

**THE IMPORTANCE OF ASSESSMENTS: HOW PORTFOLIOS CAN IMPACT  
STUDENTS' SELF-EFFICACY AND COMPREHENSION IN AN ONLINE  
GRAPHIC DESIGN COURSE**

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## **Abstract**

The purpose for this study was to find an assessment that is currently being used and is a common assessment familiar to others within the Brick-and-mortar classroom and transform that assessment for use within the online learning environment. By using assessments, teachers can measure whether or not students are learning what it is they are teaching. (Methodology) The purpose of this qualitative, comparative case study was to study the relationships between creating portfolios and how this process impacted students within an online graphic design (digital Imaging) course. (Results) With this study, the intent was to lay the foundation for using portfolios in virtually any graphic design course and to be able to see the progress of students through their portfolios each week. Another intent of this study was to measure how a student's perceived self-efficacy changed during the process of creating a portfolio. (Conclusions) The uses of portfolios are common within the work force when trying to obtain a position with the "fine arts, architecture, fashion design, graphic artists, orthodontists and plastic surgeons" (Angelo and Cross, 1993, p. 114). Drummond (2004) provided one of the first portfolio assessments within an online science course, which resulted in starting and completing this study for an undergraduate, online, graphic design course and opens the door for future use within other online courses within Higher Education. (Contains 8 tables)



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## **CHAPTER 1. INTRODUCTION**

### **Introduction to the Problem**

The nature of higher education has been undergoing a profound change. The paradigm shift away from the process to outcome orientation alters the direction of all higher education processes in Europe and America (Zawacki-Richter, Hanft & Backer, 2011). This is the shift that entails and requires changes in the process of examination processes; the latter should build on the competencies that are to be acquired by students (Zawacki-Richter et al., 2011). The movement from processes to outcomes in the higher education domains has already caused a series of shifts in course development and structure, but the issue of delivering competency-based assessments, especially in distance education, remains unresolved (Zawacki-Richter et al., 2011). In the future, people will hardly choose jobs for life (Wright, Knight & Pomerlau, 1999). They will enter “portfolio” careers, meaning that the success of their career decisions will depend upon the evidence they provide on the wide array of skills, abilities and knowledge they have to fulfill the desired job (Wright et al., 1999). This, in turn, may increase the use of portfolios as a form of knowledge assessment in higher education. By utilizing portfolios, this provides a visible and tangible representation of the individual's knowledge, skill, and dispositions.

Higher education professionals and curriculum designers have continually relied on a complex mixture of assessment models, which include but are not limited to presentations, written assignments, presentations and tests. The use of portfolios in distance education has been rather scarce and, even then, ineffective and insufficient

(Zawacki-Richter et al., 2011). Reasons why higher education institutions have avoided using portfolios as an instrument of assessment are difficult to define. On one hand, the current state of research on the use of portfolios is focused on how useful it is for learners to use portfolio assessments (Tosh, Light, Fleming & Haywood, 2005). As a result, student perceptions of portfolio use in higher education are beyond the scope of contemporary research (Tosh et al., 2005). On the other hand, many teachers still expect that their institutions will provide training required to successfully implement portfolios; the situation is particularly difficult with distance teaching (Kim & Bonk, 2006).

In terms of electronic portfolios that exemplify a novel approach to knowledge assessment in higher education, there has been little deeper reform (Lazerson, Wagener & Shumanis, 2000). Nonetheless, the rapid advancement of technologies necessitates the implementation of new assessment forms in distance education, but which forms of assessment are the most suitable for graphic design courses and how to implement them properly should be further clarified. Meanwhile, higher education institutions continue experiencing the pressure of the growing demand for higher education services, whereas the emergence of knowledge-based economy calls for reconsidering and adapting the purposes and processes of knowledge assessments to meet the needs of the new, global learning reality. In the age of competition, only those higher education institutions that constantly update their assessment procedures will have a chance to remain competitive and profitable in the long run.

The need to explore the relevance of portfolio assessments in an online graphic design course is justified by; (a) the lack of attention to competency-based assessments; (b) the peculiar features of distance education that affect the nature of assessment

procedures; (c) the growing demand for learning in knowledge-based economy; and (d) the growing utilization of portfolio-based assessments in traditional higher education environments and their relationship to online courses. As previously mentioned, the paradigm shift from input towards outcome orientation justifies the development of new research projects that will explore the validity of portfolios as a form of outcome-based assessment procedure and its applicability in online graphic design courses (Zawacki-Richter et al., 2011). Although the paradigm shift toward the outcome-based nature of higher education has been widely recognized, the potential benefits of portfolios as an instrument of outcome-based learning assessment are persistently disregarded (Zawacki-Richter et al., 2011).

Very often, portfolios become merely a “one more thing to do” and may not be treated as interesting and important by students who are already overloaded with assessments and tasks (Stone, 1998). Furthermore, portfolios have the potential to respond to the most recent trends in higher education, such as documenting authentic learning experiences, enhancing accountability in distance education, and helping colleges and universities to connect their students to multiple media and letting them express their experiences through YouTube and other technological innovations (Reese & Levy, 2009). While the demand for learning, especially distance learning, has been growing, technical advances challenge previous assumptions about higher education and assessment (Hanna, 1998). As a result, earlier methods of assessing knowledge may appear to be irrelevant in new global contexts. Moreover, the existing portfolio systems may fall short of their potential and undermine the effectiveness of new, technology-based approaches to higher education (Love & Cooper, 2004).

Certainly, higher education institutions have been relatively successful in the development of online portfolio assessment programs; unfortunately, the “intention of these online portfolio assessment programs has been to combine the benefits of traditional portfolio-based assessment with the paper saving and other benefits of online environments” (Love & Cooper, 2004, p.66). In other words, by implementing traditional portfolio assessments with online universities, colleges and other higher education facilities have created more problems than they can solve. First, traditional paper-based portfolio assessments implemented online, lack full integration with the course contents and design (Love & Cooper). Second, the heuristics and design criteria that underlie the creation of online education systems differ dramatically from those underpinning traditional education discourses (Love & Cooper). The specific features of distance education and their implications for portfolio assessment should not be ignored: distance education and learning by nature is associated with the concepts of isolation and the absence of face-to-face interactions with instructors (Suen, 1996). Apparently, there is an urgent need to explore the use and usability of portfolio assessments in distance education courses, to provide recommendations and improvements for education professionals.

The following was the analysis of portfolio assessments and their effects on students in online graphic design courses. The crucial stages of the project will include a brief analysis of the issue in question and its background and history, problem statement and purpose of the study, its basic aims and objectives, as well as the discussion of methodology and the relevance of the study in the context of contemporary distance education and its relation to social change. All these stages were designed to create a

picture of completeness in the discussion of portfolio assessments and their applicability in distance education environments. It goes without saying that technological advancements trigger new developments in the field of education, but the main question to be answered is how to apply these developments properly. The goal of higher education, as well as education in general, is to deliver knowledge in ways that enhance students' self-efficacy and comprehension, regardless of the course they choose. Graphic design courses are no exception: comprehension and self-efficacy are the foundational ingredients of effective education. Thus, how exactly do portfolio assessments impact students in the graphic design course? This was the question answered in this study.

### **Background of the Study**

Portfolio assessments exemplify one of the most interesting and controversial aspects of higher education research. Much has been written and said about the nature of portfolio assessments and their applicability in higher education. Yet, despite the growing body of literature, the meaning of portfolios as an instrument of evaluation remains unclear. The growing number of portfolio definitions has made the task of describing portfolios in traditional and online education extremely problematic. Nevertheless, based on a thorough review of the current literature, the most accurate definition of a portfolio is:

A specific collection of materials and documents, with the purpose of documenting a specific range of performance over a period of time. The portfolio serves as a component of self-evaluation and provides participants and outsiders with an overview of personal learning success, goals and results of the projects.

(Zawacki-Richter et al., 2011, p.45)

In other words, portfolios are collections of materials that are created by students or professionals with the goal of delineating the key processes and happenings in their career/learning (Challis, 1999). Portfolios can also be defined as a collection of documents/evidence that substantiate the achievements, skills, competencies and learning accomplished by students within a given period of time (Love & Cooper, 2004). This definition also implies that portfolios encompass six different subcategories: (1) skills students intend to develop; (2) learning outcomes students are to achieve; (3) strategies used to enhance learning; (4) performance indicators used to measure students' progress and confirm they have achieved the desired outcomes; (5) evidence demonstrating the discussed performance indicators have been met; and (6) the quality of organization and presentation, so that the relationship among evidence and performance indicators is easily understood (Love & Cooper, 2004).

For the purpose of this research, the difference between portfolios and e-portfolios should be clarified. As with portfolios, e-portfolios have been defined in more than one way. Reese and Levy (2009) offer a broad description of an e-portfolio, as a digitized collection of learning and experiential artifacts and accomplishments that represent changes in individual learning performance or that of a group and even institution. However, this definition fails to capture the intangible meanings underlying the essence and utilization of e-portfolios in higher education. Therefore, the definition provided by Joyes, Gray and Hartnell-Young (2010) served as the foundation for the development and implementation of this research project:

An e-portfolio is the product, created by the learner, a collection of digital artifacts articulating experiences, achievements and learning. Behind any product,

or presentation, lie rich and complex processes of planning, synthesizing, sharing, discussing, reflecting, giving, receiving and responding to feedback. These processes – referred to here as ‘e-portfolio-based learning’ – are the focus of increasing attention, since the process of learning can be as important as the end product. (p.16)

From the current literature, this definition will serve as the fullest and most recent. However, it is interesting that the discussed definition has not taken the paradigm shift from the process- to outcome - oriented learning for granted. Rather, the discussed definition of e-portfolios claims that the process of learning and its products are equally essential (Joyes et al., 2010). This, however, does not change the essence of e-portfolios; nor does it reduce the validity of this study. On the contrary, this definition once again confirmed the broad applicability of e-portfolios as an instrument of assessing knowledge during and after the process of learning. Based on this definition, e-portfolios differ from traditional portfolios in that the former are created and delivered via digital environments and involve the use of the latest technologies. Moreover, it is possible to assume that the inclusion of technologies in higher education assessments and the inherently digitized nature of e-portfolios have greater potential to increase user engagement and collaboration among students and between them and their teachers/ facilitators in higher education environments (Attwell, 2007).

It should be noted that portfolios have been found in all fields of professional development and higher education. They have been used for assessment and learning, promotion and appraisal (Klenowski, Askew & Carnell, 2006). Surprisingly, there is no single standard application for portfolios in higher education (Meeus, Petegem & Looy,

2006), but in many cases, portfolios have served the purpose of developing reflective and teaching skills from pre-serving to postgraduate levels of learning (Klenowski et al., 2006). Portfolios can also be used for the purpose of strengthening the validity of summative evaluations (Klenowski et al., 2006). The body of research concerning the use of portfolios in formative assessments at postgraduate levels is very scarce (Klenowski et al., 2006). Nevertheless, it is still possible to classify higher education portfolios by the mode of implementation and purpose of use. It appears that in higher education, portfolios are often used for admission purposes, since they allow assessing student competencies and their readiness to enroll in higher education (Meeus et al., 2006). During higher education courses, portfolio assessments can be used to supervise and assess student competencies (Meeus et al., 2006). Portfolios are also used upon entrance into the profession and during one's professional evolution, as an instrument of ongoing professional assessment in the workplace (Meeus et al., 2006). The most common types of portfolios include smart and documentation portfolios, learner portfolios, introductory and course portfolios, meta-portfolios, and demonstration and instruction portfolios (Meeus et al., 2006). Although Meeus et al. (2006) cite these examples and types of portfolios, they also recognize that the current state of literature provides at least 28 types of portfolio clarifications. Therefore, defining and explaining these categories would be neither easy nor useful for this research. Since the goal of this study had nothing to do with the typology of portfolios and e-portfolios, this task would be successfully accomplished in future studies.

The multitude of portfolio types and applications creates a picture of their universal applicability across all courses and learning models. However, this impression



was at least erroneous, since the use of portfolios as an instrument of assessment is conditioned by its nature, origins, and initial purpose (Meeus et al., 2006). Objectively, portfolio assessments reflect and fit in the atmosphere of co-constructivism in education that shifts the emphasis from individual responsibility for learning to a more collaborative view of the educational process (Klenowski et al., 2006). Portfolios are best used in the conditions where learners are given freedom to identify the most important aspects affecting the learning progress and act to make changes and improve their progress. Portfolios as a tool of assessment fit perfectly well in the environments where critical investigation, self-reflection, reorganization and reinterpretation of knowledge are crucial components (Klenowski et al., 2006). Portfolios facilitate the link between individual meanings and the contexts in which they are created (Klenowski et al., 2006).

It is interesting to note that origins of portfolios as an instrument of assessing knowledge are found in the arts. Actually, the term ‘portfolio’ was borrowed from graphic arts to denote a collection of evidence substantiating the act of learning and measuring its progress (Snadden & Thomas, 1998). Today, portfolios can hardly be considered as new to the field of higher education, but for many years they have been a foundational pillar of graphic arts education, used to track the professional development of artists in long-term perspectives (Snadden & Thomas, 1998). It was not until recently that portfolios have come to be used beyond arts, for example, in medical education and science. Portfolios are becoming extremely popular as an instrument of measuring professional growth of employees in organizations as witnessed by Snadden & Thomas (1998). The assessment potential of portfolios can hardly be exaggerated: portfolios exemplify an extremely effective element of authentic assessment and allow measuring

changes in knowledge and personal and professional development over time from a practical, not theoretical, angle (Snadden & Thomas, 1998).

The roots of portfolio assessment can also be traced to the times of John Dewey, who defended the value of self-reflection education and actually laid the groundwork for the development of portfolio philosophies in their current form (Snadden & Thomas, 1998; Wang & Liao, 2008). Unfortunately, Dewey's self-reflection ideas were not widely accepted, until Schon published his works on reflective practices and their value for higher education (Snadden & Thomas, 1998). Although portfolios are closely associated with the graphic arts, it was the Northern American system of education that brought the value of portfolios to the surface and gave rise to the new portfolio forms of assessment in schooling (Snadden & Thomas, 1998). Although, at first, portfolios worked merely as a collection of evidence supporting that the act of learning had occurred, they gradually changed to become an instrument of collecting and reflecting on students' educational experiences (Snadden & Thomas, 1998; Wang & Liao, 2008; Zawacki-Richter, Hanft & Baecker, 2011). Even when portfolios became a popular form of summative assessment in American school education, their true value was persistently underestimated (Snadden & Thomas, 1998). The reliability and validity of the assessment results provided through portfolios were questioned (Snadden & Thomas, 1998). There was no explicit consensus among raters as for the role which portfolios could play in understanding student performance (Snadden & Thomas, 1998; Wang & Liao, 2008; Zawacki-Richter, Hanft & Baecker, 2011). Nevertheless, extensive use of portfolios in the classroom became a challenge that dramatically altered the classroom climate, the nature of interactions

among students and teachers and brought the novelty and creativity in the process of assessing students' works (Rowe, 2008; Snadden & Thomas, 1998).

Today, the use of portfolios raises a number of questions that refer to their applicability in highly diverse technological learning environments. Performance expectations in higher education increase (Mangin & Stoelinga, 2010), and new transformative models of learning give rise to electronic ways of assessing student knowledge, including e-portfolios (Stansberry & Kymes, 2007). More often than not, researchers explore the validity and assessment reliability of traditional and electronic portfolios (Barbera, 2009; Batson, 2002; J.O. Brown, 2001; Chenail, 2008; Conrad, 2008; Gulbahar & Tinmaz, 2006; McLoughlin & Luca, 2001; Strivens, 2007; Suen & Parkes, 1996; Swan, Shen & Hiltz, 2006; Zawacki-Richter et al., 2011). However, there has been no research on the impact of portfolios on students' self-efficacy in distance education, and this research is intended to fill this gap.

### **Statement of the Problem**

Although portfolios have become a popular instrument for assessing student learning in traditional education, their applicability in the context of distance education is poorly understood. The main reason why portfolios and distance education contexts lack an explicit connection is because distance education differs dramatically from the more traditional on-site classroom learning. Distance as the distinguishing feature of distance education has far-reaching implications for assessment and learning processes (Zawacki-Richter et al., 2011). Distance also necessitates the development of new technologies and media that, in turn, distinguish distance education from all other forms of learning (Zawacki-Richter et al., 2011). Distance education by nature implies the sense of

isolation in students, the lack of face-to-face interactions and delayed instructor feedback (Zawacki-Richter et al., 2011). Apparently, not all students feel satisfied with the absence of direct interactions with the instructor, and even the presence of sophisticated technologies cannot reduce this relationship gap. Nevertheless, the number of students taking online courses rapidly increases; the line between traditional on-campus and distance students is fading (Venable, 2010). Even those students who consider themselves traditional come to consider an opportunity to engage in an online course (Venable, 2010). More and more 1<sup>st</sup>-year college students report having completed at least one online course even before they have been enrolled in college (Venable, 2010). Some universities and higher education departments require that students engage in at least one online learning course during their education process (Venable, 2010). This, in turn, raises the question of assessment quality and the role in which portfolios can play in enhancing students' self-efficacy in distance education.

Students are reported to experience considerable emotional and learning problems in online courses. The main problems that cause frustration in students include (a) the lack of immediate feedback; (b) the ambiguity of instructions and learning criteria provided on the Web; and (c) technical problems experienced by students in online courses (Hara & King, 1999). These emotional problems, in turn, undermine educational opportunities provided on the web (Hara & King, 1999). Moreover, distance learning shifts the responsibility for the quality of education and interactions to the learner, who is directly responsible for compensating for the lack of contact with other learners and the instructor (Suen, 1996). The active learner is the necessary precondition for making distance learning successful, productive, and cost-effective. Distance learners usually

tend to have clearer goals and reasons for engaging in a distance course, but the degree of responsibility for managing contacts with the instructor varies across individuals (Suen, 1996). Apparently, students engaged in distance education need additional encouragement and support to achieve the desired learning outcomes. This is why the role of portfolio assessments in managing students' self-efficacy in distance learning requires a detailed examination.

Portfolios and e-portfolios exemplify a unique source of learning potentials, which motivate students to engage in reflective thinking and deep criticism of the learning progress (Barbera, 2009). In present day learning environments, the goal of education is to motivate students to construct new knowledge between them and their instructors, as well as between students themselves (Barbera, 2009). In this context, assessment procedures must be explicit and timely, to encourage and support students in achieving their learning goals. The problem is that assessment is no longer an instrument of grading but is a wide concept or philosophy of motivating students to move along the learning continuum. The problem is whether or not portfolios should be used to assess knowledge in distance design courses and how portfolio assessments can affect students' self-efficacy and comprehension in an online graphic design course.

### **Purpose of the Study**

The purpose of this comparative case study was to explore the impact of portfolio assessment on students' perceptions of self-efficacy and comprehension in a graphic design course. Reasons why the purpose of the study was justified are numerous. Through discovery and research, the current state of literature confirms that assessment tools used by on-ground institutions differ greatly from those used by online institutions

in the higher education domain. The body of literature covering portfolio assessment and their usability as a formative assessment tool in student assignments highlighted the benefits offered to students and their effects on achievement (Chung, 2008; Kicken, Brand-Gruwel, Merrienboer & Slot, 2009; Smith & Tellema, 2007; Stansberry & Kymes, 2007; Venable, 2010; Zawacki-Richter et al., 2011). This study will focus on the analysis of portfolio assessment and their potential to enhance comprehension and students' self-efficacy in an online graphic design course.

The intent of the study was to address the existing gap in knowledge concerning the use of portfolio assessments in distance education and their implications for the quality of learning in online courses. The fact is that, with the rapid advancement of technologies and online education as a form of knowledge delivery, the need for developing new forms of online assessment has been mostly unsatisfied. While instructors need better knowledge of assessment procedures and their online applicability, students need greater confidence to cope with the responsibility and processes provided in online education environments. The results of the study, on the one hand, will guide further research in the field of portfolio assessment in distance education and, on the other hand, provide recommendations to improve the quality of assessment procedures used in distance education. Whether or not the results of the study will be applicable in distance courses other than design is difficult to predict; eventually, portfolios by their nature are closely connected with design. Nevertheless, the study will lay the groundwork for evaluating the validity of portfolio assessments in distance education and their implications for students' self-efficacy and comprehension.

## **Research Questions**

The goal of the study was to achieve an understanding as to whether or not portfolio assessments positively affect students' self-efficacy and comprehension in an online graphics design course. By researching one online Digital Imaging course, allowed the researcher to analyze the possibility of using this study and research method within other online, graphic design courses such as; Illustration, Page Layout, Product Packaging and Digital Layout, just to name a few. In addition, the study focused on the analysis of student-instructor-assessment relations in an online graphic design course. Another question was whether or not it would be worth using portfolios for formative and summative assessment in distance education, particularly, in an online graphic design course. The principal variables explored in this study include assessment portfolios, and students' perceptions of self-efficacy and students' comprehension in an online graphic design course. As a result, the research questions of the study included:

- How do portfolios impact students in an online graphic design course?
- How do portfolios impact students' perceptions of self-efficacy?
- How do portfolios impact students' comprehension?

## **Theoretical Framework**

The current state of research into portfolios and their use in online education suggests that the analysis of portfolio use in distance learning warrants the application of complex theoretical frameworks. This being said, Mezirow's theory of transformation is believed to exemplify the most relevant approach to the study. Mezirow's theory of transformation is a constructivist theory that focuses on the "cognitive restructuring and integration of experience, action and reflection" (Stransberry & Kymes, 2007, p.489).

Mezirow's theory of transformation is a constructivist theory of adult learning, and this is the main reason why this theory was used as the foundation for this research project.

According to Mezirow (1997), transformative learning is the process that affects change by means of the frame of reference. Adults develop and acquire a coherent body of experiences which serve the main frame of reference while defining the meaning of the world (Mezirow). In other words, frames of reference are the experiential lens through which adults develop their vision of the surrounding reality. They produce selective impacts on adult feelings, perceptions and actions, leading to the rejection of ideas that do not reflect adult preconceptions about the world and acceptance of those ideas that allow adults to realize their mental and behavioral intentions for their own benefit (Mezirow). Based on Mezirow's theory of transformative learning, adults use critical reflection to transform their frames of reference (Mezirow,). Adults tend to become critically reflective of the assumptions made by other people or generated under the influence of changes in political, social, economic or cultural environments (Mezirow). Consequentially, self-reflection is the fundamental driver of personal transformations. Here, the link between self-reflection, personal transformation, and the use of assessment portfolios in distance education should be explained. Since learning is intended to cause positive transformations in learners' worldview, and these transformations, according to Mezirow (1997) take place through critical self-reflection, then portfolios fit perfectly well in the contemporary conditions of knowledge delivery in higher education. Assessment portfolios can become that very means of self-reflection that drives personal transformation and expands students' worldview. However, this assumption warranted further analysis and validation, and this was actually the goal of this study.



According to Mezirow (1997), there are four types of learning processes. First, adults can seek to support their viewpoint, by finding and using available evidence that supports their view (Mezirow, 1997). This evidence will eventually reinforce the existing ethnocentric biases and strengthen the intensity of the point of view (Mezirow, 1997). Second, adults learn by seeking new points of view (Mezirow, 1997). “We can encounter a new group and create new negative meaning schemes for them by focusing on their perceived shortcomings, as dictated by our propensity for ethnocentricity (Mezirow, 1997, p.7). Third, adults can learn to transform their viewpoints and develop new knowledge of cultures in ways that transform the existing viewpoint and eliminate the existing misconceptions (Mezirow, 1997). Fourth, although rare, adults can transform their ethnocentric biases and attitudes toward the reality in which they live. However, these processes are very rare and demand extreme efforts and willingness to transform personal attitudes and beliefs.

Mezirow’s theory of transformative learning has far-reaching implications for understanding the process of distance education, the role and place of portfolio assessments, as well as the effects which portfolios might cause on students’ self-efficacy and content comprehension. To begin with, recognizing the function of learning transformation and transformative learning in the context of distance education contributes to a better understanding of adults’ learning needs and, consequentially, makes the role and function of adult education more explicit (Mezirow, 1981). Furthermore, adult educators must understand that learning is a multifaceted process that takes many forms; as a result, the analysis of the relationship between learning and assessment can become extremely complicated. Finally, to ensure the efficacy of adult

learning, instructors must assist learners in getting aware and critical of their own and other's preconceptions, beliefs and assumptions (Mezirow, 1997). Adult learners definitely need to discover and understand their frames of reference and redefine the obstacles and problems they encounter in their lives, through transformative learning and self-reflection (Mezirow, 1997). In this sense, portfolios as a form of assessment hold a promise to facilitate critical self-reflection among adult learners and, therefore, become a reliable driver of transformations in adults. Again, these assumptions need further validation and analysis. This is why Mezirow's transformative learning theory was used in this research and this is also why this research project is being implemented.

Vygotsky's theory will add relevance to Mezirow's theoretical framework. Based on Vygotsky's (1978) theory of learning, "the mind is not a complex network of general capabilities such as observation, attention, memory, judgment, and so forth, but a set of specific capabilities" (p.31). Vygotsky (1978) suggests that each of these specific capabilities is independent of others and, moreover, develops independently. For Vygotsky (1978), learning is more than the development of thinking abilities. The essence of learning is in acquiring numerous thinking capabilities about many different things. Learning does not change individuals' focus and attention but teaches them to expand their worldview and focus on more than one thing (Vygotsky, 1978). Therefore, any improvement caused by learning in one capability will affect other abilities, only to the extent that they are related (Vygotsky, 1978). Vygotsky's theory implies that portfolio assessments can measure changes in individual capabilities as a result of learning but can hardly measure their relations, as far as these capabilities are believed to be unrelated.

Simultaneously, it is with the help of portfolio assessments that changes in various capabilities under the influence of learning can be measured and evaluated.

### **Nature of the Study**

The current state of research demonstrates the utility of qualitative methodologies as instruments of analysis for researchers. According to Stansberry and Kymes (2007), the importance of qualitative frameworks in the study of portfolios cannot be disregarded. The qualitative study conducted by Stansberry and Kymes (2007) had indicated that students are actively involved with learning, and portfolios strengthen the feeling of joy and satisfaction from being engaged in the process of education. Creswell (2009) stated “qualitative research is a type of educational research in which the researcher relies on the views of participants” (p.46). This was the main methodological framework used as the foundation for this research study.

The study sample consisted of 20 participants in a graphics design course, selected using random sampling procedures. Creswell (2008) justified the relevance of random sampling as a method to randomly assign individuals to the study group. In doing so, provides each student the same probability to be included within the research project. In this study, random sampling defined as the process of systematic selection of subjects for analysis, without having taken local and contextual features into account (Cohen, 2006). The course lasted five weeks and, once in a week within their course (any week), students were required to create a portfolio of the finished work to be assessed by the researcher. Their work would be a specific design project for the given week. Students were also expected to complete an open-ended survey, which were then analyzed with the help of qualitative research techniques. At the end of the course, students’ self-efficacy

and its relation to the use of portfolio assessments during the course were evaluated through the data collected via an open-ended survey distributed among the participants. Comprehension levels were measured by means of rubrics that measured the comprehension of the required design skills, as well as the analysis of design concepts. Eventually, the data gathered on comprehension and self-efficacy was combined to create a complete picture of the relationship between self-efficacy, comprehension and portfolios in an online graphic design course.

### **Significance of the Study**

The study proved to be of particular relevance for educators, especially those working in the field of distance learning. Since the time when computers have made virtual classrooms possible (Suen, 1996), the number of education professionals working in the distance education domain has continued to increase. The advantage of distance education is in that students do not need to be physically present in the classroom and participate in the course activities at one and the same time (Suen, 1996). This, however, has placed new demands on educators, who lose the sense of control over students' activities and, therefore, cannot adequately evaluate their learning progress. The results of this study will provided an understanding as to whether or not portfolios as a form of formal assessment enhance students' self-efficacy and comprehension and, consequentially, should be used in online graphic design courses.

The study was extremely important for scholars and researchers in the field of online education. The number of studies about and the knowledge of distance education and its philosophies have been constantly increasing. Nevertheless, several questions

concerning the use of portfolios in distance education continue to persist: (1) how to resolve the conflict between individual learning and large-scale learning priorities, such as the development of a new professional group or the creation of a solid foundation for lifelong learning; (2) how to assess student work that are not and cannot be standardized; (3) what criteria should be used to consider the influence of students' feelings, perceptions, feelings and attitudes on assessment results; and (4) how to deal with the issues of privacy while using portfolios (Snadden & Thomas, 1998). All these questions, although not directly related to the purpose of this study, were inherently related to the use of portfolios in distance education. Researchers working in the field of distance learning and exploring various models of assessment and their applicability in present day education will be able to use the results of this study as a guiding light in their future research endeavors. It is possible that the results of the study will also give rise to the emergence of new portfolio assessment types, which will have made this study potentially significant for both scholars and practitioners.

The impact of the study results may cause on practitioners should not be disregarded. The past 25 years have witnessed an influx of adult learners into the higher education institutions within the United States (J.O. Brown, 2002). As a result, they bring a wealth of lived experiences and share them with their supervisors and education practitioners (J.O. Brown, 2002; Zawacki-Richter et al., 2011). However, until present, little has been known on how exactly portfolios affect adult learners and what these learners can derive from the use of portfolios and e-portfolios in higher education (J.O. Brown, 2002). For higher education practitioners, this study will become a revelation about how confident and self-efficacious students may feel with portfolios. Although the

study is focused on the graphics design course, the results of this study will shed light on and create the basis for developing similar research projects in other learning settings.

Despite its growing popularity, distance education has been a relatively new field of knowledge and practice. Consequentially, instructors in online courses either have lacked knowledge to implement new forms of assessment or have had to adopt traditional portfolio forms to be used in online education. More often than not, the use of portfolios in distance education is either insufficient or scarce (Zawacki-Richter et al., 2011). In this sense, the practical value of this research project can hardly be overstated. The results of the study will help to clarify the relationship between assessment portfolios, students' perceptions of self-efficacy and their comprehension levels and, simultaneously, remove or resolve the fears contemporary educators may hold with regard to using portfolios in online graphic design courses.

The study will close the existing gap in knowledge about portfolios and student self-efficacy. Most studies have evaluated the objective, not subjective, side of using portfolios for assessment purposes in education (Barbera, 2009; Batson, 2002; R.E. Brown, 2001; Chenail, 2008; Conrad, 2008; Gulbahar & Tinmaz, 2006; McLoughlin & Luca, 2001; Strivens, 2007; Suen & Parkes, 1996; Swan, Shen & Hiltz, 2006; Zawacki-Richter et al., 2011). However, as the number of students engaged in online courses has increased, traditional forms of assessment pose a serious challenge to the quality of student outcomes. Since students experience serious emotional and cognitive problems due in part by the lack of face-to-face interactions, the relationship between portfolios and students' feelings of self-efficacy have to be clarified. The results will add to the current state of practical knowledge about portfolios.

The results of the study can become a guide in the development of new policy recommendations for distance education, specifically in graphic design courses. Once the relationship between portfolios, self-efficacy and comprehension is established, the place of assessments and portfolios in distance learning can be clarified. “If we are to revolutionize and dramatically enhance education, it will require engaging students and getting them to think meaningfully and strategically about learning, especially the learning of core competencies” (Abrami et al., 2008, para.1). However, revolutionizing higher education will be impossible without a solid empirical basis supporting the relevance of e-portfolio assessments and their positive effects on students’ self-efficacy. This study will help to clarify the effects that e-portfolios produce on adult learners, and guide further examinations in the field of portfolio assessments, as related to other, non-design courses.

The study was directly related to the notion of social change, which has shown to be not possible without fundamental commitments to quality education, through the construction of knowledge, meanings, perspectives, and personal transformations (Mezirow, 1997; Meeus, Petegen & Looy (2006). Therefore, the quality of education is at the heart of all social change projects. The study ultimately provided with its results, its guidances, and recommendations to improve the quality of distance education, through the more appropriate use of portfolios in online graphic design courses. Consequentially, the results of this study will have contributed to positive social change, with the help of the knowledge obtained by students through critical self-reflection and transformative learning and, possibly, the use of portfolios in online graphic design courses (Meeus, Petegen & Looy, 2006; Mezirow, 1997).

## Definition of Terms

*Assessment.* This study defines assessment as the process of accumulating, analyzing, and systematizing information about students' learning results and their implications for change in individual intellectual capacity (Stasiunaitiene & Kaminskiene, 2009).

*Comprehension.* This study defines comprehension as a student's capacity to perceive and understand the meanings communicated by online instructors and the requirements placed on them in terms of graduation (Caldwell, 2008).

*Design course.* This study defines design course as a brief online distance course of five weeks that qualifies students to complete the undergraduate degree of a Graphic Designer.

*Distance education.* This study defines distance education as a field of education that presupposes delivering knowledge and teaching content by technological means, to recipients that are not physically present in one place and at one time (Hanna, 1998).

*Distance learning.* This study defines distance learning as that which occurs not in the actual presence of the teacher, either in the next building, at home, or in a place located hundreds and thousands of miles away (R.E. Brown, 2001).

*Evaluation.* This study defines evaluation as the process of measuring the degree to which the learners have achieved the desired learning standard (Stasiunaitiene & Kaminskiene, 2009).

*Frame of reference.* This study defines frame of reference as a coherent body of individual experiences, including concepts, associations, feelings, values, and conditions



responses, which are used to govern transformative learning in individuals (Merizow, 1997).

*Learning achievements.* This study defines learning achievements as skills, knowledge, abilities, and attitudes that a person (student) demonstrate in the course and after the process of learning takes place; learning achievements can be also considered as the results of subjective learning or objective studying results (Stasiunaitiene & Kaminskiene, 2009).

*Portfolio.* This study defines a portfolio as being “a specific collection of material and documents, with the purpose of documenting a specific range of performance over a period of time. The portfolio serves as a component of self-evaluation and provides participants and outsiders with an overview of personal learning success” (Zawacki-Richter et al., 2011, p.45).

*Self-efficacy.* This study defines self-efficacy as a “persons’ confidence in their abilities to complete tasks or reach goals but is not based entirely on actual experience while performing these tasks in the past” (DeTure, 2004, p.22).

*Transformative learning.* This study defines transformative learning as the process of effective change through experiences, perceptions, preconceptions and other frames of reference (Mezirow, 1997).

### **Assumptions**

Given that qualitative research was the foundational element of the present research project, the following assumptions dictated the process of research and analysis. To begin with, the researcher assumed that the reality was comprised of multiple meanings, most of which are subjective and need to be clarified. In this sense, students’

words while describing their experiences with portfolios created the foundation for understanding the effects on self-efficacy and comprehension. Furthermore, it was initially assumed that teachers and students had the basic understanding of portfolios, their meaning, content, and outcomes. Students did not need to have experience using portfolios as a form of assessment but already had the knowledge of what portfolios entailed. However, they may have needed to understand the essence of portfolio assessments and their implications for the quality and efficiency of the learning process. This was why the participants had to be instructed about the essence and significance of portfolios in traditional and distance education.

It was also assumed that all participants entered the graphic design course voluntarily, and with having the goal of improving their design knowledge and skills. This was the basis for evaluating the levels of self-efficacy and changes during the course and with the help of portfolios. Finally, it was assumed that all students had a capability to articulate their thoughts and perceptions effectively.

### **Limitations**

The proposed project design and methodology are not without limitations. Most limitations are associated with the deficiencies inherent in qualitative research. To begin with, the issue of transferability should not be disregarded. In qualitative research transferability is somewhat similar to generalizability in quantitative studies and refers to the applicability of the study results in contexts other than the study itself (Tappen, 2010). However, qualitative studies are not designed to ensure the generalizability of findings, as in case with quantitative studies (Tappen, 2010). The goal of qualitative research is not to generalize the findings but to perform an in-depth examination of a particular

phenomenon within a given context (Tappen, 2010). To ensure greater reliability of qualitative research results, they can be connected to other findings and studies, and careful comparisons across people and places will create a more complete picture of the phenomenon in question.

Another problem was that the study was focused on the analysis of the relationships among students' perceptions of self-efficacy, course comprehension, and the use of portfolios as a form of assessment in an online graphic design course. Qualitative researchers tend to focus their analysis on a small number of participants, and it is difficult to imagine that the 20 students involved in the present study would represent the entire student population engaged in an average graphic design course within distance education.

Another problem was that the research project built on the use of the subjective data, which made it difficult to re-channel non-measurable responses and contexts into measurable data (Terry, 2005). According to Creswell (2008), qualitative validity implies that the “researcher checks for the accuracy of the findings by employing certain procedures” (p. 190). In the case of this study, all procedures were followed to provide possible themes through the use of coding terminologies through open-ended surveys. The only limitation is the possibility of interpretation of the reader and coding keywords properly to meet all participant responses. As a result, Gibbs (2007) confirmed “qualitative reliability indicates that the researchers approach is consistent across different researchers and different projects” (as cited in Creswell, 2008, p. 190).

Moreover, the issue of the researcher's bias while interpreting subjective data should not have been easily dismissed. Qualitative studies are particularly susceptible to

the risks of interpretation bias (Creswell, 2008; Mezirow, 1997; Rezaei & Lovorn, 2010; Terry, 2005). Here, the most important is the quality of the relationship between the researcher and research subjects. The reliability of the researcher and the researcher's ability to detect and reduce the effects of personal bias on the interpretation of study findings will play a crucial role for the quality of this research project. Qualitative researchers may become too closely involved with the research subjects, which will threaten the quality of the study findings (Terry, 2005). However, the lack of engagement with the research subjects, which is not regarded as desirable in quantitative studies, may be highly desirable in qualitative research projects (Bryman & Bell, 2007). Through greater involvement with participants' lives, the researcher can better understand the world they are seeing through their eyes (Bryman & Bell, 2007). These may be typical limitations for an average qualitative study; however, these issues have also been addressed within this study. The researcher will only have contact with the participants within this study during the data collection period but only in the role of being the instructor for the assigned course(s). All "immediate" interaction will take place between the participants and the Research Assistant (RA) assigned for this study to keep from creating possible problematic scenarios.

Eventually, the issue of subjects' honesty had to be considered. Researchers can never be confident that the information provided by the research participants was truthful. This is particularly the case of students' perceptions of self-efficacy. "Social scientists, unlike lawyers, must often make decisions regarding the subjective realm without recourse to a process of closely interrogating or interviewing a subject" (Carspecken, 1996, p.74). Moreover, social scientists must have an ability to distinguish truthful

information from the untruthful inferences made by students with regard to their perceptions of the online course. Students who feel that their revelations threaten their successes in online education may be reluctant to uncover the true feelings they held with regard to their self-efficacy and participation in an online graphic design course. These were the problems that could threaten the validity and reliability of the study results. For the purpose of this study, participants were informed that their instructor who was also the researcher would not have knowledge of who was or was not participating within the study. By assigning a Research Assistant, alleviated any of the possible fears of honesty within their surveys.

### **Summary and Organization of the Remainder of the Study**

This section was devoted to the discussion of the study problem, purpose, and research questions. The study was intended to close the existing gap in literature and practical knowledge of portfolios and their applicability as a form of assessment in distance graphic design education. The main question to be answered was how portfolios impacted students engaged in distance graphic design courses. More specifically, the study was designed to understand whether or not portfolios affected students' perceptions of self-efficacy and their comprehension of the content delivered online. Therefore, the purpose of this comparative case study was to determine how, and to what extent, portfolios impact students' self-efficacy and impact their comprehension levels while completing the portfolio process.

The growing popularity of distance education, the growing number of students engaged in online courses, and the difficulty applying traditional assessments in distance education create a context that justifies the importance of the study. The study has far-

reaching implications for educators, education researchers, and policymakers. The difficulties and limitations of the proposed qualitative design should not be disregarded. The researcher's reliance on the subjective data, along with the limitations of participants' readiness to reveal their perception of their self-efficacy may have posed a serious challenge to the validity and reliability of the study results.

The remaining chapters for this study include: review of literature, methodology, data collection and analysis, results, conclusions and recommendations. Chapter 2 includes a detailed review of literature. The goal of the review is to reconsider the most recent findings in the context of self-efficacy and comprehension in distance learning, identify the existing research gaps and possible ways to deal with them. Chapter 3 will cover methodology requirements and concerns, providing the explanation and justification for the research methods used in this dissertation. Chapter 4 will shed light on the instruments used to collect the data for this dissertation and describe the process of data analysis. In Chapter 5, the results of the research will be presented, followed by conclusions and recommendations.

## **CHAPTER 2. LITERATURE REVIEW**

### **Introduction**

Distance education has become part of the higher education realities. New assessment models are being developed to meet the growing demand for quality education and learning in highly technological environments. The shift from process- to outcome- oriented performance measures necessitates the creation of assessment procedures that build on student competencies (Zawacki-Richter et al., 2011). The entire field of higher education has already undergone a series of dramatic shifts, such as the move towards outcome-based orientation and the call for greater transparency and accountability in the field of learning (Reese & Levy, 2009; Zawacki-Richter et al., 2011). Yet, higher education institutions are still far from improving their assessment results. One of the main problems is in that professionals in distance education use different assessment methods and not all of them are appropriate and fit in the complex conditions of online knowledge delivery (Zawacki-Richter et al., 2011). One of the possible reasons why portfolios are still scarce in distance education is because education professionals lack an insight into the utility and usability of these assessment procedures.

The body of research into the role of portfolio assessments in e-learning environments constantly increases. While higher education institutions experience the growing demand for learning and education services, adopting unique and effective models of education can become a serious competitive advantage. One of the main goals of this research is to close the existing gap in literature and link the use of portfolio assessment models in distance learning to self-efficacy and comprehension.

Consequentially, this research would have been impossible and incomplete without reviewing relevant research that has been written and said about portfolio assessments, their role and history, as well as the importance of qualitative research designs in the past 5 years (2007-2012). The importance of this research and the review of literature are further justified by (a) the overall lack of attention to competency-based assessments in learning; (b) the overall peculiarity of distance education compared to classroom-based learning; and (c) the growing popularity of reflective portfolio assessments in classroom-based higher education.

One of the main goals of this review is to justify the use of qualitative methodology in the analysis of portfolio assessments and their effects on students' self-efficacy and comprehension in an online graphic course. A detailed review of literature will create the conditions needed to ensure comparability and enhance the interpretive characteristics of the research results. Eventually, although literature review alone cannot solve the problem of using portfolio assessments in distance education, its results can frame the basis for obtaining and delivering quality research results.

Portfolios and e-portfolios can become a unique source of learning achievements, which can motivate students to achieve new learning horizons. According to Barbera (2009), the goal of education is to enable learners to construct knowledge between students, as well as between students and instructors. The body of literature covering portfolio assessment and their usability as a formative assessment tool in student assignments highlights the benefits offered to students and their effects on achievement (Chung, 2008; Kicken, Brand-Gruwel, Merrienboer & Slot, 2009; Smith & Tellema, 2007; Stansberry & Kymes, 2007; Venable, 2010; Zawacki-Richter et al., 2011).



However, it is never too late to emphasize the benefits and potential weaknesses of portfolio use in education, based on previous experiences. Earlier findings and previous experiences can become a unique source of primary knowledge and help to avoid the common fallacies inherent in professional research. This literature review will include the following elements: qualitative studies related to portfolio assessments, self-efficacy and comprehension; portfolios as assessment tools, and comprehension.

### **Qualitative Comparative Case Study**

Qualitative designs remain one of the predominant design frameworks in the study of portfolio assessments. Reasons why qualitative designs are so popular in the study of portfolio assessments are numerous and diverse. On the one hand, qualitative research fits in the meaning and nature of portfolio assessments, which rely on storytelling and narration. On the other hand, the study of portfolio assessments demands greater attention to the exploratory and interpretive aspects of portfolio assessment use and its implications for social behaviors in education. Using qualitative study designs in the study of portfolio assessments is not an easy task. The pedagogy of portfolio assessments is extremely complicated. However, the current state of research suggests that, in the analysis of portfolio assessments in distance learning, there is no study design better than qualitative case study. The goal of this section is to highlight the rationale behind the use of qualitative study designs in this study and identify possible misconceptions.

Qualitative studies remain one of the most popular elements in the study of portfolio assessments, self-efficacy and comprehension. The current state of research provides solid arguments to justify the implementation of qualitative research designs in

the analysis of portfolio assessments in various learning settings. This section begins with an overview of qualitative studies in portfolio assessment and proceeds to the analysis of qualitative research in the study of self-efficacy and comprehension. The latter appears to be the most problematic and, simultaneously, the most interesting object of qualitative research. The findings of this literature review will facilitate the development and implementation of qualitative research frameworks for the analysis of portfolio assessments and their effects on learners' self-efficacy and comprehension in an online course.

**Qualitative case study and portfolio assessments.** Present day research provides a wealth of information regarding the use of qualitative research design in the analysis of portfolio assessments and their effects on learning. The appropriateness of qualitative designs and case studies in the analysis of portfolio assessments should not be disregarded. Different researchers point to different aspects of qualitative design in the study of portfolios as a form of assessment in education and learning. Papinczak, Young and Groves (2007) suggest the presence of a strong epistemological grounding in the use of qualitative case studies: qualitative analysis is not intrusive and invites individuals to engage in exploratory conversations, which are parts of both the hermeneutic and pedagogical processes. Qualitative methodologies enable researchers to discover the meanings adults tend to endow with their learning experiences (Papinczak et al., 2007). By contrast, quantitative studies, such as quantitative questionnaires and surveys, can restrict respondents to the questions deemed important by the researcher (Grant, Vermunt, Kinnersley & Houston, 2007). Within quantitative methodologies, respondents simply have no freedom of self-expression and self-exploration (Grant et al., 2007).

Despite the growing popularity of qualitative designs and their utility in the analysis of portfolios and e-portfolios, the gap in qualitative research continues to persist. Reardon and Hartley (2007) write that a wealth of research informs stakeholders about the role of portfolio in assessment, criteria for using portfolios, characteristics and qualities of good portfolios which, in the absence of the qualitative angle, fails to integrate portfolios with the sequence of learning experiences leading students towards the desired goal. It is no wonder that the study of portfolio assessments calls for the use of qualitative research designs.

In the analysis of portfolios as an instrument of assessment, qualitative case studies and similar qualitative methods are believed to be more appropriate than quantitative frameworks. Plaza et al. (2007) claim that, bearing in mind the inherently qualitative nature of reflective portfolios, qualitative methods may be more appropriate than quantitative ones. Chau and Cheng (2010) further support this opinion, by saying that, “understanding the e-portfolio experiences of participants and seeking to identify ways in which such experiences are understood and perceived by participants” mandates the use of qualitative approaches (p.935). The reason is that qualitative research paradigms substantiate and emphasize the intricacy of human realities expressed in assessment portfolios (Chau & Cheng, 2010). Qualitative comparisons are of particular use in contexts where the main themes in participants’ reflections have to be examined (Lo, 2010). Since many participants’ responses are loosely structured, statistical analyses will fall short of resources and capabilities to produce relevant study results (Lo, 2010). Finally, portfolios’ narrative nature and the emphasis on storytelling justify and require using qualitative studies to explore their themes and aspects (Fisch, 2010). It is through

qualitative frameworks that an in-depth view of students' experiences in distance education and portfolio assessment can be developed (Chetcuti, 2007).

Qualitative designs have proved to be extremely relevant in the analysis of portfolio assessments, since portfolios are closely associated with the concept of competence, which encompasses knowledge, communication, reasoning and technical skills, and cannot be always measured in quantitative terms (Cox & Irby, 2007). Both portfolios implementations and competence development are contextual and require the use of sophisticated qualitative solutions (Cox & Irby, 2007). Qualitative analysis meets the criteria of comparability, fairness, cognitive complexity and authenticity, all of which are also characteristic of portfolio assessments (Baartman et al., 2007). For example, Tochel et al. (2009) used qualitative research to identify the main themes in the effectiveness of portfolios in postgraduate education. Ntuli, Keengwe and Kyei-Blankson (2009) applied to qualitative methods to analyze teacher perceptions' of electronic portfolios. Apparently, qualitative methods hold a promise to facilitate the analysis of portfolio assessments in higher education, although self-efficacy and comprehension could benefit from the use of qualitative designs.

**Qualitative study and self-efficacy.** Like portfolio use in general, self-efficacy has proved to be a unique object of qualitative analysis. Unfortunately, not all researchers realize the value carried by qualitative designs. This is probably why mixed studies continue to dominate the current state of self-efficacy research. Kaskaya, Unlu, Akar and Sagirli (2011) used mixed study designs to explore the effects of themed movies on teachers' perceived self-efficacy and found that, at the end of the intervention, students' perceptions of the teaching profession improved considerably. Poellhuber, Chomienne

and Karsenti (2008) further analyzed the effects of peer collaboration and collaborative learning on learners' self-efficacy in distance courses and discovered that peer interactions had the potential to improve students' self-efficacy. Likewise, Gunawardena et al. (2010) applied to mixed methods of research and tried to predict learner satisfaction in an online education program. These findings have far-reaching implications for understanding the meaning of self-efficacy in online learning. On the one hand, self-efficacy is being influenced by a variety of factors, including themed movies, peer interactions and learner satisfaction (Gunawardena et al., 2010; Kaskaya et al., 2011; Poellhuber et al., 2008). On the other hand, given the popularity of mixed research designs, it is possible to assume that the concept of self-efficacy requires detailed statistical analyses, and mixed methods of research can ensure greater validity and reliability of qualitative findings, through triangulation. The most interesting, however, is the fact that self-efficacy, especially in online education, is often taken for granted. In other words, researchers in distance education fail to define and denote the meaning of self-efficacy. Whether or not the meaning of self-efficacy in distance education differs from that in classroom settings is difficult to define, but it is clear that researchers are becoming increasingly concerned about the applicability of qualitative methodologies in the study of self-efficacy and its implications for distance education.

Saade and Kira (2009) performed a qualitative analysis of computer anxiety in e-learning. In their study, self-efficacy was defined in terms of Bandura's theory and denotes learners' ability to judge how well they can executive a learning task to achieve the desired goal (Saade & Kira, 2009). By contrast, Gunawardena et al. (2011) suggest that, in online environments, self-efficacy is essentially about learners' confidence in

utilizing technology to engage in productive learning. Apparently, both concepts require further validation and qualitative analysis, to ensure their applicability in distance learning. Although self-efficacy can be successfully measured by means of self-report forms and Likert-type scales (Bell & Kozlowski, 2008), only qualitative methods can expose the hidden meanings of self-efficacy in technological educational environments. Nonetheless, researchers keep using quantitative elements of research design in an attempt to look deeper into the nature and implications of portfolio assessments in various learning environments (Lee & Hwang, 2007).

The choice of qualitative methods of self-efficacy analysis is closely associated with the fact that students' perceptions of self-efficacy vary greatly across individuals, confirming the multifaceted nature of the self-efficacy concept and its complex relationship to learning and socialization in education (Gardner, 2010). Self-efficacy is inseparable from the so-called vicarious experiences, also known as social comparisons (Hutchison-Green, Follman & Bodner, 2010). Stated plainly, students develop their self-efficacy perceptions, by comparing their personal abilities to the perceived abilities of other students, and these experiences play a fundamental role in the formation of learners' efficacy beliefs (Hutchison-Green et al., 2010). Eventually, self-efficacy is a complex construct that is closely associated with the meaning and extent of learning motivation in students: according to Pajares, Valiante and Cheong (2007), self-efficacy is positively related to adaptive motivation, self-regulated learning, task goal orientation and perceived value of writing. All these constructs may have a measurable side but underline the value of qualitative, exploratory research frameworks that enable researchers to look beyond their complexity.

**Qualitative studies and comprehension.** As previously mentioned, qualitative research has become one of the central media of professional analysis in the study of portfolio assessments and their implications for self-efficacy. Likewise, qualitative approaches to the study of comprehension are becoming more prevalent. However, it should be noted, that the issues of measurability in the study of learning comprehension continue to persist. In this sense, the problems identified in the study of self-efficacy are very similar to those identified in the analysis of the contemporary comprehension research. Again, like in the study of self-efficacy, the meaning of comprehension is being taken for granted. Of all comprehension studies included in this review, only Brodie (2007) tried to discuss and evaluate the relationship between various levels of learning, including comprehension. Even then, Brodie's (2007) definition of comprehension was borrowed from Bloom's taxonomy of learning, where comprehension is explained as the process during which learners interpret, translate or summarize the information provided during the course and, consequentially, demonstrate their understanding of the learning event. Comprehension follows knowledge; the latter is limited to recognizing and recalling information and facts (Brodie, 2007). Definitely, comprehension is a higher level of learning which also involves interpretation and analysis (Brodie, 2007). Brodie's (2007) qualitative analysis also suggests that comprehension lays the groundwork for applying information in situations different from the learning context. This is how comprehension transforms into application (Brodie, 2007).

Unfortunately, the body of qualitative research into comprehension is very scarce. Over the past five years, few researchers tried to apply the benefits of qualitative designs to understand the meaning of comprehension. In most cases, comprehension is believed

to be a purely measurable construct, whose value is determined through scoring, grading, and other quantitative instruments. Only Rowe and Wood (2008) used qualitative analyses to understand student perceptions of feedback and their implications for comprehension. Suviniitty (2010) also used qualitative design to explore the complex relationship between lecturers' questions and students' perceptions of lecture comprehension.

The sustained popularity of non-qualitative approaches in the analysis of comprehension reveals and confirms an ongoing concern regarding the importance of measurability in comprehension. The lack of trust to qualitative designs further strengthens professional commitment to quantification. For example, Rybarczyk et al. (2008) developed a quantitative research approach to explore the effects of case-based study designs on students' comprehension of cellular respiration concepts. Yanguas (2009) and Suviniitty (2010) raised the question of measurability in the study of comprehension, and Murphy (2007) used mixed methodology to strengthen the validity of his qualitative findings. Unfortunately, comprehension as a concept lacks a qualitative insight. The latter, however, could explain the complexity underlying the process of comprehending new knowledge and information in distance and traditional classroom-based education. In light of the discussed research gap, this study looks like a unique attempt to understand what exactly stands behind the term "comprehension" and how students in design courses "comprehend" the new material.

In summary, the current state of research offers a wealth of qualitative information regarding the nature of portfolio assessments, self-efficacy and comprehension. The most problematic is the qualitative analysis of comprehension, as the



latter is often regarded as a purely quantitative, measurable construct. Likewise, self-efficacy often becomes an object of quantitative and mixed studies. The lack of qualitative information and understanding of these concepts, as well as the exploratory, reflective and narrative nature of portfolio assessments justify the implementation of qualitative designs for the study of portfolio assessments and their effects on students' self-efficacy and comprehension in online design courses.

### **Portfolios as a Type of Assessment**

Portfolios are hardly a new instrument of assessing learning. The history of portfolios as a form of assessment and their popularity in classroom-based learning suggest that portfolios exemplify a unique, complex, and extremely effective mechanism of assessing students' progress towards their learning objectives. This, in turn, raises the question of appropriate portfolio use in higher education and their potential usability in distance education. This is why a detailed review of literature can expose the main benefits of portfolio assessments in different learning settings and identify possible uses of portfolios as a form of assessment.

Portfolios are believed to have far-reaching implications for learners' self-efficacy and comprehension. Here, special attention should be paid to the place which portfolios occupy in the contemporary visions of learning as a constructive activity. The relationship between portfolios, constructivism, self-efficacy and comprehension needs professional attention. Theories of Albert Bandura (1986), Jean Piaget (1967), Vygotsky (1978) and Mezirow (1981) should both create the basis and serve an analytical lens for the present study. All these theories used to be extremely popular among earlier researchers, especially in the self-efficacy and comprehension domains. The task of this

review is to link earlier findings to the study of portfolio assessments. Undoubtedly, portfolio assessments have a great future in distance education, but systemic knowledge of research findings can ensure that the assessment and learning potentials of portfolios are utilized to the fullest.

**History of portfolio assessments.** The history of portfolio assessments is inseparable from the history of assessment, in general. The history of assessment in U.S. education dates back to the middle of the 19<sup>th</sup> century, when assessment emerged in K-12 education (Buzzetto-More, 2007). At that time, Horace Mann, a pioneer of assessment, used the first written examinations to measure learners' progress in Massachusetts (Buzzetto-More, 2007). By the 1920s, a broad scientific movement emerged, leading to the development and implementation of large-scale testing which, by the middle of the 1960s, transformed into the National Assessment of Education Progress (Buzzetto-More, 2007). In higher education, the movement to develop accreditation mechanisms for higher education institutions coincided with and drove the first models of measuring educational outcomes (Buzzetto-More, 2007). Even today, electronic portfolios are used for accreditation purposes, from the unit to institutional levels (Meyer & Latham, 2008). Here, Buzzetto-More (2007) suggests that Northeast Missouri State University and Alverno College were the first to develop assessment models to meet the evaluation needs of outcome-based instruction. Today, assessment is considered as an integral piece of higher education processes and a mechanism that ensures that students achieve their learning goals (Buzzetto-More, 2007). The goals of assessment in present day higher education include: (1) improve student learning; (2) help students to identify their strengths and weaknesses; (3) review and improve the quality of instructional and

teaching strategies; (4) improve teaching effectiveness; (5) review and improve curricula activities and programs; (6) provide administrative data to support decision making; and (7) develop effective communication channels with stakeholders (Buzzetto-More, 2007). Since portfolios are an important type of assessment, all these goals and procedures also apply to them.

According to J.O. Brown (2001), portfolios were first used in higher education 25 years ago and, since then, tens of thousands of adult learners have developed their own learning portfolios to get college credits and successfully complete their degrees. The term “portfolio” originates from the graphic arts, where portfolios were used to collect evidence to confirm that the act of learning has taken place (Snadden & Thomas, 1998). Today, portfolios are being extensively used in almost all disciplines, to document the learning progress (Snadden & Thomas, 1998). Portfolios may include records of experiences and events, critical reviews of articles, descriptions of teaching sessions attended by adult learners, projects in which adult learners participated, etc. (Snadden & Thomas, 1998). Portfolios enable adult learners to identify and reflect on the weakest and strongest sides of their learning progress, describe what they have learned and what they still need to learn, as well as possible ways to deal with new learning (Snadden & Thomas, 1998). However, Snadden and Thomas (1998) note that portfolio assessments work best when they are implemented and operate through continuous interactions between learners and instructors. Interactivity is the main prerequisite for turning portfolio assessments into a driver of continuous learning (Snadden & Thomas, 1998).

The history of portfolio use in American education is integrally linked to the name of John Dewey, who is often considered to be one of the first proponents of

reflective thinking in education (Snadden & Thomas, 1998). Dewey's contribution to popularization of portfolio assessments can hardly be overstated. Portfolio assessments were developed specifically to enhance, motivate and encourage reflection in education (Snadden & Thomas, 1998). Today, portfolios can be defined as "a purposeful collection of student work that exhibits the student's efforts, progress and achievements in one or more areas" (Snadden & Thomas, 1998, p.193). However, like everything else in education, portfolios are susceptible to the effects of technological advancement. The term "electronic portfolio" is gradually replacing traditional forms of portfolio assessments. Batson (2002) writes that the term "ePortfolio" has already become commonplace. ePortfolio is essentially the same as traditional portfolio assessments, but it makes the entire process of learning much more convenient for learners and, simultaneously, meets the changeable demands of the technological reality (Batson, 2002). Based on what Batson (2002) writes, ePortfolios expand learners' reflective capabilities, through the inclusion of graphic content, audio and video instruments, and even animation. This is probably why eportfolios are becoming so popular in higher education.

**Common use of portfolios.** A wealth of research has been completed to identify the best and most appropriate ways of using portfolio assessments. In the context of the present study, portfolio assessments in higher education present the issue of the major concern. Klenowski et al. (2006) write that, as of today, portfolio assessments can be found in virtually all phases of professional education and development. In higher education, portfolios are often used for the purpose of summative assessment (Klenowski et al., 2006). However, the body of research regarding the use of portfolios in formative

assessment is increasingly scarce (Klenowski et al., 2006). Nevertheless, in higher education, as well as in other learning environments; portfolio development and use is underpinned by the constructivist and dialogic theoretical constructs (Klenowski et al., 2006). The emphasis on knowledge construction in all fields of adult development and learning emphasize the value of portfolios as a form of summative assessment.

Portfolio assessments are being extensively used in health and medical education. Grant et al. (2007) explored students' perceptions of event analysis and portfolio assessment in medical learning. Driessen, Tartwijk, Vermunt and Vleuten (2004) analyzed the use of portfolios in undergraduate medical training and confirmed that portfolio assessments could become a unique and extremely useful supplement to traditional assessment models. Plaza et al. (2007) analyzed how reflective portfolios could be used in health sciences education and concluded that, despite the considerable advantages offered by portfolio assessments, the fundamental issues of their validity and reliability remained. By contrast, Kuper, Reeves, Albert and Hodges (2007) assert that reflective portfolios fit perfectly well in the purpose and nature of medical education, as there is growing understanding that medical education is better delivered through a set of social constructs. Medical education, as well as education in general, is no longer an individual process but, rather, a product of continuous interactions between two or more individuals and groups (Kuper et al., 2007). In social sciences, ideas about how people act are always culture- and context-specific, and only portfolio assessments can give professional educators a chance to understand the nature and implications of these behaviors (Kuper et al., 2007). Additionally, portfolios have been used and analyzed in postgraduate education (Tochel et al., 2009), as a tool of reflective learning in initial

teacher education (Chetcuti, 2007), as well as the instrument of literacy assessment (Walsh, 2009) and a useful tool of assessing second language learning (Cummins & Davesne, 2009).

In today's learning environments, the use of web-based portfolio assessments is becoming a popular topic of professional discussion. As education, including higher education, is moving towards online spaces, professional educators are becoming preoccupied with the task of developing web-based assessment forms. Chang and Tseng (2009) analyzed the effects of web-based portfolio assessments on students' performance in junior high school and found that online portfolios improved students' reflection, goal setting and problem solving capabilities. Barbera (2009) further supported those results, by stating that e-portfolios and netfolios offered students a better understanding of the learning process, learning objectives, through self-revision and participation in peer assessment.

In the qualitative analysis of electronic portfolios by Fitch, Peet, Reed and Tolman (2008), students reported that portfolios helped them to organize their thoughts, tie initially separated elements of their learning experiences into a coherent body of learning, make sense of other classes, although the electronic nature of portfolios made it difficult for many students to work with them. It seems that portfolios can be universally applied across a variety of learning contexts, although certain problems and limitations should not be disregarded. For example, Lucas (2007) writes that portfolio assessments represent an interesting self-evaluation scheme that enables students with various linguistic problems to address the existing deficiencies, through self-autonomy and learned independence, but only when portfolio assessment instruments are properly

developed and appropriately applied. According to Lucas (2007), the process of developing portfolios consists of four stages: collection, selection, reflection and projection. However, whatever the nature and application of the assessment instrument, it is always rooted in the constructivist learning framework and reflects the growing urgency of comprehension constructs in higher education.

**Portfolio assessments and self-efficacy.** Portfolio assessments are rooted in the constructivist philosophy (Klenowski et al., 2006). Portfolios as an instrument of assessing learning reflect “a shift from a stress on individual responsibility for learning to a more collaborative view, allowing learners to identify issues in their organization and society which affect their learning and well-being” (Klenowski et al., 2006, p.269). It is through the prism of the constructivist philosophy that the link between portfolio assessment and students’ self-efficacy can be better understood. Researchers offer an insight into the effects of portfolios on self-efficacy in learning.

Understanding the relationship between self-efficacy and portfolio assessments is important, since higher learner self-efficacy beliefs are fundamental to the professional maturation of students (Jones, 2009). Learner self-efficacy further predetermines higher motivation and better learning outcome expectations (Jones, 2009). Self-efficacy in learners is closely related to personal responsibility, effective goal setting and transformations: Jones (2009) suggests that self-efficient learners are transformative learners, who assume personal control over their learning progress. Through the prism of Bandura and Mezirow’s theories, self-efficacy drives the rapid transformation of the learning process, turning learners into both producers and products of their social environment (Jones, 2009).

Students construct their perceptions of self-efficacy through the nature and form of assessments used to evaluate their learning progress (Brown & Hirschfield, 2008). Students perceive assessment in four different ways: they may feel that assessments make them accountable; they may think that assessment is unfair and, therefore, irrelevant; they may perceive assessment as a good way to improve learning; or they may experience the sense of joy about particular forms of assessment. According to Strivens (2007), students feel that e-portfolio systems support formal learning, overall development, summative assessment, and transition to a different learning environment. In other words, portfolio assessments drive student' self-efficacy, by creating a reflective dialogue between students and instructors and letting students express their achievements and concerns openly and constructively (Hayatdavoudi & Ansari, 2011).

Portfolio assessments have the potential to drive students' self-efficacy, since they create an atmosphere of learner-driven education; the latter is the foundational ingredient of the constructivist philosophy (Sajadi & Khan, 2011). Portfolios are fully compatible with the principles of active learning, which represents learners as those who have capability to realize mental processing through creativity and exploration (Sajadi & Khan, 2011). In this sense, the benefits of using portfolios to assess learners' knowledge cannot be ignored. Portfolios have proved to be extremely effective in the construction and analysis of learning in ADHD students (Sajadi & Khan, 2011). Specific to ADHD students Mayer (2001) stated, "humans can process information into different channels of auditory/verbal and pictorial/visual" (p. 659 as cited in Sajadi & Khan, 2011). In other words, by creating a portfolio, ADHD students or participants of this study now have a visual aid of their work in progress. Portfolios raise students' self-efficacy by reducing



their anxiety in writing (Ozturk & Cecen, 2007). As an instrument and medium of storytelling, portfolios play an important role in the development of learners' literacy (Wan & Tanimoto, 2008). Students using portfolios to assess their knowledge experience greater satisfaction, being active participants of the learning process and able to reflect upon their progress (Wang & Liao, 2008). In these constructivist learning environments, portfolios help learners to manage learning and foster the evolution of lifelong learning priorities and skills (Little, 2009).

Loyens and Gijbels (2008) claim that there is still a huge gap between the constructivist philosophy and educational practices. The fact that constructivism manifests in a number of ways and has more than one theoretical position makes it difficult to narrow the gap between educational practice and theory (Loyens & Gijbels, 2008). Despite these difficulties, constructivism remains the dominant educational philosophy, and portfolio assessments look like a perfect element fitting in the constructivism atmosphere of knowledge delivery in higher education.

**Portfolios and comprehension.** As previously mentioned, comprehension remains one of the most problematic elements of portfolio analysis in research, due to the fact that its meaning is often interpreted in quantitative terms. However, given the topic of this study, the relationship between portfolios and comprehension has to be better understood. Recent studies highlight the crucial role of portfolio assessments in driving students' comprehension in different learning settings. As always, comprehension is understood in terms of Bloom's taxonomy and implies the process of translating and interpreting new knowledge, through project participation and presentations, demonstrations and explanations, as well as criticism (Todorova & Mills, 2007). Here,

the body of literature covering the relation of portfolio assessments to comprehension can be roughly divided into two categories: first, whether or not portfolios improve comprehension and, second, how exactly portfolio assessments can drive better comprehension of the learning material.

Here, Conrad (2008) recognizes the potential of portfolio assessments to enhance the quality of learning and students' progress. Taking Dewey's educational philosophy as the basis, portfolio assessments promote real-world learning and help adult learners in distance education to master the new knowledge through reflective learning (Conrad, 2008). From the viewpoint of Mezirow's theory, portfolio assessments emphasize educators' role in learning as helping students to engage in reflective thinking and helping them to redefine their understandings and insights (Conrad, 2008). Portfolio assessments are also recognized as a unique instrument of building collaborative ties and building schoolwide comprehension instruction (Au, Raphael & Mooney, 2008). Kariman and Moafi (2011) emphasize the positive effects of portfolio assessments on comprehension in prenatal training for midwives. Ha (2010) discovered that portfolio assessment improved learners' self-expression capability in English learning. An important question is how exactly portfolio assessments improve comprehension.

Several ways are possible. Fox, White, Kidd and Ritchie (2008) write that examining portfolio contents brings both students and educators towards better understanding of students' learning practices and decisions. The results of portfolio assessments can further inform instructional and curriculum decisions in higher education (Fox et al., 2008). Brown and Hirschfield (2007) further suggest that portfolio assessments keep students accountable for their own learning progress, loading students

positively to seek achievement. Based on the self-regulation theory, students who assume responsibility for their learning have greater chances to attain to the desired learning objectives (Brown & Hirschfield, 2007). Leu et al. (2009) contend that the Internet expands learning frontiers and defines new boundaries of learning and literacy in the twenty-first century; this being said, it is possible to assume that e-portfolios will become the defining feature of learning assessments in the digital age.

Yet, the link between portfolio assessments and comprehension is not without controversy. Lafontaine and Monseur (2009) suggest the presence of a serious gender gap for open-ended questions used to measure comprehension through portfolio assessments. Another question is whether the responsibility and self-regulatory learning through portfolio assessments benefits learners. Settlage, Southerland, Smith and Ceglie (2009) make an interesting suggestion that not confidence but self-doubts are the basic driver of self-efficacy and comprehension in learning. Settlage et al. (2009) further claim that the importance of self-doubts in learning comprehension confirms the soundness of Dewey's assumptions that uncertainty is the fundamental element of knowing and learning.

In summary, portfolio assessments have a long history. Portfolios are becoming increasingly popular in learning, including higher education. Originating from graphic arts courses, portfolios slowly transcend to cover other learning settings and environments. Portfolios are used in medical education, health and language learning. If properly developed and implemented, portfolio assessments have the potential to raise self-efficacy and improve comprehension in all groups of learning, through reflective thinking, responsibility and self-control.

## **Self-Efficacy and Portfolios**

Many educators are struggling with the problem of defining the most suitable theoretical framework, to promote learning and enhance students' progress toward the desired learning objective. Theories of Dewey, Mezirow, Piaget, Bandura and Vygotsky have been extensively used to motivate new, alternative ways of thinking in adult students. Researchers have made considerable contributions to understanding the concept of self-efficacy and its relation to the use of portfolio assessments. The most important findings in the field of self-efficacy and portfolio assessments have been described in the earlier section of this review. However, there is no practice without theory, and there is no theory without practice. The use of portfolios as an instrument of assessment and its implications for self-efficacy and comprehension requires a more profound theoretical analysis, and the learning theories of Bandura, Dewey, Mezirow, Piaget and Vygotsky can help to explain the mechanism of portfolio implementation and its effects on students' conceptions of learning. Although learning theories of Bandura, Dewey, Mezirow, Piaget and Vygotsky are extremely popular in education research, their use in the analysis of self-efficacy-portfolio relationships is rather scarce. However, all these theories have the potential to inform curriculum and instructional design decisions regarding the use of portfolio assessments in distance education.

Albert Bandura is rightly considered as the main source of knowledge about self-efficacy in education and learning. Bandura views individuals as independent, self-organizing, self-reflecting and proactive (Pajares, 2007), and learning is considered as a complex product of individuals' interactions with the environment. In this sense, and based on Bandura's theory, self-efficacy has nothing to do with learners' actual

capabilities but refers to what learners think about their capabilities and achievements (Milstein, 2005). This is exactly what portfolio assessments are intended to achieve: to expose what learners think of the strongest and weakest sides of their learning progress. It should be remembered, that self-efficacy is contextual by nature and cannot be universal; self-efficacious learners may feel confident about solving their learning problems in one situation and unconfident about solving the same problem in an entirely different context (Wahab, 2007).

Theories of Dewey, Piaget, Mezirow and Vygotsky continue this line of discussion. Yukawa (2005) used Mezirow's theory of transformative learning to explore the effects of online narrative analysis on learners' self-efficacy, which means that portfolio assessments hold the promise to transform learners' experiences, making learning more inclusive, open and discriminating. Of great importance is the use of Dewey's theory in the analysis of portfolios and self-efficacy, since Dewey was among the first to emphasize that reflection was the essential part of the learning process (Neumann & Oberhuemer 2007). This is actually why Neumann and Oberhuemer (2007) used Dewey's theory as the basis for analyzing learner empowerment through e-portfolios. According to Neumann and Oberheumer (2007), portfolios place students in the role of being their learning and education architects, which also leads them to gain greater self-efficacy in learning.

Again, and based on Piaget, the relationship between portfolios and self-efficacy can be explained in terms of the internal world of learners and self-regulation (Oon-Seng, 2006). These are the aspects of Piaget's theory that have been successfully used to explain the complex process of intelligent development and problem-based learning

(Oon-Seng, 2006). According to Vygotsky, learning begins in the social context and further transforms into the psychological processes driving the process of learning, which also means that portfolio assessments can become the major external factor of influence driving the development of inner self-efficacy perceptions in learners (Oon-Seng, 2006). Unfortunately, most of what has been said about these theories is merely assumptions that require further analysis and validation. However, that portfolio assessments are closely aligned with the ideas of constructivism cannot be denied.

**Self-efficacy and comprehension.** Whether or not self-efficacy can drive better comprehension of the new material is an important question. The relationship between self-efficacy and comprehension was explored by Schunk and Zimmerman (2007), Caprara et al. (2008), and Wadsworth, Husman, Duggan and Pennigton (2007). In all these studies, Bandura's concepts of self-efficacy formed the basis for interpreting the findings. In Schunk and Zimmerman (2007), a model of self-efficacy was developed to improve students' reading and writing performances; as a result, better self-efficacy proved to greatly affect the quality of students' achievement, further supporting the validity of Bandura's social cognitive theory. Caprara et al. (2008) analyzed perceived self-efficacy and its potential contribution to academic achievement in school education and confirmed that low declines in self-regulatory efficacy were associated with higher grades and better retention in junior high school. Moreover, perceived self-regulatory efficacy in junior high school created the groundwork for improved achievements later in high school education (Caprara et al., 2008). Extremely important were the findings of Wadsworth et al. (2007) who, through the lens of Bandura's theory, explored the relation of self-efficacy to comprehension in an online mathematics course. Again, self-efficacy

was confirmed to enhance learning achievements in online environments (Wadsworth et al., 2007).

**Comprehension in the constructivist perspective.** Earlier in this review, the problem of understanding the concept of comprehension has been raised. Although constructivism does not always help to solve this problem, it creates a good basis for reconsidering the relationship between comprehension and constructivism and its implications for practicing educators. Constructivism emphasizes the importance of experiences in creating meaning (Zarei & Esfandiari, 2008). Therefore, constructivist transfers of knowledge occur by engaging students in authentic tasks that are provided and executed in meaningful situations (Zarei & Esfandiari, 2008). Therefore, comprehension in the constructivist perspective can be interpreted as the process by which learners use theoretical tools in real world situations (Zarei & Esfandiari, 2008). Only application can ensure that the process of learning is effective and appropriate (Zarei & Esfandiari, 2008). Yuan (2007) writes that, in constructivism, learning is essentially about constructing and comprehending. Since knowledge is merely an explanation of a problem, it will progress and change with the progress of learners (Yuan, 2007). Better comprehension of the learning material can be achieved, by aligning students' objectives with those of learners, developing student-centered approaches to learning, and utilizing cooperation, situation, and communication to enable students to realize their potential and creativity (Yuan, 2007). The emphasis on cooperation in learning and its importance for comprehension is also made by Ziyaeemehr (2012), who refers to Vygotsky and recommends that collaborative activities can enhance students' comprehension and, simultaneously, activate comprehension strategies proposed by

students. Unfortunately, only one study has explored the meaning of comprehension in an online graphic design course: Maldonado, Lee, Klemmer and Pea (2007) analyzed patterns of collaboration and their implications for comprehension in design courses. Again, collaboration appeared to be a serious factor of comprehension improvements in the online course (Maldonado et al., 2008). The lack of research into comprehension in graphic courses justifies the relevance and feasibility of this study.

### **Summary**

The current state of literature provides a wealth of information regarding the relevance and use of portfolios in education. It would be fair to say that the history of portfolio assessments is inseparable from the history of assessment in general. Since the goal of assessment in higher education is to identify students' strengths and weaknesses, review and validate the effectiveness of various teaching strategies and inform administrative and instructional decision making (Buzzetto-More, 2007), portfolio assessments have all chances to become a viable mechanism of assessing learners' progress in higher education.

In light of everything said in this review of literature, several important conclusions can be made. First, the history of portfolios dates back into several decades, and their initial goal and purpose is to encourage and empower students to evaluate their knowledge and learning progress through reflection and critical thinking. Today, traditional portfolios are giving place to new, technological forms of assessing students' knowledge. Unfortunately, the use of portfolio assessments in distance education is still poorly understood. The current state of literature suggests that portfolios as a tool of assessment have become extremely popular in almost all disciplines, from medicine and



health education to language and literacy development. Unfortunately, and despite the fact that portfolio assessments have their roots in graphic design courses, contemporary researchers do not pay much attention to the potentiality of portfolio assessments in graphic design courses, especially in online environments. Most probably, the use of portfolios in graphic design education is so widespread that researchers do not consider it interesting and useful. However, as the entire system of education moves away from process- towards outcome-oriented assessment philosophies and technological advancement changes the nature of knowledge delivery, the need to reevaluate the applicability of portfolios in distance education is getting more urgent. This gap in empirical literature further justifies the importance of analyzing the usefulness and usability of portfolio assessments in online learning environments.

Second, self-efficacy and comprehension have been extensively explored in the context of constructivist learning. The current state of literature suggests that constructivism can readily become the dominant framework used by professional educators to design and implement learning solutions. Based on everything written and said about self-efficacy and comprehension, it is clear that Bandura's social cognitive theory is the most popular and, simultaneously, the most relevant instrument of interpreting self-efficacy research findings. Then come the constructivist and learning theories of Dewey, Piaget, Vygotsky and Mezirow. Constructivism, portfolios and self-efficacy create a complex triangle of interdependencies: while portfolios have the potential to enhance learners' self-efficacy through openness, reflection, and storytelling, constructivism further justifies the use of portfolio assessments in learning, with the goal of making students responsible for their learning progress and, consequentially, making

learning meaningful and productive. The positive relationship between self-efficacy and comprehension has been abundantly established. While the Internet and new communication technologies expand higher education frontiers, the meaning of comprehension and its relation to self-efficacy and portfolio use in distance education should be reviewed.

Third, theories of constructivism lay the groundwork for re-interpreting the relationship between self-efficacy and comprehension and have the potential to improve professional understanding of portfolio use and its implications for learners in distance learning. In constructivism, as well as in the rest of recent studies, comprehension is usually understood as part of Bloom's learning taxonomy and the process by which individuals recognize, analyze and apply new knowledge in real-world environments. Applicability stands out as the central criterion of comprehension in classroom-based and distance education settings. Comprehension emphasizes the learner-centered nature of knowledge development and learning and implies that portfolio assessments could help students to systematize and organize their knowledge, making learning meaningful and important.

Finally, a large body of literature is devoted to the analysis and evaluation of qualitative methodologies in the study of portfolio assessments, self-efficacy and comprehension. Contemporary researchers are almost unanimous in that qualitative frameworks best fit in the needs and requirements of portfolio research. Reasons why qualitative analysis reflects and suits the nature of portfolio assessments are numerous and diverse. Basically, qualitative analysis reinforces the storytelling and narrative nature of portfolio assessments, as well as the crucial role of reflection and critical thinking in

their development. Qualitative research is the best way to uncover and explore the hidden messages sent by distance learners through portfolios. Quantitative instruments cannot capture the complexity and intricacy of self-reflection in portfolio assessments. Likewise, qualitative methods of research are the best solution to methodological problems inherent in the study of self-efficacy: because self-efficacy is essentially about how students perceive their own competencies and capabilities, qualitative methods can expose complex changes in students' perceptions of their progress under the influence of portfolio use in distance education.

## **CHAPTER 3. METHODOLOGY**

### **Introduction**

The field of higher education has been in the state of transition from brick and mortar to technological outcome-oriented processes and decisions (Zawacki-Richter, Hanft & Backer, 2011). The lack of attention to competency-based assessments and the peculiarity of distance education, as well as the growing utilization of portfolios in brick and mortar higher education classes justified the need to conduct this research. As such, the purpose of this comparative case study was to explore the impact of portfolio assessments on students' perceptions of self-efficacy and comprehension in a graphic design course. The current state of literature confirmed that assessment tools used by on-ground institutions differ greatly from those used by online institutions in the higher education field. Benefits offered by portfolios in formative assessment are numerous (Chung, 2008; Kicken, Brand-Gruwel, Merrienboer & Slot, 2009; Smith & Tellema, 2007; Stansberry & Kymes, 2007; Venable, 2010; Zawacki-Richter et al., 2011). This study was focused on the analysis of portfolio assessment and its potential to enhance comprehension and students' self-efficacy in an online design course.

### **Research Questions**

Since the goal of this study was to understand whether or not portfolio assessments positively affected students' self-efficacy and comprehension in an online design course, the following research questions will have to be answered:

1. How do portfolios impact students in an online design course?

2. How do portfolios impact students' perceptions of self-efficacy?
3. How do portfolios impact students' comprehension?

The study built on the benefits and features of qualitative research design, which has proven to be extremely valuable in the analysis of portfolio use in higher education (Stansberry & Kymes, 2007). According to Creswell (2009), qualitative research is a type of research where researchers rely on participants' views. This was why qualitative analysis was at the heart of this study. This case study was focused on portfolio assessment in the online graphic design-learning environment in order to provide a framework for future teachers who are teaching within the arts field.

### **Research Design**

Case study was the foundation of the research design for this study. Woodside (2010) defines case study research as “empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident” (p.1). Case study research is actually a type of research that focuses on understanding and describing, controlling or predicting individuals, processes, organizations, etc. (Woodside, 2010). The main distinguishing feature of case study research is in being focused on individuals (Woodside, 2010). Speaking figuratively, a case study researcher will never study a thousand rats for one hour but, instead, will focus on studying one rat for a thousand hours – this is one of the most famous statements of B.F. Skinner (1966) cited in Woodside (2010). Certainly, that does not mean that case study is the study of one individual over a lengthy period of time; rather, the key point of case study analysis is in digging up the bones of knowledge and consciousness in the individuals participating in the study. Case study is the most useful

when a profound analysis of changes in individual perceptions, feelings and knowledge have to be made (Woodside, 2010).

Case studies are extensively used in fields and contexts where the boundaries between the phenomenon in question and the context in which it occurs are blurred (Darke, Shanks & Broadbent, 1998; Yin, 1994). It should be noted, that case study is a method of research that focuses on the analysis of one single setting (Eisenhardt, 1989). Case studies are often claimed to combine several different research methods, although the use of one method of analysis is quite possible (Woodside, 2010). Unfortunately, the use of case studies in educational research is associated with several major misconceptions. Flyvbjerg (2006) lists five major misunderstandings about the nature and implications of case study research. First, case study research tends to be associated with theoretical, not practical knowledge and researchers who seek to choose the most appropriate analytical method erroneously assume that case studies place theoretical knowledge over practical findings (Flyvbjerg, 2006). Second, single case-studies are claimed to be non-generalizable (Flyvbjerg, 2006). Third, a popular assumption is that case studies are more appropriate for generating hypotheses, whereas other methods of analysis should be used to test and validate (or invalidate) these hypotheses (Flyvbjerg, 2006). Fourth, case studies are often blamed for their bias toward verification (Flyvbjerg, 2006). Fifth, specific case studies are difficult to summarize (Flyvbjerg, 2006). All these controversies reduce the frequency with which case studies are used in education and other fields of research. Yet, these are merely misunderstandings. Moreover, it would be fair to say that a science/ discipline without a great number of professionally performed case studies is actually a discipline that lacks systematization in the production and use of

exemplars (Flybjerg, 2006). Any discipline without a good deal of exemplars is actually an ineffective one (Flybjerg, 2006). To a large extent, this study did not simply use case study as the central methodological framework but also shows that applying case study methods in educational research is easy, possible, realistic and useful. The benefits and usefulness of case study research have been described in abundance and confirm the relevance of the case study choice in this research.

McLeod (2010) asserted that, for anyone embarking on case study research methods, it is important to be aware of case study advantages. The usefulness and usability of case studies in research have been widely established, mainly due to the flexibility and critical perspectives provided by case studies (McLeod, 2010). Case study research makes possible the analysis and description of innovative practices and unusual cases (McLeod, 2010). Through case study research, successful integration of learning and practice becomes possible (McLeod, 2010). Eventually, the use of case study designs is justified by the opportunities provided by case studies in uncovering the subconscious processes affecting individuals in their routine practices (Woodside, 2010). Unlike traditional surveys and interviews, case studies are inherently intended to expand the researcher's access to participants' thinking processes (Woodside, 2010). In this sense, the proposed research design was particularly useful for the analysis of students' thinking and self-efficacy perceptions and processes: bearing in mind the overall complexity of the self-efficacy concept, it was possible to assume that not all students would be able to explicitly define the changes in their perceptions under the influence of portfolio assessments in an online graphic design course. Case study design will have enabled effective measurement of the ongoing thinking processes in the research participants

(Woodside, 2010). Eventually, case studies have proved to be an effective instrument of research and analysis in the field of education, including distance education and virtual educational domains (Baxter & Jack, 2008; Girvan & Savage, 2010; Liaw, 2008; Reingold, Rimor & Kalay, 2008; Samarawickrema & Stacey, 2007).

Case study method reflected the inquiry-based direction of this study and facilitated the analysis of complex real-life environments. With the help of the case study method, the rich problematic of portfolio utilization in distance education can be uncovered (Flyvbjerg, 2006). For students and novice experts, knowledge generally consists of intimate experiences drawn from thousands of individual cases that cannot be standardized (Flyvbjerg, 2006). By operating at the level of experience, researchers use real expertise to judge the differences and contradictions in case study narratives provided by research participants (Flyvbjerg, 2006). The use of case study design ensures the researcher's proximity to the real-life environments in which distance learning occurs; this proximity, in turn, creates conditions that favor advanced understanding of case problematic and results in more discoveries than any other method of research may allow (Flyvbjerg, 2006). Case study was the best choice for this study, since only case study questions and process could provide an in-depth understanding of the issue in question (Creswell, Hanson, Plano & Morales, 2007).

Of critical importance is the issue of qualitative validity and qualitative reliability in case studies. The main criteria for assessing the rigor of case study research include internal validity; construct validity; external validity; and reliability (Gibbert, Ruigrok & Wicki, 2009). Objectively, the case study method contains no more bias toward verification of its results than other methods of inquiry (Flyvbjerg, 2006). Therefore, it is



within any researcher's capability to guarantee that the use of case study methods leads to valid and verifiable results. In this study, case study methodology was the best and most valid instrument of answering the research questions. Case study method is an instrument of inquiry – an inquiry that has already become a distinguishing feature of contemporary learning environments (Fallon, 2011). Moreover, while discussing their self-efficacy and comprehension levels, students may fall short of cognitive resources to judge their abilities and talents more objectively (Woodside, 2010). The emphasis of this research was to uncover the elements of self-efficacy and comprehension that may have been hidden from the eyes of the research participants. It is the type of research that takes place in one or more bounded environments, among multiple actors that directly or indirectly participate in these contexts (Woodside, 2010). Based on Simon's (1990) claim that human behaviors are shaped by the scissors whose two blades include the structure of the environment and the cognitive capabilities of the actor (as cited in Woodside, 2010), case study methods enable to account for both factors and bring them together to shape an objective picture of changes in students' self-efficacy perceptions and comprehension, as a result of portfolio use in an online graphic course. In this study, objective comprehension and subjective self-efficacy beliefs shape the scissors that govern student behaviors in an online graphic course and predispose their successes and/or failures in technologically guided learning.

### **Setting of Study**

According to Creswell (2008), sampling for case studies can range from “1 or 2 to 30 or 40” (p. 217). For this study, a random sampling was completed using two classes with each class having an enrollment between 20 and 25 students. Creswell (2008)

reminds us that random sampling provides an equal probability for any of the students to be chosen to participate as participants within this study and by doing so, “ensures that the sample will be representative of the population” (Keppel, 1991, as cited in Creswell, p. 155). The perspective sample for this study was representative of one design course, which averages between 20 and 25 students.

According to Creswell (2008), this procedure would allow the researcher to randomly assign individuals from both classes and assign to separate groups. Cohen (2006) defines random sampling as “a systematic process of selecting subjects or units for examination and analysis that does not take contextual or local features into account” (para. 1). Students choosing to participate were referred to as participants, likewise, students choosing not to participate or students not chosen to participate were referred to as the control group.

The main site for this study and research was an online university where students attended two separate Digital Imaging design courses within the Graphic Arts undergraduate degree program. The format for this study consisted of 20 participants in a graphics design undergraduate course entitled, Digital Imaging. The course ran for five weeks where students were required by the School of Education (SoE) to meet specific criteria prior to entering this course and in doing so ensured the same skill levels of each student entering this course. For this specific course, there were no prerequisites required to enter this course. In other words, no previous training was required. This was an introduction level, beginning course for their undergraduate degree program within the field of Graphic Design.

Students were randomly selected and assigned to one of the two research groups. A faculty member from the SoE completed the process of selecting participants. This was one of the best ways to avoid sampling bias. Random sampling was used to choose research participants, who were randomly assigned to either the study or the control group. The faculty member from the SoE was asked to follow a simple procedure of random sampling, by printing the names of potential participants and picking them out of a hat. Only the first 20 students were given a chance to voluntarily participate in the study. If, for some reason, a student chose not to participate in the study, another name was chosen, until 20 names were ready to be included in the list of the study respondents. By choosing all students from one and the same course, the researcher was able to ensure greater representativeness of the study sample.

Once the SoE successfully identified the participants, the researcher was notified by email that the study consisted of 20 participants. The SoE sent out surveys during weeks one, three and five through the schools' email system and also received the participant's responses (Appendices A-B) in the same manner. Once the participants and the control group returned their surveys, the SoE separated these responses and provided a multi-page PDF that was sent to the researcher. One PDF contained the responses from the participants and another PDF was provided with the results of the control group. The survey items related to the research questions posed for this study. Having the SoE choose the participants and receive their responses eliminated any researcher bias within the study, as the researcher was also the instructor for these two courses. Once the SoE collected the responses during their respective weeks, the SoE sent one email with the participant's responses and another email with responses from the control group. The

documents contained no identifying marks that allowed the researcher to identify the participants.

Participants – Group A differed only because they created a portfolio during all five weeks of their design work. Each week during lecture, the instructor demonstrated the processes necessary to create a portfolio. For example, during week one, the participants would save their design work with the requirements stated for that week's design project. Upon completion of week one, the participant saved their work as a multi-page Portable Document Format File (PDF). Each week thereafter, the participants followed the same format for weeks two through five. Adding each week's designs to one document, allowed the researcher to provide a grade based on the assigned rubric (Appendix D). Once the instructor provided a grade for the portfolios, they were sent to a faculty member within the SoE who either agreed with the grade provided, or provided a different grade followed with comments including an additional evaluator provided legitimacy to this study and its data.

Non-Participants – Group B was used as the control group. Because the instructor was not privy to the identity of either group within this study, Group B received the same information and feedback during lectures as Group A. The only difference was that the participants' (Group A) created a portfolio and the non-participants (Group B) did not.

In both classes, participants and non-participants completed their discussion board (part one), by day three of each week, with their final discussion due by day 7. Also due by day 7 was their required design project for the week. Formative feedback was provided to both groups. The instructor also provided two one-hour live lectures that demonstrated necessary activities within their weekly projects that would enable a

successful design with the requirements posted within each assignment. Live lectures were conducted using Adobe Connect, which was included within students' classrooms. Participants and non-participants also received a weekly grade entered into their gradebook. The non-participants were given written feedback, which included positive feedback, as well as critical written formative feedback that provided recommendations to enhance their skills. Other tools available to both groups, were the opportunity to email their instructor or contact their instructor by phone should they need clarification or help with any aspect of their assignments.

Recruitment took place prior to the beginning of their class in the form of email to each of these students. Students were informed that their participation was voluntary and would not affect their grade whether they chose to participate or chose not to participate. They were adequately informed as to the process of the random sampling, as well as explained that they would not be providing their responses to their instructor. Instead, they would be in direct contact with the SoE in order, to protect their identity within the study or fear of bias, as the instructor is also the researcher.

The combination of the proposed sampling procedures and a relatively small sample size is typically characteristic of all case studies. case studies usually focus on a small number of participants, which, in turn, complicates randomization (Gerring, 2007). If a sample is made of a large number of participants and their cases, the selected cases may not be representative of the overall population (Gerring, 2007). By contrast, when cases and research participants are distributed homogeneously across all study groups and variables; the probability that cases from all-important segments of the analysis will be included in the sample dramatically increases (Gerring, 2007). The proposed sampling

procedure and the number of research participants leveraged the amount of information needed to perform productive causal analysis. In other words, with random sampling, it provides a cause and effect relationship between participants and the control group. By performing a random sampling, each student has a 50/50 chance of being assigned as either – a participant or being assigned into the control group. Unlike other methods of analysis, Gerring (2007) recommends that the goals of case study research be met through purposeful selection of the research participants. In this study, the selection procedure allowed both (a) effective randomization and (b) representation of the target population.

Despite the effectiveness of the discussed sampling procedures, the risks of non-response bias were not to be disregarded. Respondents chosen to participate in this study may have lacked motivation or time to provide adequate responses or may have had the fear that their responses might impact their grades, despite being assured by the researcher that their participation would not influence their learning outcomes in any way (Gratton & Jones, 2010). To enhance the quality of the sampling procedure, all participants will be asked to report their concerns and fears that may have affected their motivation to provide case study responses, prior to taking participation in the study. By addressing these concerns, the researcher was able to reduce the risks of non-response bias and ensure greater legitimacy of the proposed methodological framework. All students received follow-up letters to assure them that their agreement to participate in the study will not affect their grades. These letters signified the completion of the sampling stage of the study.

## **Instrumentation**

Identifying and negotiating access to respondents and sites was one of the crucial stages in the design and implementation of the research project. One of the major tasks faced by qualitative researchers is to increase the likelihood of choosing good sites and secure respondents' participation in the project (Devers & Frankel, 2000). Since in qualitative research the researcher is also the research instrument, the study requires that the researcher develops, maintains and closes productive relationships with research subjects and research sites (Devers & Frankel, 2000). This study was an example of the research project where the choice of a good research site was obvious as it met the goals and fits the nature of the study. Permission for the study was gained in a personal contact with the Faculty Member in a School of Education in the participating university. The university is a field of research that requires permission to be studied (Yin, 2010). This is the private space whose boundaries are clearly defined and which necessitates obtaining official permission to perform the study. Yin (2010) stated, "Public schools are private in the sense that you will need permission from school officials to conduct research as well as permission from those officials and parents if you want to converse with or take pictures of any of the students" (p.113). That the research project takes place in the university setting implies that no permission from students' parents needed to be gained, but was essential that official permissions were gained from both the university officials and the respondents who expressed their willingness to participate in the study.

The researcher's qualifications were sufficient to design and implement this professional research project and achieved sufficient qualitative reliability and qualitative validity of the study findings. Qualifications play one of the central roles in achieving

quality results. Researchers' qualifications matter for the institutional boards that approve or disapprove the research proposal; simultaneously, the presence of sufficient qualifications guarantees that the researcher does not damage the image of the institution where the study takes place and does not do any harm to the study participants (Streubert et al., 2010). The researcher clearly understands the role and importance of the study and its potential effects on the research participants (Streubert et al., 2010).

The risks of the researcher's bias should not be disregarded. Bias is described by Stake (2010) as undesirable and ubiquitous. Becoming a qualitative researcher involves better understanding of how to deal with personal bias (Stake, 2010). All researchers, people, reports and stories have their biases, and the principal goal of quality research is to identify and reduce the influences of these biases on the results (Stake, 2010). The researcher's learning experiences and opinions regarding students' self-efficacy and comprehension in an online design course, as well as personal impressions from using portfolios as an instrument of assessment could have greatly affected and altered the picture of respondents' answers during the study. To avoid these controversies and misunderstandings, the SoE sent out and received the surveys to both the control group as well as the participants during weeks one, three and five. This eliminated any researcher bias within the study. The survey addressed the following questions:

1. How do portfolios impact students within a design course?
  - 1a. how do portfolios impact students' perception of their self-efficacy?
  - 1b. how do portfolios impact a student's desire to create a portfolio for other design courses?



The SoE in turn, provided those responses (free from any identification) to the researcher each of those three weeks, where the information was entered into a database provided by SurveyMonkey. Once the information was recorded from the database for the comparative case study, it was implied that the results answered the research questions, as well as provide any insight to new, emerging themes. The researcher anticipated that the results of the study would enhance the quality of portfolio assessments and increase their use in distance courses. The researcher also anticipated that the experiences gained by students in this course would guide them through the development of better knowledge and skills in other fields.

For this comparative case study, no certified instruments were available for use. As a result, the researcher conducted a field test of an open-ended survey that appropriately measured the perceived self-efficacy of both the control group and the participants (Appendices A-B). Also field-tested was a set of rubrics that successfully measured comprehension levels of the skills and design concepts for the given design course (Appendices C-D). Field tests were completed prior to the data collection process.

Prior to the beginning of their design course, students entering the Digital Imaging undergraduate graphic design course were sent a welcome email to their course. Within the email was an introduction to the research, outlining the importance of students responding to any emails from the SoE. They were notified that their participation in creating a portfolio for their design course was absolutely voluntary and they would have the option to opt out if their name was chosen.

Prerequisites for this course included having completed and earned a high school diploma (or its equivalent), plus students were required to complete entry-level computer

courses when entering into the online learning environment. These requirements introduce students to the online classroom, email and instruct students how to maneuver within their classrooms, and how to use the basic programs such as Microsoft Office before moving into the graphic design courses such as Illustrator, Photoshop, InDesign and web design. Students entering into Digital Imaging were required by the university to have met these specific prerequisites for the course, placing everyone at the same levels of skill and comprehension at the beginning of this course. It was with the creation of the portfolio that the participants going through this process that demonstrated increased self-efficacy in design, knowledge and comprehension of their given software, and increased levels of perceived self-efficacy from unit one – to unit five of their course when compared to the control group.

Both the control group and the participants were graded using the same rubrics for this course (Appendices C-D), which measured comprehension of the concepts of design, as well as comprehension of the skills required and learned throughout the design course. The instructor and researcher for this case study was teaching both courses simultaneously.

The researcher in this study provided an open-ended survey that responded to the research questions. Prior to the start of the undergraduate Digital Imaging course, the researcher conducted a field test by sending the following instruments to the SoE:

1. Open-ended survey for control group (Appendix A);
2. Open-ended survey for participants (Appendix B);
3. Rubrics that measured both comprehension of concepts and skills of Digital Imaging (Appendices C-D).

The researcher conducted a field test by sending the required instruments for this study to the SoE of the university. Both faculty and staff assessed the strength of the rubrics and the questionnaires to ensure its reliability for this research and evaluated these instruments. The need for an independent assessment of rubrics was justified by the controversy surrounding the validity and reliability of rubrics as a form of learning assessment (Rezaei & Lovorn, 2010; Jonsson & Svingby, 2007). Within the field test, the instructor/researcher requested an assignment from another instructor who has previously taught the same course. The assignment was graded per the rubrics provided for measuring the comprehension of design concepts and comprehension of skills of design (Appendices C-D). When completed, the researcher forwarded the assignment to the SoE for them to also assess the assignment according to the rubrics. Likewise, the same experts evaluated and assessed the strengths and weaknesses of the open-ended surveys designed to provide data for the comparative case study (Appendices A-B). Jarobe (2009) stated, “Field tests are often recommended to assess the strength of research questions/hypothesis or test the appropriateness of certain data-gathering protocols (e.g., informed consent procedures), instruments/tools (e.g., item content) and data analysis procedures” (para. 2). Once experts reviewed the instruments, the researcher moved forward with the International Review Board (IRB) process.

### **Data Collection Procedures**

The following instruments were used to collect the data (refer to Appendices A-D): participant self-efficacy survey, control group self-efficacy survey, and rubric to measure comprehension of design skills and design concepts. All instruments of data collection were field-tested prior to their implementation in the research project. The data

collected during the study was provided through participant surveys. The data was to be collected from the 20 students randomly chosen by the SoE, who had provided their agreement to voluntarily participate in the study. As previously mentioned, the researcher would serve as the central instrument of data collection, and the human-as-instrument philosophy would lay the groundwork for the implementation of this study project (Klenke, 2011). The phenomena to be observed include comprehension and self-efficacy, and the scope of these phenomena to be measured during the study are defined in the surveys distributed among the participants.

A faculty member from the SoE from the participating university will select the students to be used within the study. Participants were chosen from each class on a random basis. Student's names were printed and cut up and placed into a hat. The first 20 names selected were approached to participate within this study on a volunteer basis. If a student opted out of the study, another name was chosen to help fill the gap. If a student opted out of participating within this study, that student became part of the control group. Ensuring the 20 participants represented one design course and therefore be a successful representation of that design course.

Once the SoE had successfully identified the participants, the researcher was notified by email that the study consisted of 20 participants. The SoE will sent out surveys during weeks one, three and five and also receive the participant's responses (Appendices A-B). The surveys responded to the research questions posed for this study. By the SoE choosing the participants and receiving their responses to the survey eliminated any researcher bias within the study, as the researcher was also the instructor for these two courses. Once the SoE had the responses during their respective weeks, the

SoE sent one email with the participant's responses and another email with responses from the control group. The documents contained no identifying marks that allowed the researcher to identify the participants.

Participants – Group A differed only because they created a portfolio during all five weeks of their design work. Each week during lecture, the instructor demonstrated the processes necessary to create a portfolio each week. For example, during week one, the participants saved their design work with the requirements stated for that week's design project. Upon completion of week one, the participant saved their work as a multi-page Portable Document Format File (PDF). Each week thereafter, the participants followed the same format for weeks two through five. By adding each week's designs to one document, allowed the researcher to provide a grade based on the assigned rubric (Appendix D). Once the instructor had provided a grade for the portfolios, they were sent to a faculty member within the SoE who either agreed with the grade provided, or provided a different grade followed with comments including an additional evaluator, provided legitimacy to this study and its data.

Non-Participants – Group B was used as the control group. Because the instructor was not be privy to the identity of either group within this study, Group B received the same information and feedback during lectures as the Group A. The only difference was that the participants' (Group A) created a portfolio and the non-participants (Group B) did not.

In both classes, participants and non-participants completed their discussion board (part one) by day three of each week, with their final discussion due by day 7. Also due by day 7 were their required design project for the week. Feedback was provided to both

groups. The instructor provided two, one-hour live lectures via Adobe Connect, which was included within students' classrooms. Participants and non-participants also received a weekly grade entered into their gradebook each week. The non-participants were provided written feedback, which also included positive feedback, as well as critical written, formative feedback that provided recommendations to enhance their designs. Other tools available to both groups, was the opportunity to email their instructor or contact their instructor by phone should they need clarification or help with any aspect of their assignments.

Recruitment took place prior to the beginning of their class in the form of email to each of these students. Students were informed that their participation is voluntary and would not affect their grade whether they chose to participate or chose not to participate. They were adequately informed as to the process of the random sampling process, as well as explaining they would not be providing their responses to their instructor, but directly to the SoE to protect their identity within the study for fear of bias as the instructor was also the researcher. During each of the five weeks, participants will create a portfolio of their required work created on a weekly basis. They were also given an open-ended survey during weeks one, three and five of their course (reflecting the participant's perception of their self-efficacy, as well as demonstrating their levels of comprehension of their portfolio creation process). In week five of the participant's course, they completed their final analysis of the portfolio creation process. It is through the data collection phase that the measurement of their self-efficacy was evaluated and measured.

Both participants and control group received two, one-hour lectures provided by the instructor, who was also the researcher, which demonstrated varying processes

students needed to complete their weekly design task. This formative assessment was meant to provide personalized insight as to how each student might improve upon their designs. They were also provided written feedback to each of their discussion board on a weekly basis. Both groups received instruction and formative feedback in the same manner.

Comprehension levels of the design course was measured for both groups by implementing rubrics that will measure comprehension of required design skills, as well as comprehension of the concepts of design.

Before the surveys were distributed among the participants, pre-assessments of self-efficacy and comprehension were performed. The goal of pre-assessments was to measure the levels of self-efficacy and comprehension and use these data as covariates in the analysis of covariate procedure. The results of these pre-assessments enabled the researcher to achieve greater validity and reliability of the study results and, simultaneously, raise the comparability of the data obtained during the study. Despite the fact that Bryman and Hardy (2009) claim that the comparability of data can never be assumed, pre-assessments would ensure that the results could be effectively compared and used as an instrument of future theory-building. It is important to remember that formative assessments were provided to measure students' progress during the process of learning. What strategies would be effective for formative assessment in distance education was beyond the scope of this analysis. The choice of the exact formative procedures was to be made by the SoE. Nevertheless, formative assessment was to become one of the foundational pillars in this research project (Wang, 2007). The results of formative assessments enabled the researcher to identify possible gaps and

inconsistencies in the development of self-efficacy and comprehension in the research participants.

### **Data Analysis Procedures**

Creswell (2008) stated that an effective protocol would be to create a matrix or a “table of sources” to effectively organize your material (p. 245). Stoddart (2006) provided two similar surveys. One survey was created for the control group and the second survey – created for the participants created the portfolios. SurveyMonkey – an online software program that has a built-in analysis tool within its program provided data analysis. The researcher also used HyperREARCH, a qualitative data analysis program. With this software, the researcher was able to “code, retrieve, build theories, and conduct analysis of qualitative data” (Stoddart, 2006, p. 39). By creating the multiple methods to analyze the data provided the validity of the study (McMilan and Schumacher, 2001 as cited in Stoddart, 2006).

Upon completion of the five weeks, the researcher generated a few broad themes or categories and provided “evidence for each category” (p. 248). The final analysis was completed by providing a case study focusing on the perceived self-efficacy of the participants; and a second narrative regarding the participant’s levels of comprehension of design and the process of portfolio creation throughout the course.

For this comparative case study, three instruments were created by the researcher; 1) Open-ended survey for the control group (Appendix A); 2) Open-ended survey for the participants (Appendix B), and 3) Rubrics measured comprehension of design skills and comprehension of design concepts (Appendices C-D). A field test was conducted by



sending the prescribed instruments to the SoE in order for them to assess the strengths and weaknesses of the prescribed instruments.

A combination of multiple methods of data analysis would “ensure the validity of the study” (McMillan & Schumacher, 2001 as cited in Stoddart, 2006, p. 39), such as the use of SurveyMonkey – that would analyze the data entered into its database by the researcher. Graphs were generated based on participants’ responses. The SoE in turn, provided those responses from both groups (free from any identification) to the researcher each of those three weeks, where the information was entered into a database provided by SurveyMonkey. Once the information had been recorded from the database for the comparative case study, it was insinuated that the results would answer the research questions, as well as provide any insight to new, emerging themes

From SurveyMonkey, responses from the both groups were then entered into HyperResearch software, which is a qualitative data analysis program that allows the researcher to “code, retrieve, build theories and conduct analyses of qualitative data” (Stoddart, p. 39). From the narrative responses provided by the participants and control group, common words were chosen as keywords and placed into HyperResearch where this was then coded, producing common themes from the surveys and provided new themes for future research. Baker (2003) talked about questionnaires as being, “the principle means used for collecting data by means of a survey of a designated population or sample in which the researcher is interested” (p. 343).

The participant’s portfolio analysis was completed, beginning with the completion of the participants’ five-week course. The analysis was in the form of a comparative case study that provided insight from the participants (taken from the surveys each week) as to

how they interpreted the process of creating a portfolio for their Digital Imaging course. Shulman (2003) discussed five benefits in the use of portfolios as being; 1) portfolios permit tracking of longer periods of teaching verses a single observation; 2) portfolios can bridge gaps between the process and the product; 3) “portfolios institutionalize norms of collaboration, reflection and discussion”; 4) a portfolio provides structure; and 5) a portfolio shifts the responsibility of teaching – to learning – back to the participant (constructivist learning) (as cited in Lombardi, 2008, p. 9). Comparisons and analysis was used to determine both groups’ self-efficacy and comprehension levels throughout their course.

### **Ethical Considerations**

The main consideration for this study and for the participants was the confidentiality of selected participants and control group. Confidentiality was one of the most controversial aspects of practical qualitative research. Gratton and Jones (2010) suggested that all participants should be informed as for who, when, where and how will access and use the information provided by the research participants (Gratton & Jones, 2010). Qualitative researchers must ensure that, once the data are collected, no one will have access unless they were authorized to do so (Gratton & Jones, 2010). To ensure confidentiality of the research, only the researcher and the SoE participating in the study had access to the primary data. All research participants were provided with a written guarantee to maintain the confidentiality of their data. No personal information was collected. Maintaining confidentiality was protected with all forms of communication including emails, which was sent by the SoE during weeks one, three and five. The SoE also received responses from both groups in response to the given surveys.

Informed consent and gaining informed consent from the research participants was at the heart of the ethical nature of this study. Providing the research participants with the fullest information about the benefits and foreseeable risks of the study was central to the operationalization of the informed consent phenomenon (Murphy & Dingwall, 2007). The application of informed consent to qualitative case studies is usually more complex than in quantitative experiments, since quantifying possible risks in qualitative studies may be extremely problematic (Murphy & Dingwall, 2007). Simultaneously, the nature of the risks inherent in qualitative research differs greatly from that in experimental and quasi-experimental studies, and is limited mainly to psychological and social harm (Murphy & Dingwall, 2007). The researcher assumes that many students may fear that their participation will diminish their chances to obtain good grades. Some participants may not be willing to disclose the personal data pertaining to their self-efficacy and comprehension levels during the course. Therefore, the goal of the informed consent is to ensure that (a) students understand the nature of the study, its goals and possible outcomes, and (b) students realize the risk-free implications of their participation in the project and the zero effects of such participation on their grades. All participants will be provided with a detailed description of the study, its goals, processes and anticipated results. Any questions pertaining to the study will be encouraged and welcome. By signing the informed consent form, the participants will confirm their agreement to participate in the study voluntarily, based on the fullest information about the study provided by the researcher.

## Summary

The design for this study consisted of 20 participants in a graphics design course entitled, Digital Imaging. The course ran for five weeks. In studying the differences between sampling, this study reflected the method of random sampling. According to Creswell (2008), this procedure would allow the researcher to randomly assign individuals from both classes to separate groups. Cohen (2006) defined random sampling as “a systematic process of selecting subjects or units for examination and analysis that does not take contextual or local features into account” (para. 1).

A faculty member from the School of Education (SoE) from the participating university selected the students to be used within the study. Participants were chosen from each class on a random basis. Student’s names were printed and cut up and placed into a hat. The first 20 names selected were approached to participate within this study on a volunteer basis. If a student opted out of the study, another name was chosen to help fill the gap. Ensuring the 20 participants would represent one design course and therefore be a successful representation of that course.

Once the SoE had successfully identified the participants, the researcher was notified by email. The SoE sent out surveys during weeks one, three and five and also received the participant’s responses. The surveys responded to the research questions posed for this study. Once the SoE had received all the results from both groups, two separate documents were provided to the researcher. The first document was an email with all responses provided by the participants and the second email provided the document with responses from the control group. There were no identifying marks on either survey that would identify either assigned within the perspective groups. By the

SoE choosing the participants and receiving their responses to the survey eliminated any researcher bias within the study.

The following ethical issues were also be considered:

- The study sampled enough participants that equaled only one design course, therefore may not be representative of all undergraduate design courses;
- Participants may opt out of the research within the five weeks. Depending on where a participant chose to opt out of the program would determine if an alternate would be assigned to take their place.
- Opinions expressed by the 20 participants may not be representative of opinions within different design courses within the associate's degree program for Graphic Design.
- Surveys are typically subject to bias when translating the data.

All these issues had to be considered when the results were interpreted and analyzed. The proposed research design enabled the researcher to minimize the risks of personal bias, avoid discrimination, deception and confidentiality breaches.

Simultaneously, some ethical issues, including generalization and population representativeness could be successfully resolved in future research.

## CHAPTER 4. DATA COLLECTION AND ANALYSIS

### Introduction

As stated in the Statement of the Problem of this study, portfolios have become a popular instrument of assessing student learning in a more traditional role of education, but not so within distance education. Distance as the distinguishing feature of distance education has far-reaching implications for assessment and learning processes (Zawacki-Richter et al., 2011). Distance also necessitates the development of new technologies and media that, in turn, distinguish distance education from all other forms of learning (Zawacki-Richter et al., 2011). Distance education by nature implies the sense of isolation in students, the lack of face-to-face interactions and delayed instructor feedback (Zawacki-Richter et al., 2011). Apparently, not all students feel satisfied with the absence of direct interactions with the instructor, and even the presence of sophisticated technologies cannot reduce this relationship gap. Nevertheless, the number of students taking online courses rapidly increases: the line between traditional on-campus and distance students is fading (Venable, 2010).

The purpose of this comparative case study was to explore how and to what extent self-efficacy (cognitive learning), and levels of comprehension (constructivism), impacted students within higher education while creating a portfolio for the distance (online) learning environment. In the analysis of portfolios as an instrument of assessment, qualitative case studies and similar qualitative methods are believed to be more appropriate than quantitative frameworks. Chau and Cheng (2010) further support this opinion, by saying that, “understanding the e-portfolio experiences of participants and seeking to identify ways in which such experiences are understood and perceived by

participants” mandates the use of qualitative approaches (p.935). The reason is that qualitative research paradigms substantiate and emphasize the intricacy of human realities expressed in assessment portfolios (Chau & Cheng, 2010). Qualitative comparisons are of particular use in contexts where the main themes in participants’ reflections have to be examined (Lo, 2010). This case study is to analyze the effectiveness of e-portfolios as an assessment tool for an online, graphic design course; and to evaluate the effectiveness of comprehension of its process. This chapter presents both the comparative findings while presenting information between the participants within this study and the control group within this study that address and respond to each of the research questions designed for this study:

1. How do portfolios impact students in an online graphic design course?
2. How do portfolios impact students’ perceptions of self-efficacy?
3. How do portfolios impact students’ comprehension?

The remaining portions of this chapter will provide information regarding participant recruitment, describe the process of selecting the participants, sending surveys to the participants and control group, how that data was collected; and finally, how the participant’s portfolios were collected with a final assessment given to the participants by utilizing a rubric designed for this study. Completing this chapter will be the findings of this comparative case study based on the data collected, coded and analyzed.

### **Description of the Data**

This comparative case study concerned the students of two Digital Imaging courses at a university located in central Florida. Digital Imaging is a course required for undergraduate students earning an associate’s degree in graphic design. The university

has both, on-ground campuses, as well as distance learning (online) classrooms. These specific courses were taught through the online portion of the university and the participants were selected solely attending the distance or online learning environment.

Involved within this study were faculty and staff to ensure the validity of student anonymity and biases that could present themselves during this study. Involved were the department chair, Research Assistant 1 (RA1), Research Assistant 2 (RA2), and the Dean of Education. The department chair was key in assigning students to the two classrooms based on how this course aligned within the programming of their major, for students entering the Digital Imaging course; RA1 volunteered her time and services to help with the random sampling of participants, sending and collecting surveys, coding surveys and e-portfolios; and finally, RA2 was responsible for collecting the participant's final e-portfolios and provided a final grade utilizing the rubric designed for this specific study and to validate the reliability of the rubric. The instructor for these courses is also the researcher; therefore justifying the need for faculty to assist within this research process. Included in this study were two online courses consisting of 20 enrolled students within each course, involving a total of 40 students. With the demographic being an online course within the graphic design, undergraduate degree program, each student enrolled within the course came into the course with the same basic skill requirements and knowledge of the software being taught for a period of five weeks. The goal for this study was to be able to obtain 20 participants who would create e-portfolios, which was representative of one online course. Gender, age, or cultures were not a condition of this study as these are common traits found within a quantitative or mixed methods study.



## Field Test

A field test was conducted by submitting an official Institutional Review Board (IRB) request to five experts within the graphic design field who were also experienced in working within the online distance education and learning environment. Requests were sent to experts to examine the following instruments; 1) Self-efficacy for the control group (Appendix A); 2) Self-efficacy survey for participants (Appendix B); 3) Rubric that measures the comprehension of concepts in design (Appendix C); and 4) Rubric that measures comprehension of skills in design (Appendix D).

The first field test was conducted for both rubrics for this study. The purpose of these rubrics for this study was to create a rubric that measured student's comprehension design skills (Appendix D), as well as student's comprehension levels of design concepts (Appendix C). Also submitted to five experts within the design field were the survey questions that were used to measure the impact of creating a portfolio within a graphic design course (Appendix B), as well as measuring a student's self-efficacy (Appendix A), for the control group not involved in the process of creating a portfolio. The goal of these surveys and rubrics was to respond to each of the following research questions; 1) How do portfolios impact students in an online, graphic design course; 2) How do portfolios impact students' perception of self-efficacy; and 3) How do portfolios impact student's comprehension?

### *Rubric for Comprehension of the skills of design*

Before sending out the rubrics to various experts, the researcher provided a grade for one of the designs within the Digital Imaging course. This course is a beginning Digital Imaging course that requires students to use Adobe Photoshop to create a collage-

based design over the course of five weeks. Based on the rubric provided for this task, the researcher graded this project as a five, or a letter grade of an “A”. The rubric being used for this task is shown in Appendix D that provides the comprehension grade of the students’ design skills for this specific course. Out of the five experts who turned in grades for this project, four agreed that the assignment provided, fit the requirements of the grade of 5 according to the rubric and the other provided a grade of 4. The expert that graded the assignment as a 4 stated, “Comprehension of Skills in Design as students completed all the required elements but needed to do more in applying required techniques. It was difficult to grade the assignment without having detailed knowledge of the processes involved”. No specific changes were requested nor provided from any of the experts as to how this should be or could be modified.

#### *Rubric for comprehension of the skills of concepts*

This particular rubric was designed to measure the comprehension of design concepts within an online graphic design course for an undergraduate degree. Students are required to post two responses to the discussion boards each week. Because this assignment is discussion based and being able to use terminology of a graphic designer, no samples were sent to perspective experts. Instead, the experts were asked to evaluate the rubric that measures “Comprehension of Concepts” (Appendix C). The experts participating within this field test stated that no changes were needed.

#### *Summary of experts’ findings for rubrics*

Five experts within the field of higher education, online education and graphic design each provided a summary for each of the rubrics which measured both; comprehension of skills and comprehension of concepts within an online graphic design

course (Digital Imaging) for the undergraduate program required for students in order to earn an Associate's of Fine Arts degree. Each of the experts' feedback was positive in nature, but indicated a difference in tenses used within each rubric. Each expert recommended that all wording reflect "past tense" as students' projects would have already been completed prior to using the appropriate rubrics to measure either the students' comprehension of skills or comprehension of concepts for the specific assignments. The rubrics were revised per the experts' recommendations.

#### *Participant's self-efficacy survey*

For this study, a field test for a "Participant Self-Efficacy Survey" (Appendix A) was created to test for validity and reliability of the research questions for this comparative case study. This open-ended survey was designed to measure the comprehension of the process of creating a portfolio within an online graphic design course, as well as measuring the varying levels of self-efficacy during the portfolio creation process during a five-week course. As a result, an official IRB request was sent to five experts in the field of Graphic Design, higher education and online courses. Of those five requests, the five experts responded favorably for this study, thereby validating this instrument as responding to the research questions, allowing the researcher to utilize a comparative case study. The experts participating within this field test requested the following changes:

Expert 1 - Q1) Wording should be changed to read; Please include an estimated time spent weekly on task activities; Q5) Considering your current level of experience, confidence, problem-solving abilities and level of interaction with your instructor when issues or questions arose, please describe your level of expertise in creating portfolios

prior to this class. Please be explicit; Q6) Please include a detailed rationale for your reasoning; and Q12) How often did you need additional assistance from your instructor, a tutor or a classmate? Changes were made according to the experts' requests.

*Control group self-efficacy survey*

For this study, a field test for a "Control Group Self-Efficacy Survey" (Appendix B) was created to test the validity and reliability of research questions for this comparative case study. This open-ended survey was designed to measure the self-efficacy of the control group for this study. The control group's survey differs in the respect that members of the group will not be completing a portfolio. The students' self-efficacy will however, be measured and compared to the participant's level of self-efficacy. The control group will receive exactly the same summative feedback for the discussion board assignments and design projects, and will also receive the same lectures each week as the participants of this study. The only difference between the two groups will be that the control group will not be involved within the portfolio creation process, therefore, the open-ended questions needed utilized for the control group ought to be revised. As a result, an official IRB request was sent to seven experts in the field of Graphic Design, higher education and online courses. Of those seven requests, five experts responded favorably for this study, thereby validating this instrument as responding to the research questions, allowing the researcher to utilize a comparative case study. The experts participating within this field test requested minor changes, but none that would change the overall meaning of the question.

## **Instruments**

For this comparative case study, no certified instruments were available for use. Therefore, for this comparative case study, four instruments have been created by the researcher; 1) Open-ended survey for the control group (Appendix A); 2) Open-ended survey for the participants (Appendix B); 3) Rubrics that will measure comprehension of design skills (Appendix C); and 4) Rubrics that measures the comprehension of design concepts (Appendix D). A field test was conducted by sending the prescribed instruments to the five experts within the graphic design field in order for the experts to assess the strengths and weaknesses of the prescribed instruments. Field tests were completed and approved by the Institutional Review Board (IRB) prior to the data collection process.

Prior to the beginning of the design course, prospective students of the Digital Imaging undergraduate graphic design course were sent welcome emails. Within the email was an introduction about the research, outlining the importance of students responding to any emails from RA 1. The students were notified that participating in creating a portfolio for the design course was to be absolutely voluntary and students would have the option to opt out if they were selected as participants.

Both the control group and the participants were graded using the same rubrics for this course (Appendices C-D), which measured each student's comprehension of the concepts of design, as well as students' comprehension of the skills required and learned throughout the Digital Imaging course. The instructor and researcher for this case study taught both courses simultaneously.

A field test was conducted by sending the required instruments for this study to the School of Education (SoE) of the university. Both faculty and staff assessed the

strengths of the rubrics and the questionnaires to ensure its reliability for this research and evaluated these instruments. The need for an independent assessment of rubrics is justified by the controversy surrounding the validity and reliability of rubrics as a form of learning assessment (Rezaei & Lovorn, 2010; Jonsson & Svingby, 2007). The field test utilized an assignment created by another instructor who had previously taught the same course. The assignment was graded per the rubrics provided for comprehension of design concepts and comprehension of skills of design (Appendices C-D). When completed, the assignment was forwarded to the SoE for further evaluation and assessment against the rubrics provided. Likewise, the same experts evaluated and assessed the strengths and weaknesses of the open-ended surveys designed to provide data for the comparative case study (Appendices A-B). Jarobe (2009) stated, “Field tests are often recommended to assess the strength of research questions/hypothesis or test the appropriateness of certain data-gathering protocols (e.g., informed consent procedures), instruments/tools (e.g., item content) and data analysis procedures” (para. 2). Once experts had reviewed the instruments, the IRB process commenced.

### **Data Collection**

The following instruments were used to collect the data for this comparative case study: participant self-efficacy survey (Appendix A), control group self-efficacy survey (Appendix B), and rubrics to measure comprehension of design concepts (Appendix C), and comprehension of design skills (Appendix D). All instruments of data collection were field-tested and approved before being implemented into the research project. Before research and data collection started for this study, the instructor informed all students entering into the two Digital Imaging courses of the research that was to take

place during the course, by sending all students a welcome email. Emphasized within the email was the assurance that each student's instructor would not know who was participating or who was not participating in the portfolio creation process. Also outlined within the email was the importance of students forwarding all questions or issues about the research, the research study and what would be involved once class began to the instructor via email, the classroom portal instant message system or by phone. Once the classes began, students could no longer ask the instructor questions in order to prevent potential biases and knowledge of who was or was not participating within the research portion of this project.

On day one of the course, the RA1 placed all the student names from the two different classes into a hat. The instructor selected 20 students to potentially be the participants for the study. Once chosen, the students were issued an informed consent form outlining the nature of the study and requesting the students' permissions to be included as participants within the study. If a student declined the request, RA1 selected another student and the same process was repeated until RA1 received a total of 20, signed informed consent forms.

With the participants chosen randomly for this study, RA1 sent the remaining 20 students an email informing them that their names were not chosen to participate within the portfolio creation process, but explaining that the students will still participate within the survey process (Appendix A). Attached to the email was an informed consent form for the control group, which outlined the expectations of the study and the role and responsibilities of the proposed control group for this study. All forms were returned and signed and filed on the computer of RA1, and protected by a personal password to ensure

student anonymity. At the end of weeks one, three and five, RA1 sent surveys to both the participants and control group, requesting a 24-hour time frame for the selected group members to complete and return. When RA1 received the emails with the surveys attached from each person, the RA1 coded each survey by providing a randomized numbering system and created an excel spreadsheet for the purposes of the research, to track the surveys each week. Ensuring there was no identifiable information of the participants within the surveys, RA 1 sent the surveys to the instructor who was also the researcher for this study. Once the instructor received these surveys from both; the participant group and the control group, she entered the data received into SurveyMonkey and HyperResearch. SurveyMonkey was used to code and analyze any/all data for the survey questions that were not open-ended. HyperResearch is MAC based software for qualitative studies. All open-ended questions were entered into this software, coded with keywords from the participants' surveys and analyzed.

Participants differed from the control group, only because the participants created a portfolio during all five weeks of the design work. Each week during the instructor's lecture, the instructor demonstrated the processes necessary to create a portfolio for the participants' weekly design project. For example, during week one, the participants would save their design work with the requirements stated for that week's design project. Upon completion of week one, the participant will have saved the work as a multi-page Portable Document Format File (PDF). Each week thereafter, the participants would follow the same format for weeks two through five and add their progress to the week prior.



Upon completion of the design course, the participants sent their final portfolios to RA1 who then coded the assignments to coincide with the identifier assigned in week one. In turn, RA1 sent the portfolios to RA2, who manually went through each project to determine the grading for each of the portfolios. The grading was based on the rubric that measured the participant's skill of design (Appendix D). RA2 provided justification for each of the grades provided. RA2 held onto the grades until the instructor provided the final grades - within the participants' grade books - to the university. Once the instructor posted her final grades, RA2 forwarded his results of his grades to her and the instructor then compared those results to her final grades.

Non-Participants – Group B was used as the control group. Because the instructor was not to be privy to the identity of either group within this study, Group B received the same information and feedback during class lectures as Group A. The only difference were the participants' (Group A), created a portfolio and the non-participants (Group B) did not.

In both classes, participants and non-participants completed the discussion board task (part one) by day three of each week, with each final discussion due by day seven. Also due by day seven were the participants' and non-participants' required design project for the week. Formative feedback was provided to both groups. The instructor also provided two, one-hour live lectures via Adobe Connect™, which is currently included within students' classrooms. Participants and non-participants also received a weekly grade entered into their individual grade book for both – their discussion board projects and their design projects based on the rubrics designed, tested and validated for this study (Appendices C and D). Besides a letter grade, both groups were also provided

written feedback, which included positive feedback, as well as critical written feedback that provided recommendations on how to further enhance their discussions or their individual designs. Other tools available to both groups were the opportunity to email the instructor or contact the instructor by phone if the participants or the control group required any clarification or help with any aspect of the assignments.

According to Stoddart (2006), a combination of multiple methods of data analysis “will ensure the validity of the study” (McMillan & Schumacher, 2001 as cited in Stoddart, 2006, p. 39), such as the use of SurveyMonkey – that was used to analyze the data entered into its database by the researcher. This process was started by RA1 who coded each of the surveys by assigning numbers to both the control group and the participants. The open-ended surveys for both – the participants and the control group, each contained 10 questions requiring these groups to respond with the Likert Scale, given five points, plus a strongly agree or strongly disagree option. Data collected from both groups were then entered into Survey Monkey in order to provide a potential theme that responded to learner-instructor interactions and perceived self-efficacy each week.

Once the data was entered into SurveyMonkey, charts were generated based on participants’ responses. Once the information had been recorded from the database for the comparative case study, it was implied that the results would successfully respond to the research questions, as well as provide any insight to new, emerging themes that would be provided through the actual analysis of the performed data collection.

The final six questions within the surveys were open-ended responses. These responses from the both groups were then entered into HyperResearch software, which was a qualitative data analysis program for Macintosh users that allowed the researcher to

“code, retrieve, build theories and conduct analyses of qualitative data” (Stoddart, p. 39). From the narrative responses provided by the participants and control group, common words were chosen as keywords and placed into HyperResearch. The coded words reflected common terminology used within the participants’ responses and then applied for each of the questions. Once consistent responses were provided for these questions, all data was entered into the database and coded, producing common themes from the surveys and perhaps provided new themes for future research. Baker (2003) talked about questionnaires as being, “the principle means used for collecting data by means of a survey of a designated population or sample in which the researcher is interested” (p. 343).

### **Data Analysis**

In analyzing the data, the goal for this study was to provide data demonstrating to students within online graphic design courses the importance of creating a portfolio of students’ design work through each of the design courses students are required to attend in order to achieve an undergraduate’s degree in graphic design. Along with the importance of creating these portfolios the data hopes to prove through concept analysis, the improvement or increased levels of the participants’ self-efficacy. Zulkosky (2009) stated concepts being defined as, “a word or phrase that summarizes ideas, observations and experiences” (p. 93). By creating a portfolio, the participants were able to view their successes within the work provided for the portfolio each week which allowed for that “mental image that can facilitate communication about and understanding of phenomena” (Fawcett, 2005, p. 4, as cited in Zulkosky, 2009). Continuing along these lines of mental images (or participants viewing individual progress each week), Mezirow’s

Transformative Learning Theory begins its process of using the “frame of mind” (1987, p. 6) to transfer that mental image into personal success, thereby, increasing personal levels of comprehension and self-efficacy.

Comparisons and analysis was used to determine both groups’ self-efficacy and comprehension levels throughout the participants’ and the non-participants’ course. Shulman (2003) discussed five benefits in the use of portfolios as being; 1) portfolios permit tracking of longer periods of teaching verses a single observation; 2) portfolios can bridge gaps between the process and the product; 3) “portfolios institutionalize norms of collaboration, reflection and discussion”; 4) a portfolio provides structure; and 5) a portfolio shifts the responsibility of teaching – to learning – back to the participant (constructivist learning) (as cited in Lombardi, 2008, p. 9).

The data collected and analyzed for this study included only online students within the graphic design course within this university. The researcher for this study was assigned two Digital Imaging course consisting of approximately 40 online students within the associate’s degree program in graphic design. RA1 randomly chose 20 students between the two classrooms, collected data and provided that data to the researcher. Ultimately, the count for the participants and control groups both contained 20 students, which was representative of one online classroom. Hybrid students – students assigned to an on-ground campus, were eliminated from this research and for the purpose of this study. The following portion of this chapter provides the data collected and how this data related to each of the research questions.

*Q1. How do portfolios impact students in an online graphic design course?*

In analyzing the data collected from participants and the control group, this study demonstrated the required responses to the research questions. The first sub-question to this study: How do portfolios impact students in an online design course? In week one, the researcher asked both the participants and the control group, how many hours they spent each week within the online classroom. The success of a student within an online course is demonstrated through how much time is spent reading the required text for the course, reviewing course material and the time spent in creating the design work each week in preparation for the work to be evaluated. The assumption for a student with no experience within the assigned software program would be an average of six to ten hours per week for each week of the students' studies. If the course is harder than originally anticipated, the student would require more time within the classroom and involved in research, and reviewing the live chats that were recorded for the students' convenience. Table 1 reflects the actual time as recorded by participants during weeks one, three and five of the design course.

Table 1. Time Spent Within The Online Design Course

	Participants				
	< 5 hours	6–10 hours	11–15 hours	16-20 hours	> 20 hours
Week 1		33%	16%	42%	9%
Week 3	10%	57%		33%	
Week 5	20%	60%		20%	

Note: < = less than, > = greater than

Table 1 reflects the difference in time that participants spent within the online design course for an associate's graphic design degree. Originally, 42% of the

participants spent between 16 and 20 hours within the design course. As each week progressed, there is a steady decline of how much time was required to complete individual tasks and to create the portfolio required for this study. Table 2 reflects the actual time as recorded by the control group during weeks one, three, and five of the students' online design course.

Table 2. Time Spent Within The Online Design Course

Control Group					
	< 5 hours	6–10 hours	11–15 hours	16-20 hours	> 20 hours
Week 1		36%	32%	15%	15%
Week 3		30%	42%	28%	
Week 5		33%	33%	34%	

Note: < = less than, > = greater than

Table 2 reflects the control group spends online within the given classroom. The control group was provided the same instruction, provided the same classroom materials and the same opportunities of contacting personal instructors for additional help within the course. In week one, the majority of the control group spent less time within the course reflecting 36% of the control group only spending between six and 10 hours. By week five, the number shifts to show that 34% of the control group spent between 16 and 20 hours within the online course.

Data collection for this study included questions within the surveys to reflect interaction between the participants and instructor, as well as the instructor and the control group. The assumption prior to collecting this data was that the participants would interact more with the instructor during the beginning weeks of the design course and less as the class progressed. With the basic understanding of creating a portfolio, being able to

see personal work progress each week would improve participants' perceived self-efficacy which responds to the second and third research question for this study which are: 1) How do portfolios impact students' perceptions of self-efficacy and 2) How do portfolios impact students' comprehension? A Likert scale was created for the first 10 questions within the self-efficacy survey for the participants (Appendix B), and the self-efficacy survey for the control group (Appendix A). Tables 3 and 4 reflect the actual responses provided by each group.

Table 3 states that during week one, participants had fewer interactions with the instructor than weeks three and five. Also stated is the increased interaction through email and electronic media during weeks three and five. During week one, the participants did not interact by asking questions or asking for help. For the ones that did require assistance, the instructor responded within a timely fashion. For Q5 in week one, it shows a lack of formative feedback from the instructor at this point within the design course. No assignments at this point were turned into the classroom for comments or grading during this period of week one, reflecting an expected response. During weeks three and five, participants interacted more with the instructor by asking questions, sending emails or requiring extra tutoring.

Table 3. Participant – Instructor Interaction

		Participants							
		(Strongly disagree	1	2	3	4	5	N/A	Strongly agree)
		Numerous Interactions	Utilized electronic means to contact instructor	Instructor responded within a timely fashion	Participant responded to instructor's response	Participant received both positive and informative feedback			
Week 1									
	1								
	2	18%	8%			7%			
	3	15%	17%		7%	17%	17%		17%
	4	25%	7%		18%	8%	16%		
	5		50%		58%	50%	16%		
	N/A	42%	18%		16%	18%	50%		
Week 3									
	1								
	2		22%			10%			
	3	10%							
	4	55%	15%			12%			
	5	22%	58%		78%	78%	100%		
	N/A	13%	5%		22%				
Week 5									
	1								
	2								
	3								
	4	40%	40%				20%		
	5	60%	60%		100%	80%	80%		
	N/A					20%			
		Q1	Q2		Q3	Q4	Q5		

Note: Q = question per the survey

According to the data, the instructor responded within a timely fashion and provided both positive and informative feedback throughout the rest of the course. Table 4 was created to reflect the same questions as the participants but the word portfolio was removed and replaced with the word design to reflect an accurate assessment of the data.



Table 4. Control Group – Instructor Interaction

Control Group					
(Strongly disagree 1 2 3 4 5 N/A Strongly agree)					
	Numerous Interactions	Utilized electronic means to contact instructor	Instructor responded within a timely fashion	Participant responded to instructor's response	Participant received both positive and informative feedback
Week 1					
1				18%	
2			12%		18%
3	18%	35%			
4	18%	15%			18%
5	33%	50%	88%	82%	50%
N/A	31%				14%
Week 3					
1					
2					
3	24%		18%		
4	28%	25%		42%	42%
5	48%	75%	82%	48%	58%
N/A					
Week 5					
1					
2					
3		33%	33%		
4	50%			27%	
5	50%	67%	67%	73%	100%
N/A					
	Q1	Q2	Q3	Q4	Q5

Note: Q = question per the survey

Table 4 indicates that during week one, the interaction between the control group and the instructor was mainly through electronic means (email) or feedback within the control group's grade book. Weeks three and five shows an increased need for the instructor interaction with a high satisfaction level from the control group regarding the instructor's response time and feedback.

*Q2. How do portfolios impact students' perceptions of self-efficacy?*

Students entering into an online graphic design course have some sense of self-efficacy pertaining to the use of software for the specific design course. The requirement for students entering into the Digital Imaging course had no pre-requisites attached to the course and was placed into this course based on their placement within their undergraduate degree program. Students are perceived as going into the course with little or no experience within this specific course. Table 5 is a recorded view from the participants while entering into the Digital Imaging course – by entirety using the Likert Scale. During each week of the course, the participants created a portfolio that demonstrated the process of the design work on a continual basis.

Table 5 reflects the perceived self-efficacy of the participants. During week one, 58% of the participants had not created portfolios prior to the course, with 10% stating their personal confidence level showing as being confident enough to be able to problem solve. The ability to problem solve was stated by 25% of the participants. Also in week one, 3% of the participants would recommend this process as part of all the students' design courses. In week three, the numbers tend to shift to the center of the Likert Scale and in week five, those numbers shift to improved self-efficacy, problem solving and recommending the process of creating a portfolio for all the design courses.

Table 5. Participant – Perceived Self-Efficacy

		Participants					(Strongly disagree 1 2 3 4 5 N/A Strongly agree)				
		I have created portfolios prior to this course	I felt confident I would enjoy the process of creating a portfolio	During the process, I had to contact the instructor with questions	I felt confident enough to problem solve on my own	I would recommend this process for all my design courses					
Week 1											
	1	58%	3%	25%	10%	3%					
	2	2%	5%	15%	15%						
	3	2%	44%	25%	25%	23%					
	4		15%	10%	25%	25%					
	5		33%	8%	16%	42%					
	N/A	38%		17%	9%	7%					
Week 3											
	1	38%	12%	10%	8%						
	2		12%								
	3		33%	25%	55%						
	4	12%	12%		15%	21%					
	5	15%	33%	33%	22%	73%					
	N/A	35%		12%		6%					
Week 5											
	1		40%	20%							
	2										
	3		20%		20%						
	4				40%	20%					
	5	5%	40%	60%	40%	80%					
	N/A	80%		20%							
		Q6	Q7	Q8	Q9	Q10					

Note: Q = question per the survey

Table 6 reflects the views of the control group. The word portfolio was replaced with “design course” The data shows that 82% of the control group had never used the required software when entering into their course and 33% felt confident enough to problem solve the design problem on their own during week one. By week five however, those numbers shifted to 75% of the control group feeling confident to problem solve their design problem.

Table 6. Control Group – Perceived Self-Efficacy

Control Group					
(Strongly disagree 1 2 3 4 5 N/A Strongly agree)					
	I have used this software prior to this course	I felt confident that I would enjoy creating my design projects	During the process, I had to contact my instructor with questions	I felt confident enough to problem solve on my own	I would recommend this process for all my design courses
Week 1					
1	82%	24%		17%	
2	18%	13%			
3		14%	19%	33%	19%
4		16%	33%	17%	15%
5		33%	32%	33%	33%
N/A			16%		33%
Week 3					
1	50%				
2	14%		13%	15%	
3		35%	23%	42%	9%
4	22%	23%	19%	15%	33%
5		42%	45%	28%	58%
N/A	14%				
Week 5					
1	100%	35%			
2		33%			
3			25%		
4				25%	30%
5		32%	75%	75%	70%
N/A					
	Q6	Q7	Q8	Q9	Q10

Note: Q = question per the survey

HyperResearch is a qualitative data analysis tool that allows its users to code data, generates reports and theories based on the data. For this study, HyperResearch was used to analyze open-ended questions of both, the participants and the control group. The participants within each group were given different surveys probing the final series of questions. Keywords were provided by participants within each group, coded in HyperResearch and analyzed. Table 7 reflects the views of the participants and the

perceived self-efficacy of these participants while creating a portfolio and its usefulness within a design course.

Table 7. Participants - Changes in Perceived Self-Efficacy

Participants						
	How did creating a portfolio increase your level of competence?	Did you notice any benefit of creating a portfolio?	Would you use a portfolio as a learning tool?	Would you use the portfolio as an assessment tool?	Do you feel more confident in repeating the process for future classes?	How has your confidence level changed during this process?
Week 1						
Great Benefit	11	10	13	15	9	7
No Change	3	6	2	0	3	0
No opinion	6	4	5	5	3	13
Week 3						
Great Benefit	15	19	17	15	17	11
No Change	1	1			1	2
No opinion	4	4	3	5	3	7
Week 5						
Great Benefit	19	15	17	18	18	19
No Change		4			2	1
No opinion	1	1	3	2		
	Q11	Q12	Q13	Q14	Q15	Q16

Note: Q = question per the survey

*Q3. How do portfolios impact students' comprehension?*

Table 8 reflects participants' and control's final grades and comprehension grades. These grades were determined based on control and participant scores for rubrics designed to measure comprehension of design concepts and comprehension of design skills. The instructor computed participants' and control's final grades by using the rubric designed selected for this study. 50% and 25% of the participants and control groups respectively scored an “A” for their final grades. Also 45% and 5% of the participants had B and C final grades respectively with 25% and 10% of the control group having B and C final grades. 40% of the control group had F final grades. While 85% and 15% of

the participants had A and B comprehension grades respectively, 50% and 15% of the control had A and B comprehension grades respectively. 15 % and 10% of the control group scored C and D comprehension grades respectively and a 5% rate each for E and F comprehension grades was recorded.

Table 8: Final Skills and Comprehension Grades

	Grade					
	A	B	C	D	E	F
Final Grade						
Participant	50%	45%	5%			
Control	25%	25%	10%			40%
Comprehension Grade						
Participants	85%	15%				
Control	50%	15%	15%	10%	5%	5%

### Research Analysis

An effective analysis of the primary data provides evidence showing the possible significance of portfolio creation by online graphic design students. The primary research provided the participants' and control's data related to different indicators or influencing driving factors of students' performance. This section is a comparative analysis of the results of the participants and control group with respect to these educational performance indicators. The primary research utilized the following indicators: time spent within the online design course, instructor interaction, participant perceived self-efficacy, level of comprehension, and final rubric grade.

One of the major factors determining a student's success within an online learning environment is how much time the student spends in reading the required course text, reviewing all materials and completing the tasks weekly in preparation for the tasks to be evaluated. A shorter completion time indicates an improvement in the student's performance level in an online course. Therefore, comparing the difference between the

completion time for students participating in portfolio creation and the control group (non-participants) will contribute to identifying the possible influence of portfolio creation on the performance of graphic design students. Tables 1 and 2 indicate the time spent by the participants and control in weeks 1, 3 and 5 respectively. In the first week, more than 50% of the participants group spent over 15 hours in within the online design course while only 30% of the control group spent up more than 15 hours for the online graphic design course. This is an indication that in the first week of commencing portfolio creation, the control group actually performed better than those participating in portfolio creation in terms of time used to complete the online course graphic design activities.

There is a change in the time spent for the course completion indicated for participants and the control group by Week 3. Tables 1 and 2 show that at Week 3, participants 67% of the students participating in portfolio creation performed below the average time of completion (6-10hours), with 10% of these students actually completing the graphic design tasks in less than 5 hours. However, the percentage of control performing individual tasks in at the average completion time rate was 30% (a reduction of 6% from week 1) with not student completing individual graphic design tasks for the week in less than 5 hours. Therefore, by Week 3, the amount of students participating in portfolio creation who completed the graphic design tasks within average completion time was over 100% above that of the non-participating students.

By week 3, there was a further increase in the difference in completion time between the participants and the control group. 80% of the students performing portfolio management successfully completed individual tasks within the average time (with 20%

completing individual tasks in less than 5 hours). The rate of control students completing the graphic design tasks within the average completion time (6-10 hours) is comparatively significantly low (33%). From the analysis, it is students' participation in portfolio creation improves completion time of online graphic tasks and may therefore positively influences the general performance students in online graphic tasks.

Instructor interaction is also a significant factor influencing and indicating the students' performance (Van de Pol, Volman, & Beishuizen, 2011). The level of interaction between the students and instructors as well as between students and other students show indicate student engagement, which is another factor shown to indicate student's performance and achievement (Tosh, Light, Fleming, & Haywood, 2005). It was necessary to consider the influence of student-teacher interaction as one of the indicators influencing students' performance in the current case owing to the nature of the learning environment characteristic with the sample considered. Since the graphic design course considered in this research is an online based course, considering the effects of the learning method on teacher interaction was necessary; considering the effects of portfolio creation on interaction was also necessary. Since distance education and learning is naturally associated with the idea of isolation and the absence of face-to-face interactions with instructors (Suen, 1996), understanding the implications of portfolio assessment on teacher interaction in a distance learning graphic design course became necessary. Thus, a comparative analysis of the influence of portfolio management on students' level of interactions with the instructors in the graphic design distance learning environment became necessary. Tables 3 and 4 present an overview of the outcomes of strategically developed open end questions investigating the level of



interaction shared between students participating in portfolio creation and the control group (non-participants).

One of the factors used to investigate the effects of portfolio management on student-instructor interaction was the interaction frequency between the students and the instructors. From Tables 3 and 4, the outcome of Q1 indicates that from Week 1 to Week 3, there was an increase in the amount of interactions for both students participating in portfolio creation and the control group (non-participants). This indicates that the amount of interaction between students and instructors over time is not necessarily dependent on students' participation in portfolio creation. Another factor used to consider the effects portfolio management of the student-instructor interaction effectiveness was mode of interaction; this was done by investigating how often students used mails to communicate with instructors. This method has been used in previous research (Van de Pol, Volman & Beishuizen, 2011). While the results showed a continuous increase in the amount of electronic mail communication between participants and instructors from week 1 to week 3, there was a somewhat constant amount of electronic mail communication between the non-participants and instructors at week 1 and week 2, and a reduction in electronic mail interaction at week 3.

There is a considerable difference in instructor response satisfaction rate between participants and control. While participants' satisfaction rate increases weekly from week 1 and peaks at week 3, there is significant reduction in the satisfaction rate of the control group. This is an indication of the positive effects of portfolio creation on the online graphic design course because participants' perform better at individual tasks and are naturally satisfied with instructors' positive responses to these tasks. Distance learners

usually tend to have clearer goals and reasons for engaging in a distance course, but the degree of responsibility for managing contacts with the instructor varies across individuals (Suen, 1996). It is obvious from the students-instructor interaction results of that the portfolio creation can influence this degree of responsibility and improve student-instructor interaction. These findings are supportive of Mezirow's theory, suggesting that portfolio assessments emphasize educators' role in learning as helping students to engage in reflective thinking and helping the students to redefine personal understandings and insights (Conrad, 2008).

The research study also considers students' perceived self-efficacy as a factor influencing or indicating students' performance level. Self-efficacy refers to people's confidence to accomplish tasks or achieve goals (DeTure, 2004) as well as people's ability to judge how well personal learning tasks can be achieved (Saade & Kira, 2009; Marsh & Martin, 2011). The importance of self-efficacy on educational achievement and accomplishment of learning tasks has increased its position as a student performance indicator (Trautwein, Ludke, Nagy & Marsh, 2009), and this is also evident in its repeated use in various research studies (e.g. Wahab, 2007 & Wadsworth, et al., 2007). Based on this consideration, it is necessary to compare the participants' and control (non-participants) self-confidence levels in order to identify the influence of portfolio assessment on the students' self-efficacy, and subsequently on the course performance.

Tables 5 and 6 present the different levels of self-efficacy expressed by the participants and control over the weeks. Participants' self-efficacy level, judged by how confident the participant felt with regards to enjoying the process of creating a portfolio constantly increased from Week 1 to Week 5, while control level of self-efficacy, judged

by personal confidence level for project designs reduced over time and was the least at the third week. Participants were also more confident to recommend the portfolio creating method to be used by other online graphic design students than control (non-participants), whom were confident, but exhibited less confidence than the participants. The results in Table 7 further indicate that creating a portfolio consistently improves self-perception of competence and general student confidence. The findings for this particular construct is supported by the suggestion that portfolio assessments have the potential to drive students' self-efficacy, since students create an atmosphere of learner-driven education; the latter is the foundational ingredient of the constructivist philosophy (Sajadi & Khan, 2011). Since higher learner self-efficacy beliefs are fundamental to the professional maturation of students (Jones, 2009), creating a portfolio presents as a viable method of improving students' performance.

After understanding the general effects of how creating a portfolio influences students' characteristics such as student-instructor interaction and self-efficacy, it will be necessary to identify the effects of these characteristics on students' general comprehension levels owing to the interrelationship between these factors (Aries, 2010). Comprehension is defined as a student's capacity to perceive and understand the meanings communicated by online instructors and the requirements placed on these instructors in terms of graduation (Caldwell, 2008). It is also explained as the process during which learners interpret, translate or summarize the information provided during the course and, consequentially, demonstrate the understanding of the learning event (Brodie, 2007). While the initially analyzed learning indicators have suggest positive effects of creating a portfolio as the learning indicators each contribute to improved comprehension, Table 8

directly seeks to identify the difference between online graphic design students participating in portfolio creation and the control (students not participating).

Comprehension grades were determined based on control and participant scores for rubrics designed to measure comprehension of design concepts and comprehension of design skills. The instructor computed participants' and control's final grades by considering the rubric designed and selected for this study. The highest comprehension grade, A, denoted online graphic design students that scored 5 points individual comprehension tests. While 85% of the participants (those creating a portfolio) scored A grades at the end of the seven week period, 50% of the control (non-participants) scored the A grade. This means that the number of participants in the portfolio creation that scored an A were 50% above non-participating counterparts. The same percentage (15%) of participants and control scored a B. 5% of the control scored an F in the comprehension test for online the graphic design course while no participant creating a portfolio scored below a B grade in the same comprehension tests. The results of the comprehension tests performed after seven weeks support Dewey's educational philosophy that portfolio assessments promote real-world learning and help adult learners in distance education to master the new knowledge through reflective learning (Conrad, 2008). Reflective learning in this case may be viewed as creating a portfolio since a portfolio refers to "a specific collection of material and documents, with the purpose of documenting a specific range of performance over a period of time ... [and] ... serves as a component of self-evaluation and provides participants and outsiders with an overview of personal learning success" (Zawacki-Richter et al., 2011, p.45).

The students' final grade scored after five weeks is a reflection of the effectiveness of the different learning methods applied for the participant and control groups respectively. The final grade indicates the effects of the various learning indicators considered significant and applicable in this research study. The 8 reflects the final grades scored by the sample students offering the online graphic design course and can be used to compare the overall effect of participating in portfolio creation program and not participating in the program. With 50% of the participants scoring an A grade, students creating a portfolio presented a general A grade twice as much as the number of As presented by the control (non-participants). Also, while no participating failed the online graphic design course at week 5, 40% of the control failed the same course at Week 5. 45% participants scored B whereas only 25% control scored a B. The difference in the final grade results between the participants and the control was overwhelming and clearly suggests that creating a portfolio positively influences comprehension, self-efficacy and student-interaction form improved performance in an online graphic design learning environment.

### **Summary of Findings**

Although this research could significantly contribute to the knowledge of pedagogy particularly in the ever-developing area of online based distance learning, it is important to note that the findings in this research may not be directly generalizable as it gives room for further extensive research studies. For instance, extensive research may be conducted using the same methodology however, the research may focus on other factors influencing and indicating students' performance apart from perception of self-efficacy

and comprehension. This will expand the theoretical background of the research study and also increase the potentiality for additional findings.

The lack of consideration of the two samples based on social factors also gives room for additional research. While this study simply concentrated on the effects of creating a portfolio for online graphic design courses, further research may consider social factors such as the gender effects associated with creating a portfolio on online distance education. Although the general effects identified in this research presently indicate that creating a portfolio is a viable option to improve the perceived self-efficacy, comprehension and final grades of online graphic design students, expanding the sample would further increase knowledge of pedagogy as related to creating a portfolio.

There are also some limitations associated with this research study. One significant limitation is the possibility of participant bias. There is a possibility that students were not straightforward when completing the surveys. This limitation was minimized by explaining the importance of the research study to all participants and encouraging students to be forthcoming when responding and assuring them that the instructor/researcher was not informed of their participation status.

The selection of the sample for the survey may have also affected the results. This is because not all the students engaged in the online distance learning graphic design courses were included in the research study; with a sample of 20 and a control of 20, it is possible that the actual potential scores meant to be represented by the participants was not reflected and adversely affected the results of the study.

This section of the report presented an analysis of the data collected in the research study. The data derived through the primary research was interpreted in-line

with the different theoretical ideologies and findings in the background section and literature review of the study. The findings basically suggested that creating a portfolio positively influenced online graphic students' academic performance in terms of perceived self-efficacy and comprehension.

## **CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS**

### **Introduction**

The purpose of this study was to analyze and assess how students in an online graphic design course would respond to creating a portfolio of their weekly designs. Also studied were students' perceived self-efficacy, comprehension levels of the required software and a comparative case study was presented to show the differences of final grades between the control group and the participants of this study. G.T. Brown (2008) affirmed that portfolios first began in higher education 25 years ago and since then portfolios have been used within almost all disciplines (Klenowski et al., 2006; Kuper et al., 2007; Snadden & Thomas, 1998; Tochel et al., 2009). The importance of portfolios has been demonstrated through being used within the health and medical fields (Grant et al., 2007), teacher education (Chetcuti, 2008), as an instrument of literacy assessment (Walsh, 2009) and also used as an assessment tool for learning a second language (Cummins & Davesne, 2009).

Previous research demonstrated the need and the importance of using portfolios for the online (distance education) environment for science and math courses (Drummond, 2004). Where research was lacking until this study; was determining the importance of creating and using portfolios within design courses within an online or distance educational setting. Portfolios as an instrument of assessing learning reflect "a shift from a stress on individual responsibility for learning to a more collaborative view, allowing learners to identify issues in their organization and society which affect their learning and well-being" (Klenowski et al., 2006, p.269). It is through the prism of the constructivist philosophy that the link between portfolio assessment and students' self-



efficacy can be better understood. Through this study, an insight into the effects of portfolios on self-efficacy in learning was provided through the data analysis.

Understanding the relationship between self-efficacy and portfolio assessments is important, since higher learner self-efficacy beliefs are fundamental to the professional maturation of students (Jones, 2009). Learner self-efficacy further predetermines higher motivation and better learning outcome expectations (Jones, 2009). Self-efficacy in learners is closely related to personal responsibility, effective goal setting and transformations: Jones (2009) suggests that self-efficient learners are transformative learners, who assume personal control over their learning progress. Through the prism of Bandura and Mezirow's theories, self-efficacy drives the rapid transformation of the learning process, turning learners into both producers and products of their social environment (Jones, 2009).

### **Summary of the Findings**

The purpose of this study is based on real life observations and supported by empirical evidence collected through both - the data collection phase and the data analysis of an online graphic design Digital Imaging course. Through the completion of this comparative case study, this study was able to provide positive responses to each of the research questions and, is surmised that creating portfolios is successful and has been found to successfully impact comprehension skills and self-efficacy of online students. According to the first research where students were sub divided into manageable groups and tested on their ability to make online graphical designs - it was proven that portfolios helped in not only developing but also improving self-efficiency and comprehension. The research was conducted in a classical environment where all students were exposed to the

same academic environment as a constant. In addition, data collected proved that portfolio assessment facilities utilized concept analysis thus increasing the level of self-efficiency demonstrated by the design students.

In analyzing these results, it was found that a portfolio assessment enabled participants to develop a progressive attitude towards self-enhancement because the experiments associated portfolios with the creation of mental images among its users. These images are practical in fostering cognitive skills in the users because they create a lasting impression on the brains of the students thus facilitating communication as well as phenomenological understanding of scientific events. Furthermore, the results collected from the experiments were in line with Mezirow's Transformative Learning theory which supports that human beings often use frames of mind to telegraphically transfer mental images into practical mechanical output where output is a measurable productivity index (Edirippulige & Mrasinghe, 2011). Comprehensively, portfolios magnify output to suitable amplitudes that can indomitably be reflected by the level of a person's economic achievements, self-efficacy and personal degree of comprehension.

In comparing the two groups; the participants and the control study groups on the basis of participant and non-participant courses, the findings are consistent with those made by Fisher (2003) in the book "Online collaborative learning: Relating theory to practice. *Journal of Educational Technology Systems*" where he associated portfolios with a continuous assessment process which is essential in tracking long periods of teaching against that made during a single observation. He further described portfolios as a bridge that connects both, the processes and the products. On the other hand, it was discovered that portfolios could be helpful in institutionalizing norms related to reflection

of past events, as well as promote collaborative mechanisms between students. After the research, it was discovered that the portfolio process has many folds of benefits not only to the students but also to their respective institutions of higher learning since they provide an organizational structure through which other administrative functions can be undertaken.

Lastly, the successes of portfolios can be attributed to a constructivist type of learning where education instructors shift teaching responsibilities to participatory learning which is more practical. These studies which were conducted using standard parameters while other factors were kept constant gives the most suitable findings which can be a pointer towards making a comprehensive summary on the findings extracted from the statistical data collected. Majorly, the study is comprised of data from online graphic design classes therefore there is a high probability of adherence to principles of objectivity.

In summarizing our findings, the report will not be complete without mentioning the main impacts of portfolios on students as it was identified in the study survey. Now that this question carries the underlying points that support the research questions within this study, it is worth noting that a student's success in the online design courses is determined by time factor. Time is a constant resource which is equally available to everyone but some people spend their time more constructively than others. For instance, it was established that students who spend more time reading and making preparations about works assigned to them posted better results than those who invested little time in reading.

It has been proven that harder courses require more resource input than easy ones especially when the parties involved did not anticipate for such challenges. At first, the students are more dependent on the instructor for advice and support services but as time passes, the instructor-centered system of learning is slowly encroached by perceived self-efficacy from participants. From the analysis provided, it will be summative enough to note that portfolios have a profound impact on self-efficacy that is often boosted by the self-esteem levels of the participants. Secondly, the students using this system have been identified to benefit in terms of comprehensive or cognitive capacity of participants.

At the end of the day, a course instructor will only have to provide positive, formative and informative feedback to the students thus portfolio assessment has the characteristic of demonstrating the perception of self efficacy and student comprehension. These aspects can be gauged using a control experiment where environmental factors can be adjusted to show a slight variation in data collected for both comprehension and final grades. Data collected under the two conditions will portray a variation, which will be helpful in determining forces that influence a more positive, academic performance. The data is then analyzed in comparison to a control experiment which has the ultimate outcome of determining indicators that interplay to influence efficiency and the overall performance of the students.

### **Electronic Learning**

In conclusion, Information Technology is fast paced towards changing the face of the earth. Humanity is being transformed day after day in the aspect that people are becoming polarized towards using technology in such sectors as economics and academics. Electronic commerce is one application of the use of the internet and

technological gadgetry to transact through a given commercial platform. Likewise, institutions of higher learning are advocating for the introduction of technology and relevant facilities that will fuel full adoption of electronic learning. Electronic learning can be acronym to e-learning where students use web-based pages to access information about their universities, colleges and schools from the comfort of their homes.

It is worth noting that information collected by this research is not a generalization therefore the researcher is not subjective towards promoting or selling of her ideology on portfolios. The truth is that the research has been done extensively to cover any shortcomings that might emerge in the near future. On the other hand, the subject matter under study is so wide that it is likely to lead to controversies since some underlying principles are related. In that case, this dissertation is fashioned in such a manner that is suitable to comprehend. Specifically, the study will be of much help to pedagogies trying to establish how portfolios can impact student's self-efficacy and comprehension in an online graphic design course. The two pertinent factors in focus are self-efficacy and comprehension and how they impact student's performance. It is also certain that this study is completely theoretical and thus it is purely premised on qualitative statistical methods. This is because qualitative research as a data collection tool provides more empirical facts about our subject of study.

### **Limitations of the Study**

Limitations define shortcomings identified during the research process. A general limitation towards conducting this dissertation is that the subject area in question is very wide in that not a single research can cover all the topics. According to articles cited in the literature review, new models are being developed to counter the growing demand for

more quality learning institutions and educational facilities. Because of such pressures, there has been a remarkable shift towards performance oriented measures of education viability. Above all the changes and transformation, many national governments have requested education officers to ensure that portfolio assessments embrace high degree of integrity, accountability and transparency. Despite such appeals by the government, nothing much has been done since most institutions of higher learning are lingering behind. This has led to provisions of sub-standard services that cannot match up to international standards, which are measured by ISO certification of organizations.

Another limitation in conducting portfolio assessment research is that different educational instructors involved in the research had different scaling of marks since portfolio assessment is dependent on assessment methods used. This is a challenge and a bottleneck since determining a neutral point in marks; allocation could be tricky. The limitation is fueled further by socio-political factors since the learners might not get an opportunity to meet and interact with the instructors; therefore it develops an intricate chain of complex conditions of online knowledge delivery. The end result is that transparency is obscured consequently transforming a well meant project into disaster. For the shortcomings to be streamlined, governments should work hand in hand with education officers in order to create insight into the utilization and usability of given assessment procedures.

An additional limitation noted while undertaking this study is that research on portfolio assessments especially for an online graphic design course is that they are constantly increasing in scope of coverage. Because of this reason there exists a literature gap that would help link the use of portfolios in e-learning to self-efficacy and

comprehension. To some extent the literature gap has worked to the advantage of this research since it is focused on assessing the possibility of success in a competence based learning environment. Through this study, it has become easy for educationists to establish the growth matrix in terms of popularity of reflective portfolio assessment in institutions of higher learning. In conducting this research therefore, due attention was taken to employ the most suitable methodology in establishing effects accrued from comprehension and evaluation of the perceived self-efficacy of students.

Currently there is a wealth of information on portfolio assessments but most areas have been covered extensively which means that there are lots of generalizations. This is a limiting factor in conducting a study based on self efficiency and competence since different researchers envelop this topic from a diverse perspective covering such topics as the role of portfolio in assessment, criteria for using portfolios, characteristics and qualities of good portfolios which, in the absence of the qualitative angle, fails to integrate portfolios with the sequence of learning experiences leading students towards the desired goal. However this limitation has been catered for in this study by employing the use of qualitative methods of research, which provides conclusive data about self-efficacy and comprehension.

Other general limitations experienced during this research is that the samples used represented a graphic design course and which may not necessarily represent all undergraduate courses offered within institutions of higher learning in the United States. Alternatively, student opinions voiced by 20 participants may not be sufficient to represent those of a different course given the dynamics related to associates degree program for the online graphic design degree program. Given the complexity of graphic

deigning, some participants opted to exit the program and concentrate on other activities. Several surveys conducted could have marginal errors especially when the surveyors were subjective in recording their findings.

### **Emerging Themes Through Data Analysis**

Data analysis is an extensive, statistical practice that involves the comparison of recorded facts and figures in order to infer on a given subject matter. Given this research that is devoted to establishing how portfolios can impact student's self-efficacy and comprehension in an online graphic design course, then there is need for concept analysis. Concept analysis will embrace a theme allied to giving of a summative idea on observations or experiences as recorded by the sample population used for the study. This is only possible with practice which aid in developing superb cognitive skills that are guiding to an analyst.

Cognitive skills can enhance creation of mental images, which have been accredited to facilitating comprehensible communication and expression of ideologies. This aspect has been described by Mezirow's Transformative Learning Theory as a process entailing the use of a "frame of mind" where mental images are used to the advantage of the researcher to enhance his or her breakthrough in the research (Butler & Winne, 2010). This is in itself commendable since it is an indicator of how practical personal levels of self-efficacy and comprehension can be if applied in an online graphic design study. Most times, data analysis encompasses comparisons as a theme. In our case comparison can be made for both participants and non-participants. This proposal has been supported by Shulman (2003; as cited in Lombardi, 2008), who purports that



portfolio assessment who has implicitly stated his liking for constructive learning in institutions of higher learning.

In synthesizing this data, an analyst ought to operate within the range of an average class size of 20 students undertaking their studies using an online platform. The course in question is a graphic design course although the research could be multi-faced in terms of coverage so as to cover other course units dealing in graphic design. The participants undertaking this study are associate degree program students where half of the sample population represents a control group. Analysis of the statistical figures collected from the study indicates a direct proportionate ratio between the amount of resource input and success of the project. An average student without experience on software programming is likely to spend a total of up to ten hours per week on design related studies. In this sense, it is worth observing that a challenging course will require more time input than a simple course. Similarly, introduction of subjects may require more time because introductions are meant to cover most general aspects of a topic thus making it a time consuming venture.

Contrary to the observations made among the participant sample population, the control group exhibited a conservative use of the available time. There was also constant interaction between participants and the instructors. In the case of portfolios, the same scenario is implicit. According to the recorded observations made per the work progress sheet, each passing week is important in shaping the self-esteem of the students. The participants were noted to have improved their perception on self-efficacy and comprehension and cognitive abilities.

## **Discovery in Research**

In given research practices, there are certain implications that come with the reports made. There are benefit groups that find this information very helpful since the researcher's goal was to fill a certain gap in research, within a given discipline. The information contained in a research study is not for the person who wrote it but for the general public with the premise of providing research that will enhance the world of education. Thus there are principles such as that of empirical data and objectivity, which ensures that a study is accurate and as outstanding, as possible. There are ethical implications that come with conducting a research as well. For instance ethical considerations provide for confidentiality of the participants in both the select and control groups. Ethical implications of this research were challenged by the practicality of qualitative research. The qualitative aspect of the ethics code of conducting research was implemented using a written guarantee where participants were assured of privacy and no personal information would be provided to the public.

In terms of content implications, the research was geared towards establishing how portfolios can impact student's self-efficacy and comprehension in an online graphic design course. The collected results had the implication that portfolios are very relevant in promoting modern learning experiences in institutions of higher learning. The goal of higher education is actually to identify a student's strengths and weaknesses, review and validate the effectiveness of various teaching strategies and inform administrative and instructional decision making, portfolio assessments have all chances to become a viable mechanism of assessing learners' progress in higher education. From the research it is implicit to say that portfolio assessment is a historical strategy that was implemented in

the United States. It had the preliminary objective of encouraging and empowering students to evaluate their knowledge and learning progress through cognitive abilities and critical thinking. The traditional portfolios have since then transformed into new technology based forms of assessing student's knowledge.

The main challenge associated with portfolio assessment is that many have misinterpreted its importance. Being a type of assessment, portfolio can be conducted through the internet therefore it is applicable to a wide array of disciplines of study such as medical, health, teacher assessment and more. Furthermore it is applicable in literacy development and graphic design courses although very few researchers have gone the extra mile of investing in undertaking studies related to online graphic design environments. This research therefore has the ultimate implication that the education system is moving away from process oriented to outcome oriented assessment philosophies. Technological advancement also changes the nature of knowledge delivery and need to re-evaluate applicability of portfolios in distance education.

This research has the implication of filling in the gap that has been existent in empirical literature since its inauguration in the U.S since it justifies the need for analyzing the usefulness as well as the usability of portfolio assessments in online learning environments (Ormrod & Jeanne, 2009). Given that comprehensiveness and self-efficacy have been extensively explored in previous researches, the current state of available information materials suggests that constructivist learning can be integrated as a proffered network for professional educators who may use it to design learning solutions for their learners. It therefore confers that Bandura's social cognitive theory becomes evident from the findings posted in this report.

## **Conclusion**

In conclusion, this research was a success in determining that portfolios can impact student's self-efficacy and comprehension in an online graphic design course. The research is in line with constructivism theories which are established on the groundwork of reinterpreting the connectivity bond between self efficacy and comprehension. These findings therefore have the potential of improving professional understanding of educationists toward portfolio assessments. If all is said and done, then portfolios will act as a leeway into improving the quality of education through betterment of distance learning, which is currently being done electronically (Joachim & Nadine 2009).

Comprehension in students has been noted in Blooms' learning taxonomy. The same theory has been proven in this study since students were discovered to have the ability to recognize, analyze and apply the new knowledge that can be applied in real life. The applicability of these findings are the very core of any learner-centered nature of knowledge development and learning process as is the same case with portfolio assessment. In case this technique is embraced and modified to march future requirements in the education sector, then students will portray a more systematic and organized way of gaining knowledge and learning of new skills. This study will impact higher education and provide not only means to future research, but to explore other online classrooms to see if portfolios can indeed be used as a proper assessment tool. This study has also proven that while building on student's self-efficacy that it does impact their comprehension levels within the online classroom. Finally, this study also helps bridge the gap between students and their instructors while fulfilling the need for research in this area of study.

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## APPENDIX A. SELF-EFFICACY SURVEY – CONTROL GROUP

Course number: Design160  
Course title: Digital Imaging

On average, how many hours do you spend online (on Blackboard) for your course each week?

- Less than 5 hours
- 6 – 10 hours
- 11 – 15 hours
- 16 – 20 hours
- Above 20 hours

(Please mark the appropriate number on the scale below each statement.)

Learner-instructor interactions:

1. I had numerous interactions with the instructor during this class, which aided me in the process improving my designs.
2. I asked the instructor my questions through different electronic means such as email, discussion board, instant messaging tools, or phone.
3. The instructor replied to my questions in a timely fashion.
4. I replied to messages from my instructor.
5. I received both positive feedback and informative feedback on how I could improve my designs.

(Strongly disagree 1 2 3 4 5 N/A Strongly agree)

Perceived Satisfaction (self-efficacy) within a design course

6. I have used this software prior to this course, so there were no issues in completing this class.
7. When I began this course, I felt confident that I would enjoy creating my design projects.
8. During the process of creating my designs, I had to contact the instructor with questions that arose.
9. During the process of creating my designs, I felt confident enough to problem solve on my own.
10. I would recommend this process for all my design courses.

(Strongly disagree 1 2 3 4 5 N/A Strongly agree)

Open-ended questions to show progression of self-efficacy

11. How would you compare your level of confidence from week one through week five and why?
12. Did you notice any benefit of your instructor feedback for this design course? Why or why not?
13. Now that the course has been completed, do you feel more confident in your skills and knowledge to move forward into your future design courses? Why or why not?
14. What tips – if any – would you provide students entering into this design course and why?

## APPENDIX B. SELF-EFFICACY SURVEY – PARTICIPANTS

Course number: Design160

Course title: Digital Imaging

On average, how many hours do you spend online (on Blackboard) for your course each week?

- Less than 5 hours
- 6 – 10 hours
- 11 – 15 hours
- 16 – 20 hours
- above 20 hours

(Please mark the appropriate number on the scale below each statement.)

Learner-instructor interactions:

1. I had numerous interactions with the instructor during this class, which aided me in the process of creating a portfolio.
2. I asked the instructor my questions through different electronic means such as email, discussion board, instant messaging tools, or phone.
3. The instructor replied to my questions in a timely fashion.
4. I replied to messages from my instructor.
5. I received both positive feedback and informative feedback on how I could improve my portfolio.

(Strongly disagree 1 2 3 4 5 N/A Strongly agree)

Perceived Satisfaction (self-efficacy) with outcome of creating a portfolio

6. I have created portfolios prior to this course, so there were no issues in completing this process.
7. When I began this course, I felt confident that I would enjoy the process of creating a portfolio.
8. During the process of creating my portfolio, I had to contact the instructor with questions that arose.
9. During the process of creating my portfolio, I felt confident enough to problem solve on my own.
10. I would recommend this process for all my design courses.

(Strongly disagree 1 2 3 4 5 N/A Strongly agree)

Open-ended questions to show progression of self-efficacy

11. How did creating the portfolio, increase your level of competence within the course of study?
12. Did you notice any benefit of creating a portfolio for this design course? Why or why not?

13. What do you think of using a portfolio as a learning tool? Please be explicit.
14. What do you think of using a portfolio as an assessment tool for this course?
15. Now that the course and the portfolio have been completed, do you feel more confident in repeating this process within future design courses? Why or why not?
16. How has your confidence level changed as a result of creating a portfolio and being able to see the progression of your work? Please be explicit.

## **APPENDIX C. RUBRIC – COMPREHENSION OF CONCEPTS IN DESIGN**

- 5 - Concepts of discussion have been successfully applied and developed with appropriate use of proper terminologies. Discussion posted before deadline.
- 4 - Concepts have been developed successfully, but clarity is missing as to the proper terminologies. Discussion posted on time.
- 3 - Concepts have somewhat been developed with some use of proper terminologies. Discussion posted during the week, but deadline not met.
- 2 - Concepts not clear with minimal levels of terminologies. Discussion is posted after the current week and past the deadline.
- 1 – Concepts not clear and improper use of terminologies. Discussion submitted after allotted allowance for an assignment to be posted.

## **APPENDIX D. RUBRIC – COMPREHENSION OF SKILLS IN DESIGN**

5 – Proper techniques have been demonstrated by implementing required techniques into design work. Craftsmanship of the assignment will demonstrate technical abilities, comprehension of the subject matter applied to design work, plus demonstrate the ability to introduce new techniques into their designs. Subject matter will be presented in a professional manner.

4 - Most techniques have been demonstrated by implementing some - but not all required techniques into design work. Craftsmanship of the assignment will demonstrate technical abilities, comprehension of the subject matter applied to design work, plus demonstrate the ability to introduce new techniques into their designs. Subject matter will be presented in a professional manner.

3 - Limited techniques have been demonstrated by implementing some - but not all required techniques into design work. Craftsmanship of the assignment will demonstrate technical abilities; comprehension of the subject matter applied to design work, but did not apply any new techniques. Subject matter was presented in a less than professional manner.

2 – A few techniques have been demonstrated by implementing some - but not all required techniques into design work. Craftsmanship of the assignment does not demonstrate technical abilities, and demonstrates a lack of comprehension of the subject matter applied to the design work. Subject matter was presented in a less than professional manner.

1 – No techniques have been applied as required into the design work. Craftsmanship of the assignment does not demonstrate technical abilities, and demonstrates a lack of comprehension of the subject matter applied to the design work. Subject matter was presented in a less than professional manner.