sig.
Diversity	Years in Bahrain	46.718	5	9.344	14.279**	0.000
Awareness	Within Groups	28.793	44	0.654		
	Total	75.511	49			
Cultural	Years in Bahrain	24.855	5	4.971	9.302**	0.000
Competence	Within Groups	23.514	44	0.534		
	Total	48.369	49			

** - highly significant at 0.01

Table 5 Relationship Between Cultural Diversity Awareness and Cultural Competence of High School Teachers

	Cultural Diversity Awareness	
Cultural Competence	r – value	Significance
	0.916**	0.000

** - highly significant at 0.01 level.

FIGURE 1: Basic OB Model

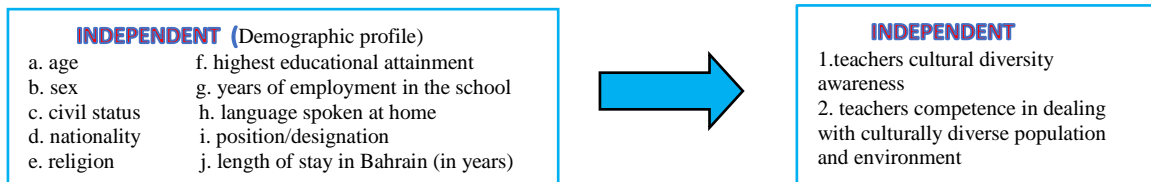


Figure 1. Research Paradigm of the Study. It shows the independent variables, the demographic profile while the dependent variables include: teachers' cultural diversity awareness and cultural competence in dealing with culturally diverse population and environment.

Conclusion

Based on the above findings, I conclude that: **1).** majority of the high school teachers are 31-35 years old, married female Filipino Muslims, speak Filipino, are college graduates, have been employed in school for less than 5 years designated as teaching staff and have been residing in Bahrain for 1-5 years. **2).** The teachers are in harmony with the concepts of general cultural awareness, assessment and multicultural environment however they are neutral to ideas about culturally diverse families and cross-cultural communication. **3).** The teachers always manage the dynamics of difference but only often assess culture, value diversity, adapt to diversity and institutionalized cultural knowledge. **4).** Cultural awareness of teachers greatly varies if they are grouped according to age, civil status, years of employment, position/designation and length of stay in Bahrain. Highest educational attainment also alters the level of the educators' awareness. However, if categorized in terms of sex, nationality, religion and language at home, the cultural awareness of the teachers are comparable. **5).** In terms of cultural competence, the teachers' proficiency level is highly diverse among other teachers with different age, number of years of employment, and length of stay in Bahrain. Single, married and widowed teachers also have varied levels of cultural competence. On the other hand, male and female teachers with diverse nationalities, religion, educational level, language and designation have similar level of cultural skills. **6).** There is an increasing relationship between the high school teachers' cultural diversity awareness and cultural competence. As the level of cultural diversity awareness increases there is a matching increase in the cultural competence of the educators. Comparably, as the cultural competence enhances, there is also an improvement in the awareness of the teachers.

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A Study on Cognitive Ability of Elementary Gifted Students with Autism Spectrum Disorder

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Abstract

In this study, four cognitive ability-related scale tests were administered on five elementary gifted students with autism spectrum disorder (GASDs) whose intellectual test result reached above PR97. Advantage discipline curriculums and performance assessments were allotted for a period of 36 sessions in order to comprehensively analyze the strengths and weaknesses of the GASDs in terms of their cognitive ability. The main findings include: (1) The Raven's Standard Progress Matrices results are between PR70 and PR98, indicating non-linguistic intelligence test are not necessary beneficial to GASDs; (2) The Torrance Tests of Creative Thinking results are all below PR45, showing weak performance; (3) The Everyday Problem Solving Test results are between PR12 and PR98, due to the effects of inadequate experience and poor meta-monitoring capabilities; (4) The Attention Scale for Elementary School Children results are between PR3 and PR99, with the Selective Attention reaching above PR94 and the Continuous Attention below PR69; (5) The Advantageous Discipline Curriculum Observation Scale results reached the average of above 3.8 (highest of 5 points), indicating keen observation, continuous attention, imagination creativity and problem-solving ability. In view of the above, it shows that the cognitive abilities of the GASDs varied in the scale tools and performance assessments. In addition to referring to the scale tools, advantageous discipline curriculum analysis showed be supplemented in order to correctly asses GASDs' cognitive ability.

Keywords: *gifted students with autism spectrum disorder, cognitive ability, analysis of strengths and weaknesses, advantage discipline curriculum*

Introduction

3rd-grade student Dan clearly displayed behaviors of anxiety, impulsiveness and rage, with the math aptitude test reaching PR99.9, WISCIII results in perceptual reasoning of PR98, working memory of PR99. The other tests of WISCIII were uncompleted due to the participant's giving up, displaying tantrums, dumping test questions and other factors. Based on the student's superb mathematics ability, the school provided math enrichment and acceleration courses, which indirectly improved the student's emotional behaviors and other vulnerable issues (Assouline, & Whiteman, 2011). Foley Nicpon, Allmon, Sieck and Stinson(2011) reviewed literature research over the past two decades and pointed out the undeniable possibility of students who were both gifted and disability at the same time. However, due to the lack of appropriate assessment tools, assessment adjustment strategies and schools' lack of professional knowledge to identify and teach gifted students with disabilities, teachers were unable to grasp the strengths and weaknesses of twice exceptional students. Teachers are less willing to refer students with disabilities or emotional behavioral problems to gifted education programs, while gifted students' receiving gifted education may be terminated due to their disabilities and behavioral problems.

In this study, gifted students with autism spectrum disorder (hereinafter G/ASD) were adopted as research participants. The research of Foley Nicpon, Assouline, Stinson(2012) points out that cognitive and academic abilities are important factors that distinguish regular gifted students and G/ASD, taking into account vulnerable and distinctive capability diagnostics. Chau Hsiao-Lan and Lu Tai-Hwa (2011) used seven dimensions to comprehensively analyze nine gifted students with cognitive and emotional disabilities. The WISC-IV results show that the verbal comprehension intelligence quotient is the highest,

and the processing speed intelligence quotient being generally low. Since the research cases fall under three types, this is limited to the assessment of the strengths and weaknesses in terms of the cognitive abilities of a single case type G/ASD. Cognitive ability and school learning adaptation have a close relationship. Effective strength and weakness analysis is an important piece of information for teachers contemplating on curriculum adaptation, which in turn enables students to display their potential capabilities. Cognitive ability is a mental learning process covering perception, memory, imagination, attention, identification, thinking, reasoning, judgment, creation, and other complex information processing capabilities. This study adopted intelligence, creativity, problem-solving ability and attention as the cognitive abilities included in this study. Standard Progressive Matrices Parallel (SPM-P), Torrance Tests of Creative Thinking (TTCT), Everyday Problem-Solving Test (EPST) and The Attention Scale for Elementary School Children (ASESC) were employed to obtain the assessment results of standardized tools. In addition, through class observations, non-standardized cognitive ability related information was obtained. The G/ASD studies of Chau Hsiao-Lan and Lu Tai-Hwa (2007) and Yssel, Prater and Smith (2010) all suggest that predominant subject curriculums can maximize students' cognitive ability performance. These cases in this study showed interests and expertise in the field of natural science. Based on this, advantage discipline curriculum was designed. These cases lacking interests, showing low motivation, having writing difficulties or limited abilities and other detrimental factors were excluded in order to more accurately analyze the true cognitive abilities of the five G/ASD cases shadowed by the dual factors of autism and gifted. The questions to be answered are as follows:

1. What are the results of these cases in the full-scale and sub-scale SPM-P, TTCT, EPST and ASESC?
2. How do these cases perform in terms of advantage discipline curriculum related academic competency, problem-solving ability, creativity, attention, emotional and social adaptation, and other dimensions? What strengths and weaknesses are presented?
3. What are the overall strength and weakness analysis results of these cases? Are the scale tools and advantageous discipline curriculum observations consistent?

Research Method

1. Research Participants

The background information of the five cases are as shown in Table 1. These cases are 4th-grade and 5th-grade male students who have passed the autism spectrum disorder evaluation, have an IQ reaching the evaluation standard of regular gifted students and have interests in the field of natural science. Among them, three also have attention deficit and hyperactivity disorder. The participants had received or are currently receiving services from resource room of their school, and three are placed in the gifted education program.

Table 1 Background of research participants

Code	Grade	Individual intelligence test IQ (Note 1)	Predominant expertise	Disability information
S1	4 th	WISC-III 133(Language 124 Assignment 137)	1. Placement in the resource room; knowledgeable 2. Excellent attention in nature themes	Identified to be autism and ADHD at age 7
S2	4 th	WISC-IV139 (VCI:144 PRI:148WMI:119PSI:102)	1. Placement in the resource room; knowledgeable about nature 2. Proficiency in language expression; imaginative and creative	Identified to be Asperger at age 7

S3	5 th	WISC-III 130(Language 123 Assignment 129)	1. Awarded a gold medal in the school mathematics contest 2. Knowledgeable about natural science	Identified to be Asperger and ADHD at age 4
S4	5 th	CMAS (Type B)132	1. Placement in the resource room; knowledgeable about natural science 2. Active learning attitude; inquisitive	Identified to be mild autism at age 3
S5	5 th	WISC-IV 142(VCI:127 PRI:145 WMI:111 PSI:143)	1. Excellent logical reasoning and perceptual organization 2. Excellent attention in nature interest	Identified to be mild autism and ADHD at age 8

Note 1: WISC-IV inclusive of four mixed index scores: full-scale IQ (FSIQ), verbal comprehension index (VCI), perceptual reasoning index (PRI), working memory index (WMI), and processing speed index (PSI); CMAS is the Comprehensive Mental Abilities Scale (Type B).

2. Research Tools

The following standardized tools are selected because SPM-P is one of the tools used in elementary gifted student referral evaluations and that it can analyze the general cognitive abilities of G/ASD without being affected by the language factor. TTCT and EPST can be used to further gain an insight into the performance of G/ASD in higher-order cognitive abilities, while the ASESC evaluation helps one understand the strengths and weaknesses of these students throughout the course of cognitive information processing.

(1) SPM-P is used to assess the intrinsic abilities of students through known graphic reasoning or results produced. Chen Jung-Hua and Chen Hsin-Yi (2006) revised and established the Taiwan norm applicable for third through sixth grade elementary students. Additionally, according to age, the standard scores ($M=100$, $SD=15$) and percentile norm were established.

(2) TTCT is applicable for elementary through senior high school students (Li Yi-Ming, 2006). It is divided into the language version and graphic version, each consisting of timed tests in two copies: Type A and Type B. According to age, the standard scores ($M=100$, $SD=200$) and percentile norms were established.

(3) EPST is a written test of situational questions applicable for fifth grade and sixth grade students (Yeh Yu-Chu, Tsan Yu-Chen, 2005). The results can be used to identify multiple questions, determine priorities, propose solutions and decide on the best solution, four assessment indicators in all, which can be converted into T scores ($M=50$, $SD=100$) and percentiles.

(4) ASESC is a timed test applicable for first through sixth grade elementary school students (Lin Hung-Yu, 2011). The contents include ten sub-tests made up of five attention dimension scores: focus, continue, select, alternate, and assign, as well as full-scale attention indicators ($M=100$, $SD=15$) and percentiles.

(5) The Advantageous Discipline Curriculum Observation Scale was established by the researcher in reference to the qualities of general gifted students and gifted students with disabilities listed by the Colorado Department of Education (2006) and revised by three senior teachers who had taught gifted students before (See Table 3). It contains five dimensions and 12 observation items, with the 5-point Likert scale and qualitative observation record design.

3. Advantage Discipline Curriculum

The curriculum covers nine Saturday morning classes from 9:00 to 12:10, a total of 27 hours. The unit themes were “Frogs in a nut shell”, “Reptiles you must know”, “Plant hunt on campus”, “Eco-tour of Fuyang Park”, “Paintings that change color”, “Be your own detective”, “Discover microbes in everyday life”, “Pingpong pictures”, etc. The observers and recorders (hereinafter referred to as TA) were three students from the Department of Special Education. They first read the basic information of these cases

and took part in curriculum discussion meetings to understand the curriculum objectives and processes before observing and recording. At the end of the first observation curriculum, the observation records were discussed, and the situation checkboxes for ticking and the standards were swapped until the observers reached the consistency of 82% to start the official recording.

4. Data Processing and Analysis

Four standardized scale tools were used to convert the cases' standard scores in each test and compare them in the norm interpretation analysis. The observation scales were averaged, which were each supplemented by qualitative records to find out the degree of consistency between the cases' scale tools and performance assessments. The qualitative data codes are comprised of the year/month/day of the data acquisition+case code+observer code. For instance, 1030419S1TA3 represents the class observation records of observer TA3 on April 19th, 2014. Different data sources were employed in this study to triangulate the strengths and weaknesses of the cases' cognitive ability and comprehensively compare the consistency and inconsistency of various source data.

Results and Discussions

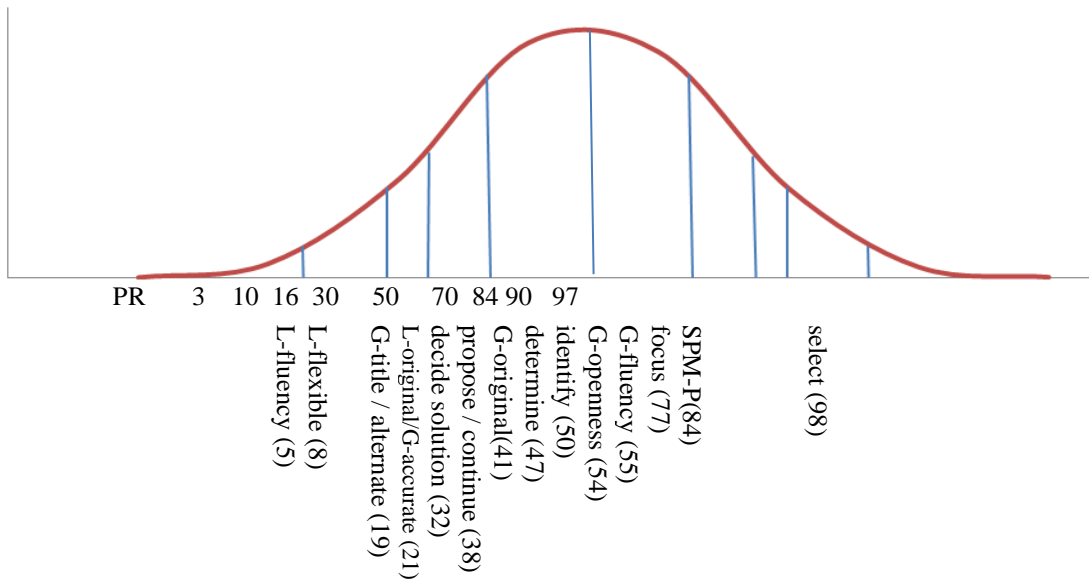
1. Cognitive Ability of Scale Tools

The percentile rank from the above scale tools as well as the advantageous discipline curriculum performances are as shown in Table 2. The standard scores in respective scales were then averaged and compared with the original percentile norm to obtain the performances of all these cases in the sub-scales (Fig. 1). In view of the configurations, the selective attention average (PR98) is an indication of the superb abilities of G/ASD; the average verbal fluency is only PR5, indicating poorer abilities; most of the abilities fall under the average ability range, which include problem-solving ability, creativity in the graphic version, SPM-P and attention in other dimensions. On the other hand, problem-solving ability, creativity, and attention in terms of predominant subject performance are considered excellent, except the emotional social adaptation under the non-cognitive dimensions that are relatively weaker. G/SAD possibly lost the opportunity to receive gifted education due to the overshadowing impairment factors. Therefore, from the scale tools and practicum observations, the students' cognitive ability strengths and weaknesses should be analyzed to provide more appropriate information during teaching guidance planning.

Table 2 The cases' percentile rank of scale tools and performance assessment

tool	TTCT		EPST					ASESC				performance assessment
case	SPM-P	Graphic Language	identify	determine	propose	decide	total	focus	continue	select	alternate	
S1	87	45 1	53	52	54	75	64	93	4	96	3	3.9
S2	70	36 15	24	52	93	52	64	87	69	94	68	3.8
S3	86	8 16	96	89	88	75	98	56	68	98	19	3.9
S4	96	15 16	70	52	29	10	32	56	69	94	17	4.2
S5	98	39 5	14	52	5	17	12	71	30	99	19	3.9

Fig. 1 Strengths and weaknesses of overall cognitive ability



Note: the numerical value in () is the PR value of the sub-scale, which is limited to the numerical values in the spatial part not corresponding to appropriate locations in the norm diagram.

2. Advantage discipline curriculum Analysis

The average scores of the observation scale are as shown in Table 3. The cases' mean of ten items reached above 3.8 except the emotional social adaptability dimension. The scores from high to low are interests in nature, observation skill, curiosity, participate, verbal expression/problem-solving skill/creativity thinking skill, basic learning skill, reading skill/persistence, participation, emotional management and social skill. The means in sequence have a similar trend, indicating better homogeneity in terms of the cognitive performance in advantage discipline curriculums

Table 3 the performance assessment of advantage discipline curriculum

dimension	item	S1	S2	S3	S4	S5	average
academic ability	basic learning skill	4.7	4.3	4.0	3.7	3.0	3.9(6)
	verbal expression	3.9	4.1	3.5	4.5	4.0	4.0(5)
	reading skill	3.0	4.0	4.5	4.0	3.5	3.8(7)
problem-solving ability	observation skill	4.5	4.0	4.0	4.8	4.5	4.4(2)
	problem-solving skill	4.2	4.0	3.0	4.3	4.3	4.0(5)
creativity	curiosity	3.5	4.0	4.8	4.0	5.0	4.3(3)
	creativity thinking skill	4.2	4.0	4.0	3.8	4.0	4.0(5)
attention	nature interest	4.4	4.5	4.5	4.9	4.9	4.6(1)
	participate	3.5	3.7	4.3	4.9	4.4	4.2(4)
	persistence	4.5	3.3	3.8	4.6	2.8	3.8(7)
emotional social adaptation	emotional management	3.8	2.5	3.6	3.3	2.0	3.0(8)
	social skill	2.8	2.6	2.6	4.3	2.2	2.9(9)

Note: The number in () is the mean of the observed result for a particular item ranked from high to low.

The five cases' practicum in the predominant subject classes showed their creative potential and generation of unique answers. For example, "a rocket was assembled according to the sample, and halfway to finishing it was transformed into a helmet and named Louis XIV Helmet"(1030510S1TA3). The practicum assessment reflected the cases' creativity-based originality, flexibility and imagination. This finding is rather inconsistent with the low TTCT score, which once again highlights the need for a

strength and weakness assessment, taking practicum course observation assessments into consideration, rather than judging only based on standardized test results (Chau Hsiao-Lan, Lu Tai-Hwa, 2011; Yssel, Prater, & Smith, 2010).

The academic competency and problem-solving ability have a mean of above 3.8, indicating the problem-solving ability of G/ASD in predominant subject curriculums is significantly superior to their performance in the EPST. For example, “as soon as the name of a fungus was heard in class, they would immediately turn to a book to find information and report it to the teacher” (1030503S2TA1). The teacher asked, “What is in a drop of water?” The case quickly answered, “There is a lot of impurities” (1030503S3TA3). The EPST involved experience, and the situational questions in the scales were in written form, mostly the imagined aspects failing to be put into operation. Had questions of actual situations been provided, the questions would have helped G/ASD solve problems fully.

In terms of attention, the five cases’ interests in nature were all above 4.6. They all completed the themed courses enthusiastically and persistently. The research participants mentioned in the records “throughout the course period that their involvement in group discussions sometimes led to conflicts, but in order to complete missions and increase the number of points, most of them followed the curriculum specifications and listened attentively without leaving their seats” (1030503 researcher log). These cases during repetitive and continuous activities found it difficult to maintain consistent behavioral responses.

Poor emotional management affected social emotional adaptations. For example, S5 drew graffiti on the table, refused to follow instructions, poked the teacher with a pen, took classmates’ stationery and threw it at them, bit classmates when they extended their elbow close to the seat. They also used foul language, such as “bullshit”, “Damn, the mechanical pencil lead broke in half”, “You suck!”, etc. Nevertheless, S5 displayed strong cognitive learning ability. After the involvement course, he displayed rich knowledge and skills, received praises and increased points, and he was gradually able to control his emotions. For example, “during a failed attempt to cut a Ping-Pong ball open, he calmly corrected the mistake step by step and made improvements to finally produced a work that spun smoothly”(1030510S5TA1).

Conclusions and Recommendations

1. Conclusions

This study mainly explores the strengths and weaknesses of elementary school G/ASD. The respective scales did not derive at fixed groups, making advantage discipline curriculum observations more significantly valuable. The main findings are as follows:

(1) The SPM-P of G/ASD is between PR70 and PR98, which is inconstant with the individual intelligence test results.

The full-scale IQ of the five cases in the intelligence test reached the mean of above two standard deviations. However, in SPM-P, two cases reached excellent intelligence standards (PR96 and PR98), two were above the mean (PR86 and PR87), and one had average intelligence (PR70), indicating the independent use of the graphic reasoning test to evaluate G/ASD intelligence resulted in underestimations of cases with excellent language proficiency.

(2) The TTCT full-scale scores of G/ASD were all below (inclusive of) PR45. Hence, a advantage discipline curriculum assessment should be supplemented.

The five cases’ fluency and originality tests in the TTCT graphic version were superior to those of the verbal version. An advantageous discipline curriculum observation and file assessment should also be supplemented to analyze the creativity strengths and weaknesses of G/ASD.

(3) The EPST full-scale results of G/ASD were between PR12 and PR98, showing better problem-solving ability in terms of performance.

Only the full scale result of one case reached PR98, while three were below (inclusive of PR32), indicating poor problem-solving ability possibly due to inadequate question-related everyday life experiences, weaker information processing ability and inadequate meta-monitoring ability. However, the five cases had rich knowledge, experience and interests in the field of natural science and showed better problem-solving ability.

(4) The ASESC scores of G/ASD were between PR3 and PR99, paying close attention to themes of interest.

The five cases had the best performance in selective attention, between PR94 and PR99. The continuous and alternative attentions were relatively weaker, between PR3 and PR69. However, these cases with poor performance in the attention scale maintained focus on the advantage discipline curriculum and showed high interest in participating.

(5) The G/ASD had an average score reaching above 3.8 in the advantageous discipline curriculum observation scale, with better performance in problem-solving, creativity and attention and the weakest performance in emotional and social adaptations.

The advantage discipline curriculum was better able to detect the actual cognitive ability of G/ASD, contributing to accurate evaluation of strengths and weaknesses. Moreover, under the premise of the predominant potential, a sense of achievement was gained from the themes of interest, which was beneficial as far as emotional and interpersonal social vulnerability were concerned.

(6) In terms of the cognitive ability of G/ASD, the strength and weakness assessment is not to be finalized only based on the scale tools.

The scale tools show problem-solving ability, graphic version creativity, SPM-P graphic reasoning ability and attention in other dimensions are only within the range of “regular abilities”. This finding is inconsistent with the advantage discipline curriculum results. Using only scale tools to evaluate students with special dual needs may only derive at negative results. Hence, scale tools and predominant school-based practicum observations should be conjunctively used to gain an insight into the cognitive strengths and weaknesses and provide more appropriate information for course planning and teaching guidance.

2. Recommendations

G/ASD is a group of people who share trait characterization as well as heterogeneity. Therefore, how to accurately analyze and evaluate the cognitive strengths and weaknesses of G/ASD in reference to the unique traits of autistic and gifted individuals remains a major issue at this stage.

1. The differences between the research participants narrowed and the number of participants increased: Due to the low G/ASD incidence and identification rates, it is recommended that the scope of sampling be expanded in order to clarify G/ASD group differences and similarities as well as the cognitive strengths and weaknesses.

2. Add an advantage discipline curriculum control group and conduct a re-test after class: General gifted students and G/ASD can be placed in the same class. Then, through the same group of observers and with the same curriculum, the two groups are compared and analyzed, thus better highlighting the differences and similarities in terms of strengths and weaknesses. At the end of the curriculum, measurement tools can be applied to evaluate the degree of influence teaching exerts on the cases' cognitive ability.

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Role of Web Engineering in the growth of the Internet

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Abstract:

The World Wide Web (www or Web) was designed originally as an interactive world of shared information through which people can communicate with each other via computer machines. The growth of the Internet and WWW (Web) has already had a significant impact on education, business, commerce, industry, banking, entertainment, government, shopping, communication, personal and working life etc. In internet growth, it is very important that quality of services should be improved. The Web Engineers may face serious problems in successful development and deployment of any system, in absence of a disciplined process. This paper gives an overview of Web Engineering, which includes the methodology, elements of Web development, Web documents and the growth comparison of Internet.

Keywords: Web, Web Engineering, Internet Engineering.

1. Introduction

The Web is simply defined as the universe of global network-accessible information. It is currently populated by hyperlinks, objects (images, sounds and videos) and plug-ins (applet, pdf files, flash pictures etc). Web is a network of servers which are connected with each other via a common protocol (HTTP, FTP etc.) and which allow to access millions of hyperlinks. The backbone of the Web page is HTML.

Since 1989 Web has grown initially as a medium for the broadcast of read-only material from heavily loaded corporate servers to the mass of Internet connected consumers. As the use of Internet is increased the style, demands of people are also increased. The Web users want all information on the Web.

This is the time of communication and the growth of the Internet and WWW (Web) already had a significant impact on education, business, commerce, industry, banking, entertainment, government, shopping, communication, personal and working life etc. Now a day, everybody is using Internet on computer system as well as on mobile. So, the Web Engineers have to develop web sites according the user's availability.

Web Engineering is a new branch of Software Engineering. Web Engineering focuses on the methodologies, techniques and tools that are the foundation of complex Web Application development or Web Site Development and it supports their design, development, deployment, evolution and evaluation [3]. Without planning no building can be created similarly without a proper planning and process no Web-based system can be developed. A software developer uses the different phases of Software Engineering to develop software whereas a Web developer uses the phases of Web Engineering to develop a Web site. As Web Applications, become increasingly integrated in business strategies for small and large companies [3]. The Web Engineers may face serious problems in successful development, deployment and maintenance of any system, in absence of a disciplined process [2].

This paper gives an overview on Web Engineering, which includes the methodology, elements of Web development, Web documents and the growth chart of Internet [7] and its impact on Web Engineering.

2. Internet Engineering Vs Web Engineering

People use the terms Web and Internet synonymously. In casual conversation such as "I was on the Internet" or "I was on the Web," there is no difference. However, in fact, the Web is just one of the services deployed on the Internet. For example, Internet is a road and Web is vehicle which moves on the road. Internet provides various services. For example, chatting, e-mail through outlook and many other services.

Internet Engineering is a systematic, scientific, disciplined approach to connect the computers or the networks. Internet Engineering is based on Internet protocols. The Internet working technology hides the details of network hardware and permits computers to communicate independently of their physical network connections. An Internet is a set of connected networks that acts as integrated as a whole. The chief advantage of an internet is that it provides universal Interconnection by allowing individuals groups to use whichever network hardware is best suited their needs [5].

Web Engineering is a systematic, disciplined, scientific and quantifiable (tools and techniques, concepts, methods) approach to develop Web Applications and Web Sites.

3. Process of Web Engineering

Web technology is transforming the way organizations conduct business and communicate with constituent groups. Web Applications are often content-driven with an emphasis on aesthetics, it is likely that parallel developments activities will be scheduled within the Web Engineering process and involve a team of both technical and non-technical people (e.g., Graphic Designers, copywriters) [3].

3.1 Process Methodology

Planning: Define target audience, purpose, objectives, and policies for information development and use.

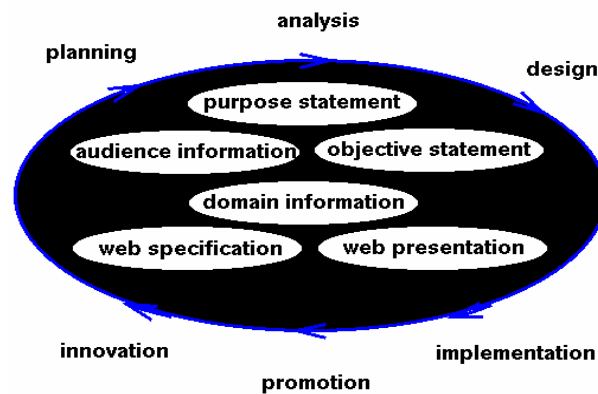
Analysis: Check technical construction of Web with validation tools, evaluate Information consistency and verify Correctness of domain information.

Design: Separate information into page-sized chunks, connect pages along routes of use and user thinking; provide information, context, and navigation cues, create a consistent look and feel.

Implementation Create an extendible directory and file structure, use tools templates for supporting consistent look and feel, check implementation in various browsers.

Promotion: Target publicity releases for General Web audiences, potential users, and current users; follow online community norms and practices, innovatively connect with users to meet their needs.

Innovation: Continuously and creatively work for improvement to meet user needs use testing, evaluation, and focus groups to shift and change Web's content as user needs change.



Process Methodology is shown outside of Ellipse.

- I) Elements of Web site are shown inside the Ellipse.

3.2 Elements of Web Development

Web elements and processes are interconnected, and decisions that Web Engineers make rely on these interconnections. As such, there is redundancy in the methodology. If any one element or process is weak, another stronger element or process might be able to compensate. A good implementation sometimes can make up for a bad design, for example. A good objective statement can make up for a poor purpose statement. The goal is not to have these weaknesses but to counter the inevitable problems that result. The elements of the Web-development methodology follow [4]:

Audience information This information includes the audience's background, interests, their platform and all detail helpful to shaping the information to suit the users' needs. All this information might not be complete at any time during the Web-development process.

Purpose statement An articulation of the reason for and scope of the Web's existence. At all times during development, a developer should have a succinct purpose statement for the Web. This statement might be in general terms or it might be very specific.

Objective statement Flows from the purpose statement and defines what specific goals the Web should accomplish. Like the audience information and purpose statements, the objective statement is dynamic, and it might become necessary later in Web development to define still other statements. Therefore, the objective statement changes as the purpose of the Web changes, but also as the information about the audience changes.

Domain information A collection of knowledge and information about the subject domain that the Web covers, both in terms of information provided to users of the Web and information that the Web Engineers need. Although not all this information would necessarily be made available to the users of the Web, this domain knowledge might be essential for the Web Engineers to have.

Web specification The specification statement lists what pieces of information will be presented as well as any limitations on the presentation. One part of a specification might state that the picture of the modem must be placed on the same hypertext page as a link to an order form.

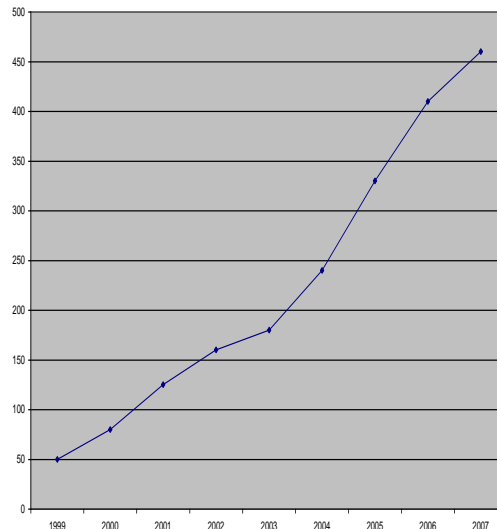
Web presentation It means by which the information is delivered to the user. The presentation is the result of design and implementation processes that build on the Web specification. In these processes, creative choices are made among design and presentation techniques to achieve the Web specification considerations for efficiency.

This list of the elements involved in the Web-development methodology shows that there are many interactions and relationships among them. In fact, all the elements depend on the best information being available about the other elements in order to be successful. A Web developer, for example, needs to know whether the objective is to sell modems or to educate people about modems when designing a particular piece of a Web. Similarly, the elements interact with the processes of the methodology.

4. Growth Comparison

The Web is one service of the Internet. We discussed two very important points one is the growth of Internet and another is the growth of Web Sites. We argue that as the number of Web Sites increased then the number of Internet users increased automatically. If the number of Internet users increased then the number of Web Sites may increase.

In recent days, it seems that the users from various fields want all information on-Web. And on the other hand the various organizations, companies and the people from various domains want to put all the information on Internet. The Internet growth chart from Jan 1999 to Jan 2007 is described in fig-II



[7].

Values of y-axis has to multiply by 1, 00,000

(Fig-II)

There are now more than 100 million Web Sites on the Internet, which gained 3.5 million Sites last year to continue the dynamic growth seen throughout 2006. In the **November 2006** survey Net craft received responses from **101,435,253** Sites, up from 97.9 million Sites last month.

Microsoft's Internet Information Server launched in February 1996, and by the survey's fifth birthday the server market was largely divided up between Apache and IIS. This month Apache leads with 60.3% market share, with Microsoft at 31.0% and Sun at 1.7% [6].

As the growth of Internet, Internet users, Web sites and web users increased the role of Web Engineers automatically increased.

5. Role of Web Engineering

From last three to four years, people from every field are accessing the Web Sites via Internet on computers as well as on mobile phones. The people from non-computer background are also using Web Sites, search engines according to their requirements. So, the Web Engineers have to develop the Web Site according to the users demand and their availability. In this paper, we are discussing some points which are important for Web Engineers.

Web and WAP As we discuss the users are using Internet on computers as well as on mobiles. The wireless market is growing very quickly and reaching new customers and services. To enable operators and manufacturers to meet the challenges in advanced services, differentiation, and fast/flexible service creation, WAP defines a set of protocols in transport, session, and application layers [8].

WAP is the acronym for Wireless Application Protocol. It is an Internet protocol developed for transferring information on the Internet to and from wireless clients. These wireless clients can run on cellular phones, palm computing devices, and other small, portable terminals. At this point, cell phones are the primary WAP devices.

Web sites are basically created for computer systems and WAP sites are created for mobiles. Web Engineers have to use the different tools and techniques for better performance of the site. We argue that, the Web Engineers should have to use WML for WAP sites and HTML, XML for Web sites.

Web Site Usability There are few Sites which are used by many people and many Sites which are used by very few people. For example, www.yahoo.com, www.google.com, www.rediff.com etc. all these Sites are used by number of people. On the other hand, Web Sites like mailcity.com, sulekha.com etc, sites which used by small numbers of people. Even the people do not hear about them. So, for those Web Sites which are used by large number of people the Web Engineers have to use the different tools and techniques for better performance of the site. We argue that, the Web Engineers should have to use multithreading technology i.e., Servlets, JSP, .Net

Role of Web Browser Web Engineers have to develop Web Sites according to the availability of the Browsers. The Web Engineers have to use only those techniques and syntax which are supported by the users systems. For example if the Web Engineers use the CSS2 for those users whose browser is older, then the Web users can't use those facilities which are provided through CSS2. On the other hand, if Web Engineers use ActiveX Controls in old versions of Web Browser then the users who have new Web Browser they can not access ActiveX Controls directly.

Web Site Requirements Web Sites must be goal oriented. For example, if the Web Engineers have to develop a Web Site for a company, like Nokia mobile phone, whose main goal is to advertise their products? Then the Web Engineers have to add more effects on the Site. The graphical quality should be better. The Engineers provide the 3-D look for users so that they can view the product very clearly.

Web Documents There are three categories of Web documents [1]. Sites that are static (i.e., neither the client nor the server has active components). Sites that provide client-side active components. Sites that provide server-side dynamic contents. Pages are created on-the-fly, their contents is populated depending on and supplied by a server-side database.

Now, the Web developer has to choose different techniques for different type of Web document. These are as follows:

Static document These are the read only documents the user can access these pages, but he/she cannot give his/her input. Simple HTML/DHTML is used for these types of documents.

Dynamic Document in this type of documents user can interact with the Web page. He/she can give his/her inputs. For example, they can fill a form and after processing an appropriate message can be displayed. The processing will be done on client side and the final data will be stored on the server. For these types of documents, the Web Engineers have to use scripting languages. For example, JavaScript and VBScript.

Active Document These documents are similar to Dynamic Documents. User can directly interact with the Web page. The basic difference between Dynamic Document and Active Document is that the Active Documents are processed at Server side not on the Client side. For Example, Railway Reservation, Stock Market etc. The Web Engineers have to use JSP, ASP, Servlets, PHP, .net etc.

User's Background Web Engineers have to develop Web Site according to the Web users. For example, if a Web Site is to be developed for doctors, Bank employees etc., who are non-computer background users then the site should be simple and focused on the topic.

6. Conclusion

Now a days, every person is directly or indirectly connected to the Web World. We discussed in this paper that as the Internet grows the number of Web Sites are also grows. By the revolution of Mobile technology, people are not depending on computers only for Internet. So the Engineers have to keep in mind, while making the web site, that their web site will be used only on computers, only on mobiles and on computers and mobiles together. As the number of Web Sites increases then the work of Web Engineers get complicated. So the Web Engineers have to adopt new tools and techniques used in the Web Engineering according to the Web Users.

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ⁱ “Content chunking” is a common strategy used in online learning platforms to break up content into shorter pieces that are easier to remember or retain.

ⁱⁱ The concept of the “21st Century Learner” embraces the understanding of how today’s students produce, digest, and evaluate content, which often times is with the aid of technological devices and virtual tools.