

UNIVERSITÉ DE SHERBROOKE

Le développement des compétences en conception de site Web par la critique et la
rétroaction de groupe

Developing Web Design Skills Through Group Critiquing and Feedback

Par

Homa Arabzadeh Nasseri

Essai présenté à la Faculté d'Éducation

En vue de l'obtention du grade de

Maître en éducation (M.Éd.)

Maîtrise en enseignement au collégial

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SUMMARY

Studies on the effects of social interaction have suggested that students with teamwork spirit can improve their problem solving skills and enhance their learning through group work activities. Moreover, the literature on the topic also suggests that one of the goals of critiquing or analyzing is to develop creativity (Neumann, 1989).

The aim of this quasi-experimental research study was to investigate whether guided small-group discussions that involved explaining, analyzing or justifying design and followed a modeling session from the teacher could improve students' creativity in web design. The convenience sample comprised of 37 third year students of the "Publication Design and Hypermedia Technology" program at John Abbott College in Sainte-Anne-de-Bellevue, Quebec who had enrolled in the Web Design course offered in the Fall semester of 2011.

The three-year specialized program of "Publication Design and Hypermedia Technology" primarily educates students in the areas of graphic design and web design. All of the core courses are held in computer labs and by the end of their studies students have learned the principles of design related to the print publications and the web world as well they have mastered many applications related to these fields. It is a challenge for many of the students of this program who do not have any background in art or design to fulfill the requirement of creativity in their assignments. Up until Fall 2011, there were no prerequisites such as a portfolio for acceptance into this design-oriented program except a high school diploma and numerous students choose this program because they like to work with computers but not necessarily design artifacts. Teachers are also challenged on how to encourage creativity and they implement diverse techniques to help students excel in their design potential.

The primary instrument of this study was a set of two assignments for the course. A traditional teaching method was used during the first assignment and a small-group teaching strategy was implemented during the second one. The grades of students for the design part of these two assignments were then examined. The findings did not show a positive effect of the teaching tool on the grades of students with average and weak design skills. However, it seems that a small number of students with high design skills were able to take advantage of the teaching strategy of this study.

Another instrument used in this research was a questionnaire on willingness to participate in teamwork. This examined the association between enthusiasm in group-work and improvement in design skills and the results indicated that students with excellent teamwork spirit were able to improve their design skills as a result of the strategy. Students in this career program stay together throughout their studies and usually by the end of the second year they all know each other very well. Several teachers in our department have adopted assignments in their courses that involve group-work among students so the prospect of interaction with classmates is high in this program.

The last instrument of this study was a questionnaire on the type of intelligences that students possessed. The responses to the questions allowed us to look at the association between certain types of intelligence and creativity. The results showed that students with a “creativity quotient aptitude” as well as the ones with an “emotional quotient aptitude” were able to take advantage of this activity and improved their design skills however the technique did not seem to help students with an “intelligent quotient aptitude”.

It is hoped that the knowledge gathered from the study will add to the information about group-work activities and critiquing in particular.

Recommendations mentioned in this study may help future researchers in planning and creating more successful strategies for teaching and learning.

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RÉSUMÉ

Des études portant sur les effets de l'interaction sociale ont suggéré que les étudiants qui ont l'esprit d'équipe peuvent développer leurs capacités à résoudre des problèmes et améliorer leur apprentissage grâce aux activités de travail en groupe. De plus, les ouvrages publiés sur ce sujet suggèrent également que l'un des buts de la critique ou de l'analyse est de développer la créativité (Neumann, 1989).

L'objectif de ce projet de recherche quasi expérimentale était de déterminer si des discussions dirigées en petits groupes qui comprenaient l'explication, l'analyse ou la justification de la conception et suivies par une séance de modélisation par l'enseignante pouvaient améliorer la créativité des étudiants lors de la création de site Web. L'échantillon de commodité était constitué de 37 étudiants de troisième année du programme d'infographie et techniques hypermédias au Collège John Abbott à Sainte-Anne-de-Bellevue au Québec qui s'étaient inscrits au cours de conception de site Web offert au trimestre d'automne 2011.

Le programme spécialisé d'infographie et techniques hypermédias de trois ans forme essentiellement les étudiants dans le domaine de la conception graphique et de la conception de site Web. Tous les cours de la formation spécifique sont offerts dans des laboratoires informatiques et lorsqu'ils terminent leurs études, les étudiants ont appris les principes de la conception en ce qui a trait aux documents imprimés et au monde d'Internet, et ont de plus maîtrisé plusieurs applications liées à ces champs. C'est un défi pour plusieurs étudiants de ce programme qui n'ont aucune formation en arts ou en conception de satisfaire aux attentes concernant la créativité dans leurs travaux. Jusqu'à l'automne 2011, il n'y avait pas de préalable, tel que la présentation d'un dossier personnel, à l'admission à ce programme axé sur la conception à l'exception d'un diplôme d'études secondaires et de nombreux étudiants ont choisi ce programme parce qu'ils aimaient travailler sur les ordinateurs et pas nécessairement pour concevoir des artefacts. Les enseignants sont aussi mis au défi de trouver une façon de favoriser la créativité et ils mettent en pratique différentes techniques pour aider les étudiants à réaliser leur plein potentiel en conception.

L'outil principal de cette étude est un ensemble de deux travaux du cours. Une méthode traditionnelle d'enseignement a été utilisée durant le premier travail et une stratégie d'enseignement par petit groupe a été appliquée durant le second. Les notes obtenues par les étudiants pour la partie de la conception dans ces deux travaux ont ensuite été examinées. Les résultats n'ont pas montré que la stratégie d'enseignement par petit groupe avait eu un effet positif sur les notes des étudiants qui avaient des aptitudes moyennes ou faibles en conception. Cependant, il semble qu'un petit groupe d'étudiants qui avaient des compétences élevées en conception ont été capables de tirer parti de la stratégie d'enseignement de cette étude.

Un autre outil employé dans cette recherche a été un questionnaire sur la volonté de participer au travail d'équipe. Ce dernier a permis l'examen du rapport entre l'enthousiasme envers le travail de groupe et le développement des aptitudes en conception et les résultats ont montré que les étudiants qui ont un excellent esprit d'équipe ont été capables de développer leurs compétences en conception à cause de la stratégie d'enseignement. Les étudiants dans ce programme technique demeurent ensemble durant leurs études et à la fin de leur deuxième année, ils se connaissent habituellement très bien. Plusieurs enseignants de notre département ont choisi de donner des travaux dans leurs cours qui comprennent du travail d'équipe; ainsi, la perspective d'entrer en relation avec ses camarades de classe est élevée dans ce programme.

Le dernier outil de cette étude était un questionnaire sur le type d'intelligence que les étudiants possèdent. Les réponses aux questions nous ont permis d'examiner la relation entre certains types d'intelligence et la créativité. Les résultats ont montré que les étudiants qui ont un 'quotient d'intelligence créative' et aussi ceux qui ont un 'quotient d'intelligence émotionnelle' ont pu tirer parti de cette activité et développer leurs compétences en conception; cependant, la stratégie d'enseignement ne semble pas avoir aidé les étudiants qui ont un 'quotient d'intelligence en aptitude'.

Il est souhaitable que l'information acquise par ce travail de recherche vienne enrichir les connaissances sur les activités de travail en groupe et sur la rétroaction en particulier. Les recommandations mentionnées dans cette étude peuvent aider les futurs chercheurs à planifier et à créer des stratégies plus fructueuses pour l'enseignement et l'apprentissage.

DEDICATION

To my parents; Monireh Sadjedi and Azizollah Arabzadeh.

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INTRODUCTION

The three year career program of “Publication Design and Hypermedia Technology” at John Abbott College mainly trains students in the fields of graphic design and web design. Upon completion of their studies, many students enter the work force as graphic and/or web designers. Throughout their studies, they become familiar with principles of design related to the print industry as well as web design and they master many application software related to these fields. The core courses of the program are all held in computer labs.

There are no pre-requisites; such as submission of a portfolio for admission into this design oriented program and students are accepted with the minimum requirement of a high school diploma. Generally, some students enter the program because they like art and creativity while others enter the program because they like technology and computers.

The majority of first year students are usually confused by the demands of teachers for inventiveness and uniqueness in their assignments. Most first year students seem unaware of the role of creativity and originality in this area. Many of them struggle with the factor of uniqueness that results from creative thinking in their work.

One of the challenges for teachers in our design-oriented department is how to teach design skills that lead to creating pertinent artifacts like business cards, logos, posters, and websites that are unique and relevant to today’s standards of businesses. Teachers use different techniques to help students find inspiration for their designs.

Many students enter our program with no background in art or design but graduate and find jobs in their field of study and pursue successful careers. It therefore seems important to enquire what factors help a student become a creative

design technician. This study looks into finding solutions to improve the design skills of students in web design and in particular, it will examine the impact on creativity of “small-group collaboration” followed by teacher modeling. This research tests the hypothesis that students’ web design skills will increase (or improve) as a result of this activity.

For the purposes of this study, creativity or design skills is defined as the student’s use of imagination to produce a website with novel ideas, the design of the website should show inventiveness and unexpected surprises in addition to proper use of white space, symmetry and focal points. Colors of the website should work together to reinforce the theme of the design and typography should support design.

CHAPTER ONE: STATEMENT OF PROBLEM

Up until Fall 2011, upon completion of their first year of study, about 12% of first year students in the Publication Design and Hypermedia Technology program decide to drop out or switch to another program. These students have previously made remarks that they change their program of study because they feel they lack innate talent or the necessary design skills to succeed in the field of graphic and web design. They have misconceptions about giftedness and the level of achievement needed to succeed in this field. Ericsson, K., Roring, R., & Nandagopal (2007) challenge the concept of innate talent (some people are born with natural superior ability) and propose that superior performance is usually achieved after many hours of intense practice.

What is creativity and what is creative thinking? Kristeller in his article "Creativity and Tradition" explores the root and meaning of the word "create". He explains that up until the seventeenth century words like "create" and "creativity" belonged to god (creator of humans and the universe); and it was only in the eighteenth century that professions like poetry, music and visual arts were grouped together and called "Fine Art" and people in these professions were labeled as being creative (Kristeller, 1983). Kristeller further argues that anyone who produces something unique can be called creative and not all original works of art are especially pleasant to all humans. The artists use their feelings, sentiments, and imagination to produce what is unique, novel, or original. The person who observes the art might use certain criteria to judge the excellence. In the twenty first century creativity is extended to other professions like technicians, managers, and cooks as well. The principle of coming up with a unique idea is related to creative thinking.

The question then arises as to whether creativity can be taught. Disciplines and cultures are the result of structuring patterns. Creativity is to ignore these patterns and to cut across the boundaries between these disciplines and cultures

(Byrge & Hansen, 2009). Creativity in a technology program can be defined as imagining a unique idea that can be implemented into a real world project. Creativity in our department is defined differently than how it is in a Fine Arts department. A Fine Art student does not worry about the practicality of his/her piece of art. Creating an artifact that is practical and at the same time exclusive is the ultimate goal of a student in our technology program. Design technicians create business cards, posters, catalogues, and websites that are used on a daily basis whereas an artist in the Fine Art program usually creates a drawing or statue that is pleasing to the eye and it is not used to achieve a specific task. Creative thinking for a design technician is to find a design solution for a business that matches the philosophy of the business and reflects the image of the company. In other words, originality should be practical and meaningful as well.

A visually appealing website for example is one that is clean or uncluttered and the color scheme blends with the color combination of the logo of the company. The pages of the website should have a visual theme that projects the philosophy or image of the company. The design of a web site is considered unique and original when it is out of ordinary and there is a surprise element that distinguishes it from the rest. A visually appealing poster should pleasingly combine images and words to broadcast a message to an audience. Often, posters try to influence, or encourage a viewer to do something, for example, to purchase a product.

A teaching strategy that improves the creativity skills of students can help them succeed in this profession and at the same time keep the number of students in the department at the desired level to prevent the dropouts. Over the years, our department has seen many students who have entered the program without any background or prior training in art and they have successfully graduated and found jobs related to their field of study. So, it is possible to succeed in this field (even without prior background in art or design). Thus one needs to investigate the factors that lead students to become creative and explore teaching strategies towards this end.

The teaching strategy that can help these students become creative is the key to success in this endeavor. In the educational environment, it comes down to teachers to recognize the different types of aptitude that students possess and plan teaching strategies that accommodate diverse intellects.

The success of a student in our career program is measured by receiving a job offer in the field of graphic or web design after graduation. There are many factors in addition to academic proficiency that influences the success of students in the work force. For example the skills to work in a group and being able to communicate properly are crucial aptitudes for advancement at work and in life. This research study will look at peer collaboration in a group discussion on critiquing design that involves explaining, justifying or simply talking about design as one of the teaching strategies that will help students improve their creative thinking and problem solving. Productive thinking and communication are two of the processes that will be used in this study in group-discussions exclusively. By participating in group-discussions, students need to work on their interpersonal and intrapersonal qualities that in turn will lead to improvement in these crucial qualities for work and life.

This study will examine a strategy to teach creativity to technicians in web design and it is hoped that the findings will be beneficial to teachers and students of any art-oriented program. The creative thinking skill is not only valuable at school or in the workplace but it can also be applied to every aspect of everyday life.

CHAPTER TWO: CONCEPTUAL FRAMEWORK

To help develop teaching strategies that would encourage creativity and originality, this study will draw from four distinct theoretical frameworks. These are 1) Vygotsky's theories of social interaction and constructivism as well as the Zone of Proximal Development (ZPD) (1978). 2) Modeling and cognitive apprenticeship by Collins, Brown, & Newman (1989). 3) Gardner's theory of "multiple intelligence" (MI) (1983), and 4) small-group learning by Slavin (1995).

1. SOCIAL INTERACTION

The Russian psychologist Lev Vygotsky (1978) explains that higher order activities of the child's brain, such as creativity and problem solving, increases by social communications in which an adult intervenes. Many social constructivist theories of learning are based on his ideas in which social interactions and participation are key factors to learning. Vygotsky observed that children who had close interactions with their parents or other adults developed higher intellectual abilities. He proposed that social interaction / collaboration plays an important role in the cognitive development of humans and they develop intelligence first through interpersonal factors and then based on intrapersonal circumstances. Interpersonal refers to external factors that affect learning for example parents' or cultural behaviors that are surrounding a child and intrapersonal is referred to what is happening inside a child's brain. He also came up with the term "Zone of Proximal Development" for the range of tasks and concepts that children can learn independently and those that they can learn with the help and assistance of adults or more skilled children. This study will focus greatly on teachings that are based on the theories of Vygotsky.

2. MODELING

Modeling is another theoretical construct that is incorporated in this study and it is based on the theory of “cognitive apprenticeship” by Collins, Brown, & Newman (1989). Students will observe the teacher modeling the tasks of critiquing and analyzing artwork and then they will be placed in small groups to duplicate the process by critiquing their peers’ artwork using the support and assistance of the teacher. The method of traditional apprenticeship has been around for centuries and it concentrates on executing tasks in a profession. A Trainee learns a profession by observing the master/teacher and subsequently he/she attempts to execute the process with the help and guidance of master/teacher (Lave, 1988) (as cited in Collins, A. 2006). Collins, Brown, & Newman updated the idea of apprenticeship to make it relevant to real-world subjects that involve critical thinking in complex tasks. They added the word “cognitive” to the “apprenticeship” to emphasize that the knowledge that apprentice is acquiring should be related to solving real-world problems rather than physical tasks.

3. MULTIPLE INTELLIGENCE

The study is also based on Howard Gardner’s (1983) theory of Multiple Intelligence that enables the instructor to place students in groups based on their diverse intelligences so that each member brings a new perspective to a critiquing and analyzing session. The topic of “Multiple Intelligence” and its implications on success has been around for many years and Gardner is one of the pioneers in this field. He introduced the theory of “Multiple Intelligence” for the first time in his book *“Frames of Mind”* and proposes a model of seven intelligence types that people possess.

These intelligences are as follows: Linguistic (words and language), Logical-Mathematical (numbers), Musical (sound, rhythm), Bodily Kinesthetic (control of the

body movement), Spatial-visual (images), Interpersonal (being aware of the feelings of other people, interaction with others), and Intrapersonal (self-awareness, self-reflective capacity) (Gardner, 1983). Gardner's theory put forward another dimension in measuring intelligence beyond Binet and Simon's theory of "Intelligent Quotient" in which the researchers looked at intelligence only from the academic point of view. The researchers believed the potential and success of a child in life depended on his or her intelligent quotient (Binet, A. & Simon, Th., 1915) (as cited in Ericsson, K. A., Roring, R. W., & Nandagopal, K. 2007).

Gardner questions the concept of traditional intelligence that suggests that Intelligent Quotient (IQ) or academic achievement is the only measure of cleverness in humans. He explains that human beings have a wide variety of abilities and children can accelerate at school and later in life, using these wide ranges of intelligences (Gardner, 1983). He recommends that teachers evaluate their students' intelligences to be able to create teaching strategies to take advantage of those intelligences.

In continuation of Gardner's study, Peter Salovey and John Mayer (1990) introduced the term "Emotional Intelligence" and they explained that people who can express and use their emotions accurately can relate to other people's emotions as well and they can also motivate people around them so that problems are solved and decisions are made without conflict and they can create happy and successful lives for themselves and others (Salovey, P. & Mayer, J. 1990) (as cited in Aguilar, J., Bedau, D., & Anthony, C. 2009). The researchers labeled qualities that are not measured by conventional intellect as Emotional Intelligence (EI). The theory of Salovey and Mayer can be considered as an extension to Gardner's theory of "Multiple Intelligence" as two types of intelligences that Gardner proposes in his Multiple Intelligence theory are interpersonal and intrapersonal qualities.

Taylor (1986) (as cited in Zhao & Zhao, 2010) also established a model for talent and introduced talent skills and processes such as “Productive Thinking”, “Communication”, “Planning”, “Decision Making”, and “Forecasting”. Taylor suggests that teachers should be encouraged to integrate teaching strategies that promote the above-mentioned processes in their daily activities and do not merely concentrate on academic factors that support IQ. Taylor’s model for talent can also be considered as an extension to the Salovey, Mayer, and Gardner theories.

According to Taylor, the term “Productive Thinking” is referred to as thinking of varied ideas (ideas that are not ordinary) as a means of collecting and generating new and unique thoughts. He also refers to the term “Communication” in the context of encouraging students to use varied words to express their thoughts and feelings to let partners or group members know that they understand each other; Taylor suggests that conversation among students will possibly lead to generating new ideas. He also explains the term “Planning” as requiring students to plan a project in which they have to know what they need, where to start and what can be an obstacle for advancing. Taylor further describes the term “Decision Making” as choosing the best option among the possible solutions and suggests students should be encouraged to make decisions and give reasons for their choices; he also defines the term “Forecasting” as requiring students to predict a situation that has not yet happened and to verify the pros and cons of the situation. Guided group discussions among students, that will be used in this study, can incorporate the “Productive Thinking” / “Communication” aspects that were introduced by Taylor (1986) (as cited in Zhao & Zhao, 2010).

High performance of experts is at times related to the knowledge and skills of their teachers who know how to teach their subject matter and it is not primarily related to innate talent (Ericsson, Krampe, & Tesch-Romer, 1993). Ericsson et al. investigated some of the experts of our world and looked into how they have reached the highest levels of expertise. They concluded in their study that people reach the

expert level in their profession by practicing deliberately (intensely and with full concentration) for many years. They also explain that people should receive immediate and informative feedback while practicing so that they can make adjustments to their techniques and that errors should be corrected instantly in order to lead to improvement in performance (Ericsson et al.). The researchers' theory suggests that students can become experts in a task with persistent practice and that innate talent (born with a quality) does not replace deliberate practicing. Going back to the policy of our department in regard to admitting students with no portfolio, it can be concluded that it is possible to train a student with no background in art to become a good technician in a design-related field.

4. COLLABORATION AND SMALL GROUP LEARNING

This study will also take advantage of the theory of “collaborative small-group work” that is based on the constructivist paradigm. Students work in small groups to achieve a task. Well-known research by Slavin (1995) has documented a move in education toward student-led small-group learning. However, collaborative learning is more than asking students to work together in groups. Slavin proposed a cognitive perspective as one of the major theoretical perspectives on collaborative learning and achievements. He suggests that interactions among students will increase student achievement because it has to do with the process of thinking. Thus, his ideas can be regarded as emphasizing collaborative learning within a constructivist environment.

The theories developed by Vygotsky (1978) in regard to social interaction and its positive effect on learning, Collins, Brown, & Newman's (1989) theory of “cognitive apprenticeship” related to teacher modeling, Gardner's (1983) theory of Multiple Intelligence pertaining to using diverse intelligences of humans to generate ideas, and Slavin's (1995) theory of small group collaboration and its effects in

problem solving will be integrated into the teaching strategy of this study to help students improve their creativity skills in web design.

CHAPTER THREE: LITEATURE REVIEW

Several articles related to the topic and to the themes discussed in the previous chapter were examined. These are studies that have used various teaching strategies to encourage students to be creative. Most of these articles dealt with research conducted at the university level but can be applied to the Publication Design and Hypermedia Technology program at the CEGEP level as well. Several themes that relate to these teaching strategies emerge from this review and these are now to be examined. These are the themes of Group Discussions, Critique as an effective means of feedback, and Multiple Intelligence.

1 GROUP DISCUSSIONS

1.1 Benefits of Group or Cooperative Learning

Many studies have shown that group work is helpful in finding innovative solutions to problems (Barak, 2009; Hungwei, Heng-Yu, Chien-Hsin, & Ling, 2009; Bryant, 2010; Slavin, 1995; Shimazoe & Aldrich, 2010; Payne, B.K., Monk-Turner, E., Smith, D., & Sumter, M., 2006; Johnson, D. W., & Johnson, R. T., 1999). Group work can be achieved through different media for example face-to-face interaction, online collaboration, conference calls, or even through social networking societies like Facebook or Twitter. In an article by Moshe Barak he extended group work even further into “idea focusing” or “convergent thinking” and “idea generating” or “brainstorming” (Barak, 2009). Convergent thinking means thinking that brings together information focused on solving a specific problem and divergent thinking means thinking that moves away in different directions while generating a database of ideas (Guilford, J. P., 1963) (as cited in Barak). Barak conducted a study based on ideas from TRIZ (a Russian acronym for the Theory of Inventive Problem-solving) in which researchers acknowledged a range of values that describe the process of inventive solutions for engineering problems. Barak’s study intended to assess the

process of learning a systematic inventive problem-solving approach; the participants were thirteen teachers studying towards their masters or doctoral degrees in mathematics, science, or technology. The diversity of participants' backgrounds helped the course to cope with solving problems in numerous fields and contexts. The study focused on gathering information on students' activities in the course and examining the processes they went through in learning and applying the systematic inventive problem solving approach. Barak concluded from his research that in order to come up with inventive problem-solving ideas, we have to give time to students to connect in thinking errands, using unforeseen thinking opportunities and asking students to justify and explain their ideas.

Barak used the systematic inventive problem-solving approach in his study. Mathematics, science, or technology teachers in his study were presented with a problem and they learned that an innovative solution to a problem is often based on factors or elements that exist naturally in a system. The problem presented to the students was that at the entrance to a small town, cars hit several elderly and young children since drivers weren't slowing down to turn off the main road. Students were asked to suggest a method to make the drivers slow down. Students first made a list of components in the system and its nearby environment, traffic signs, traffic lights, and road-bumpers. The next step was to systematically add, duplicate or remove components from the system to see the effect of additions and subtractions. At the end of this experiment students came up with an innovative solution to the problem; they suggested placing a life-sized doll of a mother and her child next to the road. On the same topic but with a twist, Cropley (2001) (as cited in Barak, 2009) argues that divergent thinking (brainstorming) should be accompanied by convergent thinking (idea focusing) in order to result in creative thinking.

Slavin (1995), whose ideas were examined in the previous chapter, explains the effects of cooperative learning as motivational perspectives, social cohesion perspectives, empirical support for the social cohesion perspective, and cognitive

perspectives. His findings on cooperative learning show that peers motivate each other through feedback and discussion, they pull together the information and verify criticism, collaboration among peers can provide a center for discovery and can encourage creative thinking, the interaction can also introduce idea generation to students. His theories underlie the Vygotsky (1978) Zone of Proximal Development in which students with higher thinking capabilities can model their way of thinking for other students.

Slavin (1995), whose ideas were examined in the previous chapter, demonstrates a model for the relationship of the perspectives in cooperative learning as diagrammed below.

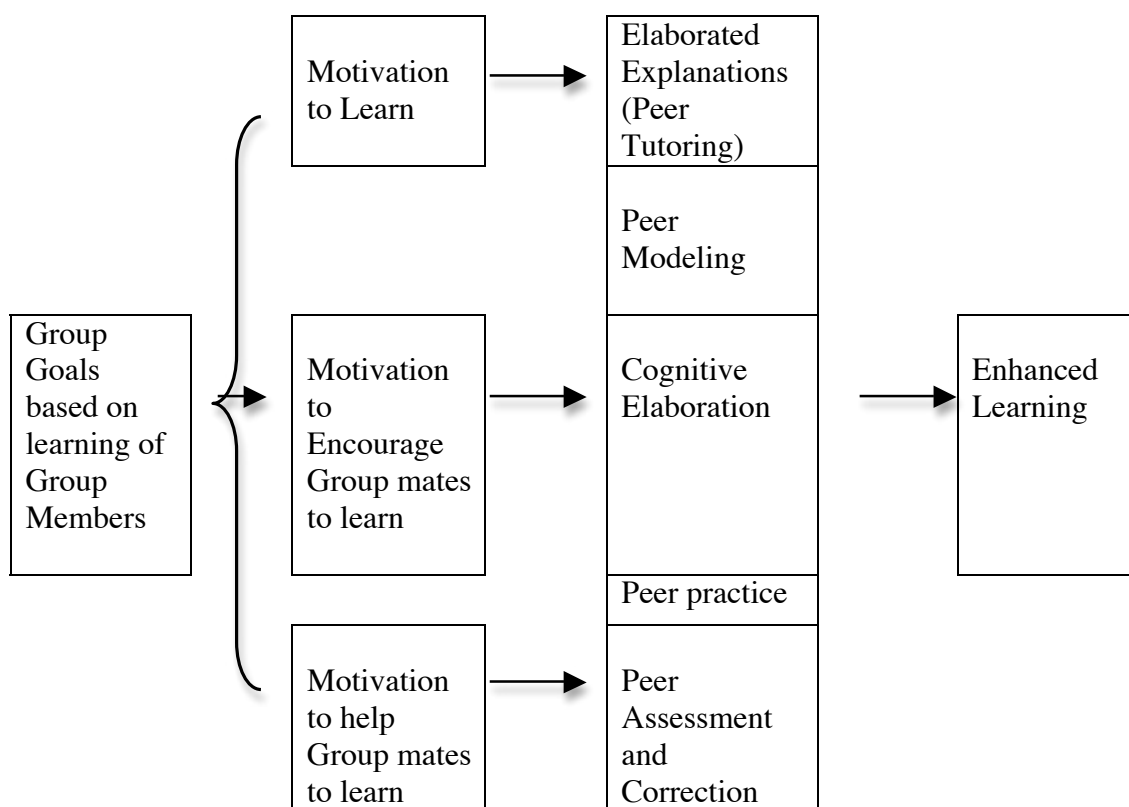


Figure 1: Slavin's Model for the Relationship of the Perspectives in Cooperative Learning

Shimazoe & Aldrich (2010) acknowledged six benefits of cooperative learning for students in their article. These benefits are 1) Encourages deep learning, 2) Helps earn higher grades, 3) Teaches social skills & values that we learn to respect as citizens, 4) Teaches higher order thinking skills, 5) Encourages personal growth, and 6) Builds positive attitudes toward independent learning.

Payne et al. (2006) also examine group work in their article and conclude that benefits of group work are not only for students but for future employers of students as well. The researchers used surveys to ask 145 students who had just finished group work about their experience on this type of activity. The survey included both open-ended questions and close-ended questions; the results of the survey were content analyzed and showed that participants value communication, teamwork, and goal development as factors that contribute to successful group work. Students learn teamwork skills; they improve their critical thinking skills, and gain more insight about a particular topic. The researchers acknowledge that teamwork at school will connect the academic factors with the needs of the business sector.

Researchers Johnson and Johnson (1999) as well put forth many potential benefits to cooperative learning. These benefits include increased self-esteem, greater love for education, improved understanding of other cultures, and improved critical thinking.

1.2 Collaboration

Hungwei et al. (2009) conducted a study in which graduate students of education and nursing at a Midwestern University in the United States were grouped to work on a project using online collaboration technique. The researchers examined the level of association between teamwork contentment and collaboration for creativity and productivity among 46 graduate students in an online course. The factors influencing group work included support from the teacher, friend, and

teammates, clear interaction, faith among teammates, and team's organization practices. The data were gathered using an online survey in which "Trust among teammates" and "Organization practices" were mentioned as effective elements in the group collaboration. The researchers also validated Gardner's theory of "Multiple Intelligence" by stating that encouraging interpersonal interactions in students will help them succeed in today's networked world.

Brandon and Hollingshead (1999) (as cited in Hungwei et al., 2009) defined collaborative group learning as "an activity that is undertaken by partners who work jointly on the same problem rather than on different components of the problem" (p. 111). The aim of collaborative learning is not only to produce successful products but also to make sure that group members are actively participating in the process of creative thinking (Hungwei et al.). It was hypothesized that active participation and collaboration among peers that is the major component of this research paper, has a positive impact on students' communication and developmental skills that in return result in creation of more unique artifacts.

1.3 Peer Conversation

Hungwei et al. (2009) argue in their article that in order to engage students in meaningful collaborative learning activities, teachers should encourage intrapersonal interactions among students in order to facilitate communication. Kitchen and McDougall (1998) (as cited in Hungwei et al.) support the idea that students enjoy working in groups because in order to be an effective member of a group they have to interact with team members constructively and at the same time use and improve their intrapersonal skills.

In the same line of thought, Bryant (2010) suggests "Peer Conversation" as one of the effective creative problem-solving strategies that improves many skills in young adults. Damon and Phelps (1989, p. 135) (as cited in Bryant) agree that peer

interaction is partly responsible for a variety of important early accomplishments of children. For example; “children’s understanding of fairness, their self-esteem, their tendency toward sharing and kindness, their acquisition of role-taking and communication skills, and their development of creative and critical thinking.” (Damon and Phelps).

Payne et al. (2006) also elaborate in their article about peer conversation and the impact it has on students learning. Through conversation they learn about the background of each other and learn about multicultural issues. The researchers surveyed 145 students who had just completed a group project and asked about their experience and how would they change group projects. Results of the survey showed students realize that communication is vital for improving group work.

1.4 Brainstorming

Bryant’s qualitative controlled case study (2010) was initiated because she noticed that her students’ excellent technical or computer-based knowledge was not helping them produce exciting and stimulating works of art. She was teaching the art of movie making with the same old method of teaching that she had been taught many years ago. She was handing out step-by-step instructions that included a picture of the finished project, repeating the instructions verbally and demonstrating the procedure using a computer and projector.

She decided to use the movie making high school course named Introduction to Animation that she was teaching, to investigate whether students could gain necessary technical expertise while producing creative pieces of art using problem-solving strategies. The course was an elective in the Computer Animation pathway in the high school Bryant was teaching and the main goal of the unit of instruction was to teach students how to create a stop-motion film that used computer programs of Photobooth, iPhoto, and iMovie using the Macintosh operating system. She studied

her class of 21 students by reviewing their sketchbooks and evaluating their personalities, availability, gender, and willingness to participate and then she chose a small sample of three students for her study.

Creative problem-solving strategies proposed by Bryant (2010) included a) open-ended instructional problems; for example, create a movie from a changing moment in your life, b) incorporating brainstorming among students during class activities, c) storyboarding; to graphically present their ideas, d) peer conversations, e) utilizing symbolism or metaphor; using symbols –like the color black for a hurtful stage of life- to show their feelings and concepts, and f) critiquing; students will criticize each others work. Brainstorming was proposed by Bryant as one of the effective problem-solving strategies that art teachers can use in their classroom when students are working on projects that involve the use of technology and in particular Internet. Brainstorming can be used as a tool for generating ideas that can help students come up with creative solutions for their projects in addition to better understanding the overall principles of the unit of study (Bryant).

Group collaboration that involves informal discussions among students and their peers often leads to discoveries and insights for students. Group collaboration and interaction among adolescents can be informative and at the same time encourage and boost creativity (Moran and John-Steiner, 2003) (as cited in Bryant, 2010). Results of Bryant’s study showed an increase in motivation and engagement of students in the activity that in return improved their creativity and problem solving skills.

2. CRITIQUE AS AN EFFECTIVE MEANS OF FEEDBACK

Several researchers (Hungwei et al., 2009; Bryant, 2010; Feldman, 1973; Neumann, 1989) have identified quality feedback and critique as factors that improve students’ problem solving and creative thinking skills.

Hungwei et al. (2009) in their study that was conducted in an online course at a Midwestern university in the United States examine key factors in online collaboration and their relationship to teamwork satisfaction. They used a convenience sample of 46 graduate students from education and nursing programs for their study, they implemented an online survey to collect data and the results showed that “Trust among teammates” and “organization practices” were effective reasons for online collaboration satisfaction. Researchers also stress the importance of quality feedback in an online environment and identify it as a significant factor in online learning activities of students.

Bryant’s qualitative controlled case study was conducted in a high school movie-making course and the objective of the study was to examine whether students will acquire the required computer technology expertise while expressing originality in their assignments. A small sample of three students was chosen from a group of 21 based on their personalities, gender, availability, and willingness to participate. Students were given an open-ended assignment to create a movie of a period of their life that has transformed their personality. Bryant proposes “Critique” as one of the positive factors in creative problem solving in her article. Bryant asked students to discuss the results of their work with each other and she provided feedback to them. Students were also asked to think together about the overall meaning of an artifact and try to come up with ideas for improvement. Teamwork and peer assistance were extra bonuses that Bryant observed in students’ motivation and engagement due to her creative problem-solving strategy. Finken (2005) (as cited in Bryant, 2010) also agrees with the concept of feedback and critique. He emphasizes peer advice when he expresses that learners profit from discussing the work with their classmates during the class. He further explains that the overall perspective of other students can be important and when several students give the same feedback, the student receiving the criticism is more prone to agreeing with it. In the same line of thought, Shallcross (1981) (as cited in Bryant) encourages teachers to be honest and supportive when critiquing students’ work so that students learn how to effectively analyze art.

Feldman (1973) explains in his article that the art of critiquing is basically talking about art in an informed and organized way. Conversation about art can be identified as sharing discoveries about an artifact. Feldman elaborates that technical expertise and observation are key factors that make people capable of talking about an artifact. Feldman believes that people should not necessarily be artists in order to be able to talk about art; technical expertise in art is an asset and the ability to look at art purposefully is also an important quality. The author further explains in his article that criticism is not all about judgment of an artifact, the process of describing, identifying, analyzing, and interpreting a piece of art are all valuable educational achievements for people who participate in this activity. Feldman further talks about critiquing as a tool that students and teachers can use to share their discoveries and they learn how to cope with disagreement as well as how to handle conflict. Feldman suggests that in order to encourage students to develop a critical mind, teachers should ask questions to start the conversation. Feldman believes one of the most important qualities that any teacher can bring into the task of critiquing is their humanity for mankind so that they can relate to other humans and share their experiences with them.

Neumann (1989) explains that a critique is merely a kind of conversation in which a teacher or an individual discusses the artwork and one of its purposes is to guide the listener to think rather than show how to think. Neumann believes that the critique is not meant to point out the errors and tell the student how to do the job rather it is supposed to make the student the master of the domain so that s/he finds the solution for his/her design. Neumann and Feldman both believe the Socratic dialogue is one of the most effective ways of encouraging students into participating in critiquing. The Socratic critique is a style of teaching in which the teacher interrogates students in order to involve them into thinking. Neumann identifies “creativity” as one of the most important goals of critiquing. He further elaborates that creativity is finding novel solutions for problems that are either practical or artistic.

3. MULTIPLE INTELLIGENCE (MI)

Studies have demonstrated that incorporating teaching and learning activities that take into consideration the many aspects of students' intelligences (as it was proposed by Gardner) can positively influence the creative thinking and problem solving skills (Zhao & Zhao, 2010; Hungwei et al., 2009; Bryant, 2010). Zhao & Zhao (2010) conducted a controlled experiment in a Web design and development course in which they took a randomly selected sample of two sections of 59 students at the university level. In the experimental group, the instructor presented the first project of the semester to the students, arranged and allotted time for discussions in class. The Instructor also gave demonstrations and invited a guest speaker to the class. In the control group, the instructor followed the traditional practice in education that concentrated on the IQ (Intelligence Quotient) of the students and did not use EQ (Emotional Quotient) or CQ (Creativity Quotient) in his teaching. Course materials were covered, assignments were handed in and students were assigned to read chapters from the book, no other activity was organized for students. At the end of the course, the researchers using one-way ANOVA, observed statistically significant positive results related to time efficiency (the time that is spent in producing a web site) and fewer programming errors (the web site application processed with less errors) in the work of students in the experimental group.

Zhao & Zhao argue in their article that in today's global communication and increasing opportunities for offshore outsourcing (moving manufacturing plants to overseas) technology students should be prepared to adapt to multicultural environments by using skills that are related to interpersonal and intrapersonal intelligences as it is labeled by Gardner (1983). Further, the researchers discuss that finding IT jobs, in 21st century is not only about knowledge of math and sciences, it is about creativity and imagination and above all integrating (IQ), (EQ), and (CQ). IQ domain consists of skills and competencies in reading, understanding, and reasoning (academic), the EQ realm consists of empathy, communication skills, and teamwork,

and the CQ sphere consists of brainstorming, innovativeness, and creative problem solving. “Integration methods include discussions, demonstrations, guest presentations, goal-setting, and hands-on action planning” (Zhao & Zhao, 2010, p. 44).

4. SUMMARY

Several articles related to this study were examined and a number of themes emerged from this investigation. Group discussion, that is the major component of this study, has been identified as one of the factors that improves idea generation that will result in creativity and novel ideas (Hungwei, Heng-Yu, Chien-Hsin, & Ling; Barak, 2009; Bryant, 2010; Slavin, 1995; Shimazoe & Aldrich, 2010; Payne, B.K., Monk-Turner, E., Smith, D., & Sumter, M., 2006; Johnson, D. W., & Johnson, R. T., 1999). Critiquing along with feedback, the task of students during the group work sessions in these studies have been identified as key elements that improve critical thinking (Hungwei et al., 2009; Bryant, 2010; Finken, 2005; Feldman, 1973; Neumann, 1989). Findings of several articles related to Multiple Intelligence conclude that group works in which students with diverse intelligences work together will result in innovative ideas (Zhao & Zhao, 2010; Hungwei et al., 2009; Bryant, 2010).

5. RESEARCH QUESTIONS

Research Question 1: Given the literature review and the theoretical framework, this study will investigate whether guided, small-group discussions that involve critiquing and analyzing a web design that follows a modeling session from the teacher, help students develop design skills that will lead to creating unique websites that are relevant to the needs of today’s businesses.

Research Question 2: Are there certain student characteristics that can be associated with creativity that are required from a design technician?

a. Is there an association between students' willingness to participate in teamwork and their creativity in designing artifacts? The willingness of student to participate in teamwork will be measured by the questionnaire that they will fill out at the beginning of the course. See Appendix A.

b. Is there an association between certain types of "intelligence" and creativity? The diverse intelligences of students will be identified by the Multiple Intelligence questionnaire that they will fill out at the beginning of the course. See Appendix B.

CHAPTER FOUR: METHODOLOGY

1.1 Research Design

This study used a Quasi-experimental research method. The quasi experiment focused on a strategy (experimental treatment) to see if it could improve Web design skills of students. It was intended for a 3-credit web design course that was offered to third year students of the “Publication Design and Hypermedia” program at John Abbott College. The sample was a convenience sample of 37 students. In this course, students learn how to design corporate websites and how to use their XHTML¹ (Extensible Hypertext Markup Language) and CSS² (Cascading Style Sheets) knowledge to code the site so that it can be viewed over the Internet.

The course was offered twice a week, it consisted of two sections that were scheduled on the same days but at different times, and each section had approximately 20 students. The four assignments/projects of the course were identical for both sections and they consisted of designing and coding four corporate websites with distinct styles of “e-newsletter / e-blast”, “box / module”, “e-commerce”, and “blog”. In the blog style assignment, students were required to use a CMS³ (Content Management Systems) like Wordpress⁴ or Joomla⁵.

In the first assignment of the course, the “e-newsletter / e-blast” style, both sections received the traditional teaching method that was teacher-centered; the teacher presented the assignment to the class, demonstrated and discussed samples of the well-designed as well as poorly designed e-newsletters. Students worked on this assignment individually; they designed the mockup and then they started coding the site. Assignments were submitted by the due date and in the following weeks; the

¹ A programming language used to create web pages.

² A style sheet language used for describing the look of a XHTML document.

³ A central page on the Internet that allows adding, editing, and modifying content of a web site.

⁴ Free software designed to help users with creating and modifying websites and in particular blogs.

⁵ Free software designed to help users with creating and modifying websites.

teacher marked the assignments and personally discussed the problems and accomplishments of each student in regard to design and coding of the project with him/her.

In the second project of the course, the “box / module” style, students in both sections received the treatment of this study that started by observing the teacher critiquing well-designed and poorly designed websites of the box style based on the criteria that was presented in the rubric for grading the design part of the project (Appendix C). Subsequently, students created the mockups and then they were arranged in small-groups to discuss and critically examine their classmates’ artwork (website). The students had between 30 to 40 minutes to discuss and critique each other’s design. This study investigated whether the grades of students for their creativity improved in the project that they received the experimental treatment in comparison to the project where they did not receive the technique.

The teaching strategy described above was based on the Collins, Brown, & Newman (1989) theory of “Cognitive Apprenticeship”, Slavin’s (1995) theory of small-group collaboration, Gardner’s (1983) theory of “Multiple Intelligences”, and Vygotsky’s (1978) zone of proximal development theory and cultural mediation. Relying on Vygotsky theory, the teacher supervised and helped groups that needed assistance so that misconceptions were resolved and immediate feedback was provided to the best of her ability in the limited time frame of the activity. It was also anticipated that the diverse intellects of group members would help them generate more unique ideas to flourish their creativity.

At this point, the question might arise in regard to the definition of design skills or creativity for a graphic and web design technician or the criteria for evaluating the design aspect of the assignments or why a design is regarded as superior, average or poor. To answer these questions, it should be noted that the majority of the teachers in our department have identified certain factors that are

presented in detail in Appendix C as the elements of judgment for an artwork. These components have been classified as a) Uniqueness / originality, b) composition, c) Color, and d) Typography.

1.1.1 *The Experimental Treatment*

The detailed step-by-step treatment of this study was as follows:

Step 1: The teacher/researcher modeled how to critique and analyze an artifact (website) by pointing to the good elements and the bad elements of various existing on-line websites that were designed using the box style. The teacher identified if there was a surprise element in the design that was contributing to the uniqueness or originality of the artifact that in return differentiated the creator from the rest. The teacher pointed out whether text and graphics were placed attractively in the website and elaborated on the focal point(s) of the design. The teacher analyzed the color scheme and whether the choice of colors blended with the overall design as well as the type sizes that should have contributed to the readability. In summary, the artifact should have been exclusive and at the same time relevant to the intended business. To be creative requires generating many ideas and then choosing the best one for the project at hand.

Step 2: Students created the mockup of their web design project individually.

Step 3: Students were divided by the teacher into small groups of two to three based on their individual characteristics that were recognized through a questionnaire that they filled out at the beginning of the course (Appendix B).

Step 4: The members of each group circled around workstations in the computer lab and using the mockups that were in digital form, they started discussing and critiquing the design element of each other's web design project during 30 to 40 minutes of class time. They used the guidelines of the teacher in regard to

uniqueness/originality, composition, color, and typography for the critique session. Group members collaborated to find solutions for the design problems of the team members. The teacher supervised this activity to support groups that needed help or redirected the discussions that were off topic.

Step 5: Students reworked the design of their projects based on the feedbacks that they had received from their peers as well as the teacher.

In summary, all of the students in sections 1 and 2 of the web design course received the traditional teaching method that was teacher centered during assignment 1 (e-newsletter/e-blast style) and the same students received the treatment of this study during assignment 2 (box/module style) and this research investigated whether the treatment of teacher modeling and small-group collaboration improved the design skills of students in web design in comparison to the traditional teaching technique. The implementation of the treatment is presented in Table 1.

Table 1
The Implementation of the Treatment into Course Assignments

	Section 1	Section 2
Assignment 1; e-newsletter/e-blast “No Treatment”	Traditional Teaching Method (Teacher Centered)	Traditional Teaching Method (Teacher Centered)
<i>The design grades of students in assignment 1 (No-Treatment) were populated.</i>		
Assignment 2; box/module “Treatment”	Modeling Method + Small group collaboration (Peer Discussion and Critique Method)	Modeling Method + Small group collaboration (Peer Discussion and Critique Method)
<i>The design grades of students in assignment 2 (Treatment) were populated and compared with assignment 1.</i>		

As presented in Table 1, students in both sections of the course received traditional teaching method during the e-newsletter assignment and students in both sections of the course received the same teaching tool of this study during the box/module assignment. The design grades of students during these two assignments were compared with each other.

1.2 Sample

Participants in this experiment were third year students enrolled in a 60-hour web design course in a three-year Publication Design & Hypermedia Technology program at a suburban medium-sized Cégep. This was a convenience sample of 37 students. The treatment condition (independent variable) was the incorporation of small groups peer critiquing activities that was followed by teacher modeling. The dependent variable was creativity or design skills that students demonstrated in the design of their web projects. Students in the two sections of the course received the treatment of this study on the same project so no one section was disadvantaged by this research.

1.3 Instruments

1.3.1 Web Design Project/Assignment

One of the instruments of this study was the project or assignment. As part of the assessments of this course, students had to (re) design four websites for four different corporations using distinctive styles of “e-newsletter” (Appendix D), “box/module” (Appendix E), “e-commerce”, and “blog”. A short description of each style is presented below.

- E-newsletter website: An electronic newsletter is an html document that is published on-line and it is distributed through e-mail to a list of subscribers. The purpose of an electronic newsletter is to communicate with clients to

enhance their relationship with the company, encourage royalty, introduce new service, and repeat business.

- **Box/module website:** In this style, the designer places the content into various containers. This style will help breakdown the content and make it easy to follow or find information on a wide range of topics. Boxes/Modules can be simple with no images or they can have images. Modules give order and hierarchy to the content. This style is great when there is mountain of content. By placing the content into modules and labeling them, users can easily find the information they are looking for.
- **E-commerce website:** A website that showcases the product of a company and visitors to the website can purchase the products online.
- **Blog website:** A blog web site is where you write on an ongoing basis. Each entry is called a post and it is stored in a database. New content shows up at the top of the page so visitors to the website can read what's new. Visitors can also comment on posts. Content Management Systems (Wordpress or Joomla) are tools for designing, editing, and maintaining a website online.

In these projects, students showcase their web design skills as well as their technical skills in coding of the sites. This study used two of these projects to compare the creativity of the students based on the implementation of the treatment of the study or lack of it.

1.3.2 *Questionnaire on Willingness to Work in Teams.*

This questionnaire was distributed to the students at the beginning of the course to evaluate their eagerness toward teamwork. It was anticipated that students who are keen in teamwork might take more advantage of this teaching strategy in comparison to their counterparts. This questionnaire helped the teacher/researcher evaluate the validity of the result of the study or in other words, assessing whether the results of the study were influenced by the teamwork spirit factor. The responses to

this questionnaire helped answer part of the second research question. Appendix A presents the list of questions that were used in the questionnaire.

1.3.3 Questionnaire on the Type of Intelligences that Students Possess.

This questionnaire was distributed to the students at the beginning of the course to evaluate their diverse intelligences. The responses to this questionnaire enabled the researcher to answer the second part of the second research question. Furthermore, the questionnaire provided information for designing the experiment. This questionnaire helped the teacher/researcher to organize the groups so that members of each group do not possess the same type of intelligence characteristics. We speculated that people with diverse intellects would contribute more to the generation of ideas in a group activity and as a result the group members would benefit from more diverse ideas for the design of their websites (artifacts). Appendix B presents the list of questions in this questionnaire.

1.4 Data analysis

1.4.1 Grades Distribution

Students received mark for the design aspect of their projects as well as the technical part of the assignment that involved coding. For the purposes of this study, the grade that they received for the design part of the project was recorded and an ordinal scale was used to measure it.

Table 2
Categories of Design Grades

Grades	Value given
Grade of 80 and higher - High design skills -	“1”
Grade of 60-79 - Moderate design skills -	“2”
Grade of 59 and lower - Poor design skills -	“3”

Table 2 shows the three different categories of the design grades. These categories were based on the expectations of the majority of the teachers in our department from our students. A grade of 80 and higher represented high design skills and it was denoted by “1”, a grade of 60 - 79 represented average design skills and it was denoted by “2” and a grade of 59 and lower represented poor design skills and it was denoted by “3”.

1.4.2 *Willingness to Work in Teams*

A Likert scale was used for tabulating the responses to the questionnaire on willingness to work in teams to measure the willingness of students in group-work and an ordinal scale was used for analysis.

Table 3
Willingness to Work in Teams

Team-work willingness	Value given
Extremely willing to work in teams	“1”
Moderately willing to work in teams	“2”
Do not like to work in teams	“3”

Table 3 shows the three levels of teamwork spirit used for the study, a) students who were extremely willing to work in teams denoted by value of “1”, b)

students who were moderately willing to work in teams denoted by value of “2”, and c) students who were not interested in teamwork denoted by value of “3”.

Subsequently, the design grade of each student in each of the two assignments was tabulated in a table in addition to their group-work aptitude results and a cross tab analysis was conducted to see whether the willingness to work in team was a factor for improvement in design skills. Appendix F presents data related to the questionnaire on willingness to participate in teamwork that was populated from students’ responses.

1.5 Graphical Display of Data

Bar charts were used to compare the creativity grades of students in the two projects with two different teaching strategies.

1.6 Ethical Considerations

1.6.1 Issues Relating to the Quasi-Experiment

The quasi-experimental study was used in this study to evaluate whether the “treatment” will improve the design skills of students. All of the students who had registered in the 60-hour web design course participated in this study and there was no random selection of participants. The two sections of the course received the treatment (the teaching strategy) during one of their projects. In order not to disturb the flow of the class the opportunity to participate in this activity was given to the entire class.

1.6.2 *Issues Relating to Anonymity and Informed Consent*

Approval of this research study was received in the summer 2011 from the Innovation, Research and Development Committee (IRDC) at John Abbott College. The application included a summary of the research procedure and it was signed and approved by Gary Johnson, chair of IRDC and Dean of Science & Social Science Programs (Appendix G). The application also included copies of all instruments and the consent form.

In order to ensure the anonymity of students, there was no mention of the student number or name in the documents that was created for this study. All data related to the student who dropped the course and withdrew from the program was erased or destroyed.

The participation of students was entirely voluntary and they could choose to withdraw at any time. Participation or lack of participation of student in this research did not affect their grades in any way.

No person at John Abbott College or any other organization had access to the materials collected and they were coded and stored in a way to make it impossible to identify them directly with any individual. All names were changed in the stored data and resulting publications. Data was stored on a password secured hard drive and will be destroyed after five years. All other types of information (paper copies, cd's) were stored in a locked filing cabinet and will be erased and/or destroyed after five years.

Students filled out a consent form at the beginning of the course giving their consent to participate in the study (Appendix H).

CHAPTER FIVE: PRESENTATION AND INTERPRETATION OF FINDINGS

1. FEATURES OF THE SAMPLE

The convenience sample was comprised of 37 students in a course taught by the researcher. These students were in their third year (fifth semester) of the Publication Design and Hypermedia Technology program at John Abbott College enrolled in two sections of the “Web Design IV (Corporate)” course. At the start of the course there were 40 students. Early in the semester one student dropped out of the program and 37 of the remaining 39 students submitted the first two assignments of the course in which the quasi experiment was being examined.

1.1 Demographics

Table 4
Demographic Information on Students in the Sample

Number of students	37
Year	3
Semester	5
Average Age	20
Age Range	21 or under = 32 22 -29 = 3 30 + = 2
Gender	Female = 20 Male = 17
Special Need Students	1
Mother Tongue	English = 29 Other = 8

Table 4 shows the breakdown of the students who participated in this research study. The proportion of male to female students is almost equal. The majority of

students were under 21 years old and they had entered College immediately after completing high school. From the two adult students (Age = 30+), one possessed a bachelor degree. The special needs student (Age = 22 - 29) had a tutor present during the class for note taking. The mother tongue of the majority of students (n = 29) was English. Students with a mother tongue other than English (n = 8) had studied French at high school and English was their third language. These students were capable of communicating in English however they were reserved in participating in the discussions.

2. ANALYSIS OF DATA IN RELATION TO RESEARCH QUESTIONS

2.1 Research Question 1

Do teaching strategies such as guided, small-group discussions that require critiquing and analyzing web design following a modeling session from the teacher, help students develop design skills that will lead to creating exclusive artifacts (websites) that are pertinent to the requirements of today's business world?

Findings in this section represent the results of analysis of the creativity grade that the third year students in my course received in two of their web design assignments. In the first assignment, students were asked to design an e-newsletter (e-blast) for a fictional corporation (Appendix D). An E-newsletter (e-blast) is the digital form of a newsletter and during this assignment, students received the traditional teaching method in which the teacher presented the project to the class, exhibited several samples of good and bad design and described the reasons for weaknesses of the design as well as the reasons for originality and uniqueness in the design of the sample websites.

In the second assignment of the course, students were given the task of designing a web site for a fictional company using the style of Box or Module and

also incorporating a three-dimensional object in their designs (Appendix E). In the Module style, the designer places the content of the site into various containers or boxes. This style will help breakdown the content and make it easy to follow or find information on a wide range of topics. This style is widely used when there is a great amount of content. By placing the content into modules/boxes and labeling them, users can easily find the information that they are looking for. Three-dimensional objects showcase illusion of depth. As the majority of the websites incline to look flat, adding a 3-D object in the design will enhance the overall look of the site. For this project, the teacher presented and discussed sample websites that were designed using the Box or Module style as well as websites that had incorporated 3-D objects in their layouts.

Following the initial presentation and discussion, students were given 30 - 40 minutes to create the mockup for their assignment and then they were placed into small groups to criticize and give comments to each other's design based on their teacher's modeling session. After receiving comments from classmates, students were given time to modify and finalize their designs. Members of each group were carefully selected by the teacher on the basis of their individual attributes that were identified by the Multiple Intelligence questionnaire that they had filled out at the beginning of the course (Appendix B). The effort was made to create groups that consisted of students with diverse intelligence qualities. It is expected that people with diverse intellects can contribute more to the generation of ideas.

2.1.1 *Analysis of the Design Portion of the Grade of Students*

Students' grades were divided into two categories. The first dealt with the technical aspects of the project, for example, proper coding, download time, and whether the website is displayed the same in different browsers, and the second focused on creativity in the overall design of the website. This study will analyze the creativity part of the grade of students to see whether the teaching strategy of this

research had a positive effect on the design grade as compared to the grade they received on a project that did not use the strategy.

For the purposes of this research, the first assignment is symbolized as NC for “No Critique” and the second assignment is symbolized as SC for “Small-Group Critique”. The design/creativity for the web design course assignments that is used for this study is measured based on several factors; a) uniqueness/originality that signifies inventiveness and unexpected surprises that should be present in the design of the website, b) the composition factor that indicates the effective use of white space, symmetry, and focal point, c) color that demonstrates how successfully it blends with the theme of the design, d) the typography factor that demonstrates adequate selection of font and size for readability. These criteria for measuring the design skills have been developed by the members of the PDHT department and the majority of teachers including the researcher use them to grade the design skills of students in their assignments (Appendix C).

2.1.2 Data Related to the Grades of Students

An ordinal scale was used to measure the creativity part of the grades of students in the two above-mentioned assignments. A grade of 80 and higher represented high design skills and it was denoted by "1"; a grade of 60 - 79 represented average design skills and it was denoted by "2" and a grade of 59 and lower represented poor design skills and it was denoted by "3". Results of the creativity grade distribution for the two assignments are presented in Table 5.

Table 5
Summary of the Design/Creativity Grade Distribution for the two Projects

Total =37	Grade of 59 and lower (Poor)	Grade of 60-80 (Average)	Grade of 80 and higher (High)
Assignment with traditional teaching strategy (NC) e-newsletter	43%	51%	5%
Count	16	19	2
Assignment with small group critique strategy (SC) Box Style	46%	40.5%	13.5%
Count	17	15	5

Table 5 shows the comparison of the grades of students in the two projects with two different teaching strategies. The data indicates that there was a 8% increase in the number of students who received high design grades as the result of the Small-Group Critique strategy; the number of students who received an average design grade dropped by 11%, and there was a 3% increase in the number of students who received a poor design grade in the assignment that used Small-Group Critique (SC) (Box/Module Style) in comparison to the assignment that did not involve peer criticism (NC) (e-newsletter). As can be seen from table 5, with the small-group critique strategy a few more students received the grade of 80% or higher.

It should be noted that the demand from employers, in the job market, for attributes of creativity in graduating students is very high. Students are required to be original and unique in all of their assignments and as the third year students are getting ready to enter the work environment, teachers are cautious to give design grades of 80 and higher in order for students to have a realistic idea of their level of design skills when applying for jobs that require high creativity. In general, students in the researcher's Web Design courses receive higher marks for the technical aspects of their assignments compared to the creativity component.

2.1.3 Graphical Display of the Grades of Students

A Bar chart was used to compare the creativity grades of students in the two projects with two different teaching strategies. Grades greater than or equal to 80 were denoted by "1", grades between 60 and 79 were denoted by "2", and grades less than 60 were denoted by "3".

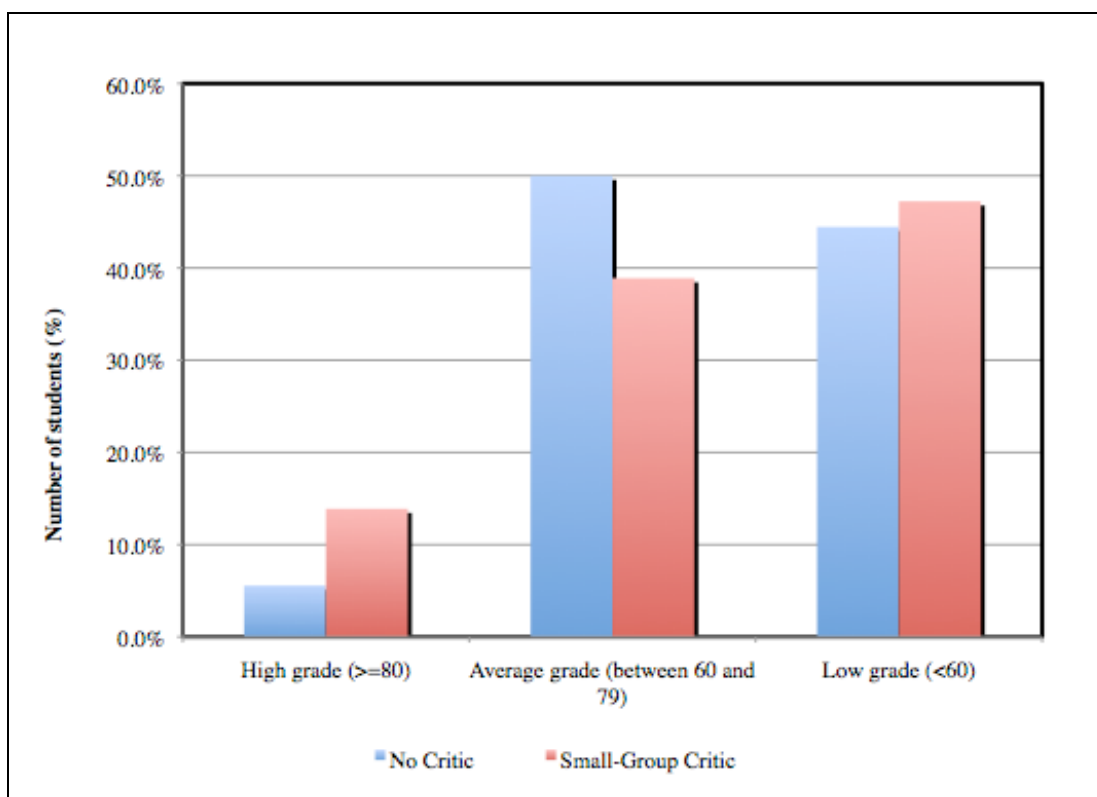


Figure 2: Distribution of Grades in relation to Teaching Strategy

As graphically illustrated in Figure 2, there was a small increase in the number of students with “High” design skills in the assignment where a small-group critique strategy was used and there was no real difference in the design grades of students with “Average” or “Low” design skills in the two assignments with two different teaching strategies. It should be noted that, as it is explained in the Introduction chapter of this paper, students enter this program without a portfolio or

any other type of art related prerequisite and it is not unusual to have a very small number of students in a class with high design skills.

We now ask why no change was witnessed in the creativity grades. There are three types of courses in the Publication Design and Hypermedia Technology department; a) courses that are related to the “Print” industry, b) courses that are related to the “Web” industry, and c) courses that are related to the “Business” field. The web world is expanding and evolving almost daily and many topics that were solely discussed in the print courses in previous years are now being talked about in the web classes as well. One of the print topics that have become popular in the web world is the e-newsletter. The topic of the assignment with No Critique strategy was to design an e-newsletter and students were familiar with this topic because the subject had already been discussed in some of their print related courses. In addition, as newsletters are being distributed more and more through the email programs, students had access to many samples. As students were exposed to the newsletter design they were able to visualize the design of their assignment with ease and confidence.

The researcher did not use the e-newsletter topic for the assignment that the Small-Group Critique strategy was used because the improvement in the grades might have been attributed to the fact that students were more familiar with the topic and it might have not been the true representation of the effect of the teaching strategy of this research study.

The Box or Module style, the topic of the assignment that the Small Group Critique used was not as familiar to the students as the e-newsletter topic because it was neither related to any print subject nor introduced to them in any of their previous web design courses. Therefore, one of the reasons the “Average” and “Low” creativity marks of students did not change in this assignment was perhaps due to unfamiliarity or less familiarity with the topic of the assignment. The second

reason could be attributed to the fact that the weaker students are not as responsive to criticism as the stronger ones and the third reason for no substantial change in creativity could be because students with mother tongues other than English did not actively participate in the discussion.

In summary, the results of findings for the first research question showed that students with an “Average” or “Low” design grade did not take advantage of the small-group discussions that involved comments and criticisms from fellow students. However, students with above average grades for design did seem to take advantage of the criticisms and comments from fellow classmates.

2.2 Research Question 2

a. Is there an association between students’ willingness to participate in teamwork and their creativity in designing artifacts?

b. Is there an association between certain types of “intelligence” and creativity?

2.2.1 Questionnaire On Willingness To Participate In Teamwork

The findings in this section represent the results of analysis of the questionnaire that was distributed to students at the beginning of the course regarding their willingness to participate in teamwork (Appendix A). This questionnaire is related to the second research question part “a”. A Likert scale was used for tabulating the responses to the questionnaire to measure the willingness of students in group-work and ordinal scale values were used for analysis.

The questionnaire addressed a number of aspects of students’ attitudes toward teamwork. It focused on teamwork in regard to projects/assignments as well as daily routines. Part of the teaching strategy of this study involved small group teamwork to

criticize and comment on students' projects, thus students' attitudes to teamwork would have influenced their level of participation and involvement in this activity. It is hypothesized that a student who enjoys group work would have benefited more from this activity in comparison to a student who prefers to work alone. The result of the analysis shows that students who were eager to work in teams received better marks in the creativity component and took advantage of this teaching strategy more so than their counterparts.

Seven questions were included in the questionnaire to evaluate students' behavior toward teamwork in projects as shown in Appendix A and the data obtained from the questionnaire is presented in Appendix F. 39 students filled out the questionnaire and the responses were tabulated on a scale of 1 to 5, 1 for answers to a question with the "Never" option that signified that the student is an excellent candidate for teamwork, 2 for answers to a question with the "Rarely" option, 3 for an answer to a question with "Sometimes" option that signified the student is an average candidate for teamwork, 4 for an answer to a question with "Frequently" option and 5 for an answer to a question with "Very Frequently" option that signified that the student is a poor candidate for teamwork.

Table 6
Distribution of Scores for the Questionnaire in Willingness to Work in Teams

	Poor Candidate		Average	Excellent Candidate	
	Very Frequently	Frequently	Sometimes	Rarely	Never
Q 1	5	4	3	2	1
Q 2	5	4	3	2	1
Q 3	5	4	3	2	1
Q 4	5	4	3	2	1
Q 5	5	4	3	2	1
Q 6	5	4	3	2	1
Q 7	5	4	3	2	1
Total	35	28	21	14	7

Table 6 shows the score associated with each question as well as how the scores represent whether the student is an excellent, average or poor candidate for teamwork.

The questions and interpretations of the results of this questionnaire were partly taken from the University of South Australia website <http://www.unisanet.unisa.edu.au/>. If a student scored between 7 and 12, he/she would have been considered as an excellent candidate to work in a team. If a student scored between 13 and 27, he/she would have been considered as an average candidate to work in a team and if a student scored between 28 and 35, he/she would have been considered as a poor candidate to work in a team. The data in the questionnaire was tabulated and the result is presented in Table 7.

Table 7
Results of the Questionnaire on Willingness to Participate in Teamwork

	Poor candidate	Average candidate	Excellent candidate
% of Students	0	77%	23%
Count		30	9

Table 7 summarizes the result of the questionnaire on willingness to participate in teamwork. The result indicates that 77% of students were average candidates for teamwork as they scored between 13 and 27 in the questionnaire and a smaller portion of 23% were excellent candidates for teamwork as they scored between 7 and 12 in the questionnaire. The result of the questionnaire also indicates that none of the students seemed to be poor candidates for teamwork.

Next, the design grade of each student in each of the two assignments was tabulated in the same table as the group-work aptitude and a cross tab analysis was conducted to see whether there is an association between willingness to work in a team and better design skills.

A cross tab analysis related to the questionnaire on group work was conducted to compare students' creativity grade in the two assignments that involved Small-Group Critique (SC) strategy as well as the assignment with No Critique (NC) strategy to their level of eagerness in teamwork. An ordinal scale was used to measure the creativity part of the grades of students in the two above-mentioned assignments. A Grade of 70 and higher represented acceptable design skills and it was denoted by "1"; grade of 69 and lower represented poor design skills and it was denoted by "2".

In this analysis the dividing line of the grade was decided on the basis of 70. The demand and expectations of teachers are very high from the third year students and the grade of 70 for creativity seems to be an acceptable line that separates weak designs from acceptable designs. In general the mean or median of the class is very close to 70 for the creativity mark of the third-year students in my Web Design courses at the Publication Design and Hypermedia Technology department.

37 students submitted both assignments as well as answered the questionnaire, the record of these 37 students was analyzed in Table 8.

Table 8
 Cross Tabulation of “Willingness to Work in Groups” with Creativity Grade in the
 Project with Small Group Critique Strategy

		Small Group Critique		Total	
		Grade >=70	Grade <70		
Group work	Excellent	Count	8	6	14
		% Within Group Work	57.1%	42.9%	100%
	Average	Count	4	19	23
		% Within Group Work	13.6%	86.4%	100%
Total		Count	12	25	37
		% Within Group Work	30.6%	69.4%	100%

It can be observed from Table 8 that using the Small-Group Critique strategy, 57% of students with excellent teamwork spirit received acceptable creativity marks in comparison to the students with average teamwork spirit. The results seem to show that students who are eager to work in teams can benefit from this teaching tool.

Table 9
Cross Tabulation of Willingness to Work in Group with Creativity Grade in the
Project with No Critique Strategy

		No Critique		Total	
		Grade ≥ 70	Grade < 70		
Group work	Excellent	Count	1	13	14
		% Within Group Work	7.1%	92.9%	100%
	Average	Count	4	19	23
		% Within Group Work	13.6%	86.4%	100%
Total		Count	5	32	37
		% Within Group Work	11.1%	88.9%	100%

It can be observed from Table 9 that by using the No Critique strategy, only 7% of students with excellent teamwork spirit received acceptable creativity marks in comparison to 57% who received acceptable marks using the small-group critique strategy.

Thus, the results of the analysis of the two different strategies in regard to teamwork seem to indicate that students with excellent teamwork spirit took advantage of the Small-Group Critique strategy more than students who do not enjoy the teamwork.

2.2.2 Questionnaire on the Type of Intelligences that Students Possess

The varied intelligences of students were identified by the Multiple Intelligence questionnaire that they filled out at the beginning of the course. The questionnaire and interpretation of the results has been partly taken from the

http://www.bgfl.org/bgfl/custom/resources_fnp/client_fnp/ks3/ict/multiple_int/questions/questions.cfm website (Appendix B).

A questionnaire with 40 questions was distributed to students at the beginning of the course. This questionnaire will answer to part “b” of research question two. This study required arranging students into small groups to criticize each other’s design work. The effort had been made to organize groups so that members of each group do not have the same type of intelligences. It is expected that people with intellect(s) that signifies “creativity” can contribute and generate more unique ideas. Findings in this section represent the results of analysis of the questionnaire on the type of intelligences that students possess in comparison to their design grade.

Twenty-eight questions concerning participants’ intelligences were included in the Multiple Intelligence Questionnaire (Appendix B). Based on findings by Howard Gardner (1983) people possess varied intelligences. These intelligences were categorized as linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial-visual, interpersonal, and intrapersonal.

Table 10
Detailed Summary of the Types of Intelligences that Students Possess

	Count	# of students (%)
Linguistic	1	2.56%
Logical-Mathematical	1	2.56%
Musical	3	7.69%
Bodily-Kinesthetic	3	7.69%
Spatial-Visual	1	2.56%
Interpersonal	6	15.38%
Intrapersonal	4	10.25%
Mixed:		
Visual/ Interpersonal	4	10.26%
Visual/ Bodily	4	10.26%
Visual/ Intrapersonal	2	5.12%
Musical/ Linguistic	1	2.56%
Musical/ Mathematical	2	5.12%
Linguistic/ Bodily	1	2.56%
Linguistic/ Mathematical	3	7.69%
Bodily/ Interpersonal	4	7.69%
Total	40	100%

Table 10 summarizes the result of the questionnaire on the type of intelligences that students possess. The questions in this questionnaire were designed to evaluate the students' varied intelligences of linguistic, logical-mathematical, interpersonal, intrapersonal, bodily kinesthetic, spatial-visual, and musical.

Proficiency and expertise in technology, communication, and creative work are developed from three types of mental processes or areas: IQ (Intelligent Quotient), EQ (Emotion Quotient), and CQ (Creativity Quotient) (Zhao & Zhao, 2010, p. 44). Based on the explanations presented in Zhao and Zhao's article in

regard to the mental processes, the seven types of aptitudes of students who participated in this study were collapsed into three categories of IQ, EQ, and CQ.

Reading, writing, understanding, interpreting, investigating, and evaluating are skills and competencies belonging to the IQ domain (Eysenck, 1994; Nietzel, Berstein, and Milich, 1998; Wechsler, 1944) (as cited in Zhao & Zhao, 2010). Students with linguistic and/or logical-mathematical intelligence were placed into the IQ category. People with linguistic intelligence are the ones who understand and rationalize ideas and information using language and people with logical-mathematical intelligence are the ones who notice patterns and analyze problems to understand the association between source and end product.

Compassion, control, interaction, collaboration, and organizational skills are within the EQ domain (Barn-On and Parker, 2000; Cooper, 1997; Goleman, 1998; Gardner, 2004; Schutte and Malouff, 1999) (as cited in Zhao & Zhao, 2010). The EQ group consisted of students with interpersonal, and/or intrapersonal, and/or bodily-kinesthetic intelligences. People with interpersonal intelligence are the ones who have the ability to relate to others and interpret moods. They usually prefer teamwork. People with intrapersonal intelligence are the ones who understand themselves and their relationship to others. People with bodily-kinesthetic intelligence are the ones who can control their physical movement and prefer the physical experience of touch and feel.

Novelty, originality, dedication, innovativeness, and creative problem solving are in the CQ domain (Baumgarner, 2003; Feldman, Csikszentmihalyi, and Gardner, 1994; Naiman, 2004) (as cited in Zhao & Zhao, 2010). The CQ group consisted of students with spatial-visual intelligence and/or musical intelligence. People with spatial-visual intelligence are the ones who understand the relationship between images and meanings; they can create and interpret visual images. People with

musical intelligence understand relationship between sound and feeling and they can recognize the rhythmic patterns. The results are shown below.

Table 11*
Cross Tabulation of Type of Intelligences with Creativity Grade in the Project with Small-Group Critique Strategy

		Small-Group Critique		Total	
		Grade ≥ 70	Grade < 70		
Aptitude	CQ	Count	8	1	9
		% Within Aptitude	88.9%	11.1%	100%
	EQ	Count	4	18	22
		% Within Aptitude	14.3%	85.7%	100%
	IQ	Count		6	6
		% Within Aptitude		100%	100%
Total		Count	12	25	37
		% Within Aptitude	30.6%	69.4%	100%

It can be observed from Table 11 that with the Small-Group Critique strategy, 88.9% of students with CQ aptitude received acceptable creativity marks. Only 14% of the students with EQ aptitude received acceptable marks for their creativity and using this strategy does not seem to have helped students with the IQ aptitude.

*

Chi-square tests were conducted to see whether the observed associations in tables 11 and 12 were statistically significant. However, even though the statistics showed significance ($p < 0.05$) more than 20% of cells in both instances had expected cell counts less than 5.

Table 12*
Cross Tabulation of Type of Intelligences with Creativity Grade in the Project with
No Group Critique Strategy

		No Group Critique		Total	
		Grade ≥ 70	Grade < 70		
Aptitude	CQ	Count	2	7	9
		% Within Aptitude	22.2%	77.8%	100%
	EQ	Count	3	19	22
		% Within Aptitude	9.5%	90.5%	100%
	IQ	Count		6	6
		% Within Aptitude		100%	100%
Total		Count	5	32	37
		% Within Aptitude	11.1%	88.9%	100%

It can be observed from Table 12 that by using the No Group Critique strategy, only 22% of students with CQ aptitude received acceptable marks for their creativity, only 9% of students with EQ aptitude received acceptable marks for their creativity and none of the students with IQ aptitude received acceptable marks for their creativity.

It therefore appears that a reason for the CQ group responding positively to the small-group critique strategy was because the CQ group consisted of students with spatial-visual intelligence and/or musical intelligence. People with spatial-visual intelligence relate to images and meanings (Gardner, 1983). One of the features of this study was to place students into small groups to criticize each other's design.

This process involved looking at the mockup of their design on the monitor and commenting on various features of the website. The exercise was natural for students who have facility interpreting images and giving meanings to drawings because it involved looking at the image and decoding it. People with musical intelligence were also in this group and they are the ones that understand the relationship between sound and feelings and they recognize the rhythmic patterns. People with musical intelligence have the ability to listen and respond effectively, music involves interaction (Hirsh, 2004 p. 101-105). We therefore conclude that students with CQ aptitude were able to take advantage of the teaching strategy of this study and they did improve their design skills because of the type of intellects that these students possessed.

On the other hand the performance of students with IQ intelligence did not seem to be associated with the teaching strategy of this study. The IQ group consisted of students with linguistic intelligence as well as students with logical-mathematical intelligence. People with linguistic intelligence make sense of situations or remember information using language either written or spoken. People with logical-mathematical intelligence analyze problems logically and have facility carrying out mathematical operations (Gardner, 1983). The teaching strategy of this study involved neither scientific thinking nor writing of any type that is the two major characteristics of these two groups. Perhaps students in this group did not benefit from the small group activity because of their attributes and type of intelligence that they possessed.

In conclusion, with respect to the first research question of this study, the data suggests that the teaching strategy did not have much of an effect on the creativity grade of the students. In regard to the second research question part “a” the data seems to show that the students who enjoy teamwork, took advantage of the teaching technique more than their counterparts. As for part “b” of the second research question, on the basis of the data, it seems that the students who possess the

Creativity Quotient responded well to the Small-Group Critique strategy, there was a minor difference in the creativity grades of students with EQ aptitude and there was no difference in the creativity grade of students with IQ aptitude. It should be noted that these findings were based on a small sample of 37 students who had enrolled in my Web Design course in the Fall semester of 2011.

CHAPTER SIX: CONCLUSIONS, LIMITATIONS OF STUDY AND RECOMMENDATIONS FOR FURTHER RESEARCH

1. DISCUSSION AND CONCLUSIONS

Theories of social interaction (Vygotsky, 1978), modeling and cognitive apprenticeship (Collins, Brown, & Newman, 1989), multiple intelligence (Gardner, 1983), and small-group learning (Slavin, 1995) have been documented and implemented in the educational environments with several positive results on students' problem solving skills. Given this theoretical foundation, the purpose of this study was to see whether students' web design skills could be improved by incorporating their diverse personalities in group-activities that involved critiquing each other's artwork (website design). Neumann (1989) in an article on the topic of creativity and analytical art suggests that the goal of a critiquing strategy is to develop creativity.

Part of the review of literature examined the effects of group work and integration of Intelligence Quotient (IQ), Emotional Quotient (EQ), and Creativity Quotient (CQ) on student productivity in a web design and development university course (Zhao & Zhao, 2010). They used the social communication and brain storming technique among students which showed that students in the controlled experiment made fewer errors in coding the websites. However, students who did not code faster in the first assignment of the course improved the speed at which they were coding when the teaching strategy was repeated in the subsequent assignment.

This research study was also conducted in a web design course and the first research question looked at the design skills of students in accordance with the aesthetic features of the websites. The results did not show a positive outcome for the average and weak students. However, it seems that a small number of students (8%) with high design skills were able to take advantage of the teaching strategy. It should

be noted that these results are based on a quasi experiment with no control group. It was conducted in only one assignment and perhaps if the experiment had been repeated in a very similar subsequent assignment, the results might have been different as was the case in Zhao & Zhao's experiment (2010). Students need to practice the art of critique in order to master it and as a result take advantage of it.

Part one of the second research question of this study questioned whether students' willingness to participate in teamwork played a role in taking advantage of the technique presented to them. The results showed that 57% of students with excellent teamwork spirit were able to improve their design skills in creating websites as the result of the procedure. The finding is in accordance with the findings of Okebukola (1986) and Wheeler & Ryan (1973) (as cited in Slavin, 1995) in which they found that students who preferred group-work, learned more from this activity in comparison to their counterparts.

In another study, Bryant (2010) experimented in a high school computer animation course to combine technical instructions with peer conversation technique and observed that students successfully found innovative solutions for everyday concepts when they took advantage of the ideas of their peers. Bryant's study used a small selected sample of students based on their personalities, gender, availability, and willingness to participate. One aspect of the findings in our study that looked at the willingness of students to work in teams was similar to the result of Bryant's study, as students who were keen in group-work were able to take advantage of this teaching strategy more than those who did not. The difference between the two studies was the selection of sample. In Bryant's research, students were hand picked based on their specific characteristics but in this research, all of the students in the class were included in the experiment.

Part two of the second research question looked at the association between certain types of "intelligence" and creativity. Results showed that 88.9% of students

with the CQ aptitude received acceptable marks for their creativity in the Small-Group Critique (SC) assignment, 14% of students with the EQ aptitude received acceptable marks for their creativity and the strategy does not seem to have helped students with the IQ aptitude. However the question arises as to why students with the IQ aptitude were not able to take advantage of the group-work activity. Studies by Okebukola (1986) and Wheeler & Ryan (1973) (as cited in Slavin, 1995) indicate that high achieving students prefer competition in comparison to collaboration and this might be the reason students with these characteristics did not take advantage of this activity in my web design course. One approach in solving this problem could be to allocate group marks for this activity so that high achievers become motivated into effective participation that may result in the generation of novel ideas for their assignments.

Furthermore, researchers Byrge, C., & Hansen, S. (2009) explain in their article that creativity is about looking outside of the normal patterns. Gardner (1983) identifies one of the characteristics of people with the IQ aptitude as having the tendency to look for patterns in the processes of finding solutions that is the opposite of what a creative person will do. So, these explanations might be some of the factors that prevented students with the IQ aptitude to respond well to the group-activity.

2. LIMITATIONS OF THE STUDY

After analyzing the results of this study, a number of limitations come to surface that must be mentioned and dealt with. Firstly, it should be noted that the data was derived from a small sample of 37 students in two sections of a web design course in a community College and as a result the findings cannot be generalized to a larger educational institution or to any other course.

Secondly, the instrument of this study comprised of two assignments of the course and these two assignments were identical in technical aspects. In both of these assignments, students had to design and code a corporate website (Appendices F & G). However, it happened that students were more familiar with the topic of the assignment in the No Critique (NC) strategy in comparison to the one with Small-Group Critique (SC) strategy so the result of the study may have been influenced by this factor. The study might have shown more interesting results if the assignments had been switched. On the other hand, the result might have not been the true reflection of the teaching strategy and the result might have been due to the fact that students were more familiar with the topic. A possible alternative could be to use the same two assignments the following year that the course is offered and compare the results of students' design skills in two different years.

Thirdly, the time constraint could have been a factor in this study. Students were divided into small groups and they were given 30- 40 minutes to discuss/critique each other's design. Some of the designs required more attention and as a result there was not enough time left to critique everyone's design extensively. Another time related issue was that students were seeing the designs for the first time in the critique session and they needed more time to analyze or digest each other's work so that they could make a meaningful comment about it. The teacher also did her best to supervise the conversations during the time allocated to the activity but it was impossible to listen and correct all of the comments in all of the groups during that short period of time.

Fourthly, the mother tongues as well as the personality of students were playing a part in their discussions. Some of the students with a mother tongue other than English were hesitant to speak. Feldman (1973) explains in his article that one of the main elements of being able to critique art is verbal vocabulary. Furthermore, a personality related issue was the fact that students who were introvert did not participate in the critique session actively. It should also be mentioned that weak

students in this web design course did not respond to criticism and comments the way better students did and this is not an unknown dilemma as it is explained in an article by Neumann (1989). He explains in his article that:

Some students are deafened by anxiety: they have a need for reassurance that is so compelling that their memories seem not to record criticism; or, upon hearing initial criticism, they become so traumatized that they want the critique to end and hear almost nothing until it does; or they spend so much time seeking reassurance that little is left for criticism. A student deafened by anxiety may become unusually passive in a critique, saying little more than “uh, huh,” “yes,” or “I understand.” When a student becomes that passive, a critique is not actually happening because there is no give and take. (Neumann, 1989, p. 762)

A further limitation, related to group-work, was the fact that some of the students took advantage of their peers through “free riding”. This limitation that is not uncommon in group-work activities can be addressed by the reward system and asking students to do a peer-assessment. Measuring students’ effective participation in a group might elevate the problem of free riders in a group-activity (Shimazoe & Aldrich, 2010).

The final limitation of this study might be due to students’ fear of being judged or graded for creativity. As it has been elaborated in the article by Byrge and Hansen (2009), creativity is about overlooking structured patterns and imagining beyond ordinary prototypes. The researchers have explained in their article that the main factor in letting go of patterns is to eliminate judgment or grade from the learning activity. This solution might be feasible in a course with a “pass” or “fail” grading system.

3. RECOMMENDATIONS FOR FUTURE STUDIES

A Design-related group critiquing strategy could be a successful method bearing several factors in mind. Firstly, as Feldman (1973) describes in his article,

criticism is not only about judging a piece of art, it is about describing, identifying, analyzing, and interpreting an artifact. When a student provides a critique of an artwork in this strategy it is possible that at times he/she makes an invalid comment or observation. The teacher should be able to correct students' comments instantly so that the receiver of the comment is not misguided. As is mentioned in the limitations, the teacher could have not been present in all of the discussions so it is recommended to ask other colleagues in the same field to help out in the critiquing session of this activity.

Perhaps another way to allow this teaching strategy to have positive effects on students, would be to encourage them to share their findings of the small-group activity with the entire class in order to take advantage of the ideas or comments of the entire group of students as well as the teacher and at the same time knowing that they have to do a public presentation. This would help them to focus their attention on the discussions and the teacher could also correct the misguided or ambiguous observations during these presentations.

Consideration must also be given to the fact that students need to practice the art of critiquing and given the opportunity to do this research study again, the researcher would use the technique once on a practice assignment and then she would repeat the same procedure on a subsequent assignment to gather data and investigate the benefits. Using a practice session with the critiquing technique might be the solution to truly evaluate the benefits of this strategy in a web design course.

A solution to the time obstacles of this study might be to ask students to send their design to each other through email or upload the designs to a website a day before the critique session so that everyone has time to go through the designs beforehand.

Furthermore, a controlled experiment for this strategy would have been better but difficult to implement in the classroom since one group of students would be denied this teaching tool. So, having two very similar assignments, one graded after the teaching strategy is implemented, the other with conventional teaching methods might be a reasonable and realistic solution for this teaching technique.

In conclusion, it should be noted that while this study has looked at group-work in a classroom setting, there are several online tools that could be used for group collaboration and critiquing such as “www.pbworks.com”. Lastly, the art of critiquing has not yet been studied to any great extent and further studies in this area would be beneficial for learners of many discipline.

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APPENDIX A: WILLINGNESS TO WORK IN TEAM QUESTIONNAIRE

Student Number: _____

Please answer all questions by placing a check mark in the appropriate box.

	Very frequently	Frequently	Sometimes	Rarely	Never
I have a hard time sharing my knowledge and opinions with others	5	4	3	2	1
I like to rely on my own knowledge and expertise to solve a problem rather than seek help from other people	5	4	3	2	1
I like to be given the option of working alone on projects	5	4	3	2	1
I often end up carrying a lot of load in a team project and I hardly receive any credit for doing so	5	4	3	2	1
People generally avoid working on projects with me	5	4	3	2	1
I often end up with team members that don't work as hard as I do	5	4	3	2	1
I cannot easily be flexible and adjust to new timetables or strategies on projects	5	4	3	2	1

If a student scores between 7 and 12, he/she is an excellent candidate to work in a team. If a student scores between 13 and 27, he/she is an average candidate to work in a team. If a student scores between 28 and 35, he/she is a poor candidate to work in a team. The questions in the questionnaire and the interpretation of the results have been partly taken from the website

<http://www.unisanet.unisa.edu.au/TeamsStudents/>

APPENDIX B: MULTIPLE INTELLIGENCE QUESTIONNAIRE

Student Number: _____

Please answer all questions by indicating the proper number in front of them.

On the scale of 1 (Strongly Agree) to 4 (Strongly Disagree) how do you describe yourself?

1 = Strongly Agree, 2 = Agree, 3 = Disagree, 4 = Strongly Disagree

1. I play a musical instrument	
2. I often have a song or piece of music in my head	
3. I enjoy cross words, word searches or other word puzzles	
4. I find graphs and charts easy to understand	
5. I can throw things well - darts, skipping pebbles, frisbees, etc	
6. I find it easy to remember quotes or phrases	
7. When I am concentrating I tend to doodle	
8. I can carry out arithmetic operations without a calculator	
9. I like to think through a problem carefully and consider all of the aspects	
10. I enjoy debates and discussions	
11. I love adrenaline sports and scary rides	
12. I enjoy individual sports best	
13. I care about how those around me feel	
14. I enjoy and am good at making things - I'm good with my hands	
15. I like having music on in the background	
16. I find it easy to remember telephone numbers	
17. I set myself goals and plans for the future	
18. I find it easy to talk to new people	
19. I enjoy the challenge of learning something new	
20. I don't use my fingers when I count	
21. I am realistic about my strengths and weaknesses	
22. I find pleasure in reading	
23. I can read a map easily	
24. I am good at solving disputes between others	
25. I have always dreamed of being a musician or singer	
33. I prefer team sports	
26. I prefer team sports	
27. If I am learning how to do something, I like to see drawings and diagrams of how it works	
28. I am happy spending time alone	

This questionnaire has been partly taken from:

http://www.bgfl.org/bgfl/custom/resources_frp/client_frp/ks3/ict/multiple_int/questions/questions.cfm website.

APPENDIX C: RUBRIC FOR GRADING THE DESIGN SKILL PART OF THE
PROJECTS

Category	Meets minimal requirements 1	Meets expectations 2	Exceeds expectations 3
Uniqueness / originality	Web site has borrowed many elements from other web sites and reflects minimal original thought. The design is predictable.	Site pages are similar to many traditional sites found on line. Personality of the created is shown.	Novel ideas have been incorporated in the site pages. Project shows inventiveness and unexpected surprises. Unique personality of the creator is highly revealed.
Composition	There is no use of white space, symmetry, and focal point. Site pages (and elements within pages) are cut off inappropriately at their borders or are surrounded by excessive white space.	There is some use of white space, symmetry, and focal point. Site pages (and elements within pages) usually fit appropriately within their borders.	White space, symmetry, and focal point are used effectively. Site pages (and elements within pages) fit within their borders in a pleasing manner.
Color	Colors clash and do little for the theme of the design. Background color interferes with text and images. Colors make text less readable.	Colors are somewhat complementary. Background color coordinates with images and text design. Colors do not interfere with readability.	Colors work together, reinforcing the theme of the design. Background color enhances images and text design. Colors strongly support readability.
Typography	Text is not easily readable. White space is not used effectively. Fonts and text effects interfere with the design and readability.	Text is readable. Type sizes communicate information and are compatible with overall site design. White space around text supports readability and	Text is readable, and selected fonts support design goals. Type sizes reflect desired emphasis. White space around text strongly supports readability and

design. Fonts and text effects are compatible with the design and readability.

design. Fonts and text effects add to mood and tone. Fonts enhance readability through color, size, and contrast.

APPENDIX D: GUIDELINES FOR E-NEWSLETTER (E-BLAST) PROJECT

Personal Project 1 (e-blast) 10%

Due date: Tuesday Sept. 6, 2011

In this project you will create an e-blast announcing to your friends and family that you are ready and available to accept graphic and web design contracts. People use different email programs and your e-blast should show almost identical in most of the following programs. hotmail, gmail, yahoo, sympatico, videotron, and bell.net.

1. For this project we will use an online program to take advantage of the analytic features of it. Go to <http://www.campaignmonitor.com/> and create an account for yourself.

Campaign Monitor is an online email marketing application that enables designers to create, send, manage and track branded emails for themselves and their clients with ease.

Create a free account and give it a test drive. You will not be charged unless your campaign is sent to six (6) or more recipients. This allows you to create a one-person (you) list and try out their services.

Price for more than 5 recipients: \$US5 plus \$0.01 per recipient

2. Design the layout of your e-blast using Photoshop, Illustrator, or Fireworks. **Due date: Tuesday, August 30.**
 - a. Create your own graphics so that you have a unique design. Optimize your images and keep their size to approximately 50k. Remember that images and graphics serve to enhance, not to distract from your marketing goal.
3. Code the website (you can refresh your memory on old-style coding with tables by looking at the code of the templates available to you in CampaignMonitor). Include sufficient amount of text and graphic in your e-blast and make sure the text is easy to read.
 - a. Include <unsubscribe>, <view in browser>, and <forward to a friend> link as well as today's date in your newsletter.

4. Reflection: using a word processing program write about your thoughts and feelings on this project. You should also answer to these questions:
- a. Why are you sending this e-blast?
 - b. What are you trying to achieve from sending this e-blast?
 - c. Who are the recipients of the e-blast? Describe the population.
 - d. Did you try to match the e-blast to an existing website?
 - e. How successful was your e-blast? Any statistics?
 - f. Were you inspired by an already existing template or design? If yes, include the snapshot of the existing design

You will be marked based on:

Originality and attractiveness in design.	30%
Accuracy and efficiency of the code:	30%
a. Readability without graphics	
b. Web site organization (folder for images, css, etc.)	
c. Proper naming of the files, folders, and images	
d. Accessibility (alt attribute, image replacement technique, etc.)	
well-written text.	30%
Presentation of the project to class & reflection page.....	10%

Late assignments will be subject to a penalty of one mark (10%) per day (including week-ends) up to a maximum of ten days.

APPENDIX E: GUIDELINES FOR BOX-STYLE (MODULE) PROJECT

Personal Project 2 (Module Style & 3-D object) 10%
Due date: Thursday, September 22, 2011

- In this project you will create the website of a fictional corporation that has more than 20 employees. The pages of your site should be designed using the Module Style. You should also incorporate a 3-D design element into your home page.
- Create the website of a fictional company that gears to the needs of the entertainment industry. Here is a sample www.entertainmentafrika.com/. You should have at least **four pages** in your site.
- What is a Module or Box style design? In this style, the designer places the content into various containers (Divs). This style will help breakdown the content and make it easy to follow or find information on a wide range of topics. Modules can be simple with no images or they can have images and expanding boxes. Modules give order and hierarchy to the content. This style is great when there is mountain of content. By placing the content into modules and labelling them, users can easily find the information they are looking for. Here are some examples: www.listentomanchester.co.uk , www.frankfurt.de , www.sympatico.ca .
- What is a 3-D design element? The majority of the websites incline to look flat. Adding a three-dimensional element to the design will enhance the overall look of the site. You are basically including a 3-D object in your home page to create the illusion of depth. You can use many techniques to achieve the illusion of depth. For example, shadow that appears to descend away from the object. Here are some examples: www.noodlebox.be & www.softgray.com.

- Design the layout of your home page using Photoshop, Illustrator, or Fireworks. Include sufficient amount of text and graphic. **Due date: Thursday, September 15th.**
 - Create your own graphics so that you have a unique design. Optimize your images and keep their size to approximately 50k. Remember that images and graphics serve to enhance, not to distract from your marketing goal.
 - Code the website using CSS and XHTML. You cannot use Absolute Positioning or tables for the overall layout of the site. However you can use “Absolute Positioning” to place odd elements in your site and you can use “Tables” to place ranges of data that are supposed to be aligned underneath each other. You have to use floats and css positioning to create the layout.
 - Create one style sheet for screen and one style sheet for print.
 - Add a Favicon.
 - Empty links are Not allowed.
 - Absolutely no “Image maps” for navigation bars; use “lists” instead.
 - Make sure to include a privacy statement: clearly describing your business’s policy for protecting customer’s personal information.
 - Validate your site for Transitional XHTML/CSS and check your pages for browser compatibility as well.
 - Upload the site to the bluehost server (f11_web4).
- Reflection: using a word processing program write about your thoughts and feelings on this project. You should also answer to these questions:
 - g. Why a corporation needs a website?

- h. What is the corporation trying to achieve by launching a website?
- i. Who are the potential visitors of this site?
- j. Were you inspired by an already existing design? If yes, include the snapshot of the existing design.

You will be marked based on:

Originality and attractiveness.....	30%
Accuracy and efficiency of the code:	30%
e. Validation, browser compatibility	
f. Web site organization (folder for images, css, etc.)	
g. Proper naming of the files, folders, and images	
h. Accessibility (alt attribute, image replacement technique, etc.)	
i. SEO (title, keyword, description)	
Well-written text.	30%
Presentation of the project to class & reflection page.....	10%

Late assignments will be subject to a penalty of one mark (10%) per day (including week-ends) up to a maximum of ten days.

APPENDIX F: DATA RELATED TO THE QUESTIONNAIRE ON
WILLINGNESS TO PARTICIPATE IN TEAMWORK

Student Number: _____

Please answer all questions by placing a check mark in the appropriate box.

	Very frequently 5	Frequently 4	Sometimes 3	Rarely 2	Never 1
I have a hard time sharing my knowledge and opinions with others			28.21%	58.97%	12.82%
I like to rely on my own knowledge and expertise to solve a problem rather than seek help from other people	7.69%	20.51%	35.90%	30.77%	5.13%
I like to be given the option of working alone on projects	20.51%	10.26%	51.28%	17.95%	
I often end up carrying a lot of load in a team project and I hardly receive any credit for doing so	5.13%		41.03%	41.03%	12.82%
People generally avoid working on projects with me		2.56%	23.08%	35.90%	38.46%
I often end up with team members that don't work as hard as I do		10.26%	30.77%	53.85%	5.13%
I cannot easily be flexible and adjust to new timetables or strategies on projects			25.64%	43.59%	30.77%

Student Number: _____

Please answer all questions by placing a check mark in the appropriate box.

	Very frequently 5	Frequently 4	Sometimes 3	Rarely 2	Never 1
I have a hard time sharing my knowledge and opinions with others			11	23	5
I like to rely on my own knowledge and expertise to solve a problem rather than seek help from other people	3	8	14	12	2
I like to be given the option of working alone on projects	8	4	20	7	
I often end up carrying a lot of load in a team project and I hardly receive any credit for doing so	2		16	16	5
People generally avoid working on projects with me		1	9	14	15
I often end up with team members that don't work as hard as I do		4	12	21	2
I cannot easily be flexible and adjust to new timetables or strategies on projects			10	17	12

APPENDIX G: INNOVATION, RESEARCH & DEVELOPMENT COMMITTEE
CONSENT LETTER

Innovation, Research & Development Committee

Ste-Anne-de-Bellevue, June 14, 2011

Homa Nasserri, PDHT Dept
John Abbott College
21275 Lakeshore Road
Sainte-Anne-de-Bellevue, Québec, H9X 3L9 Canada

Subject: Developing Design Skills through Group Critiquing and Feedback.

Dear Ms. Nasserri,

In accordance with your application dated March 1, 2011, the College's Innovation, Research & Development Committee (IRDC) is granting you permission to solicit John Abbott College students to participate in the Research Project entitled "Developing Design Skills through Group Critiquing and Feedback".

By signing the Research Proposal Form, you attest that you would follow the John Abbott College Institutional Research Policy (Draft II), a copy of which is attached to this letter.

In addition, please email a pdf. copy of this Approval Letter, stating that you will comply with our Institutional Research Policy, including the section on Ethics Involving Research on Human Subjects, you will be able to start your research.

The Committee wishes you the best of luck in your endeavour and hopes that your research is a successful one.

Sincerely,

Gary Johnson

18/06/11

Chair of IRDC
Dean of Science & Social Science Programs

Homa Nasserri _____ (date)

Teacher , PDHT Dept.
John Abbott College

APPENDIX H: STUDENT CONSENT FORM

Lakeside View  *Global Vision*
CEGEP JOHN ABBOTT COLLEGE
Consent Form

Developing Design Skills Through Group Critiquing and Feedback

Researcher:	Homa Nasserri	Tel: 514-457-6610 ext. 5929
Email	Homa.nasserri@johnabbott.qc.ca	
Dept	PDHT	
Supervisor:	Dr. Shernaz Choksi choksis@fclass.vaniercollege.qc.ca	Tel: 514-845-5826

Research Questions:

Research Question 1: This study will investigate whether incorporating activities like guided, small-group discussions that involve critiquing and analyzing design that follows a modeling session from the teacher, help students develop design skills that will lead to creating unique artifacts that are relevant to the needs of today businesses.

Research Question 2: Are there certain student characteristics that can be associated with creativity that is required from a design technician?

a) Is there an association between students' willingness to participate in teamwork and their creativity in designing artifacts? The willingness of student to participate in teamwork will be measured by the questionnaire that they will fill out at the beginning of the course.

b) Is there an association between certain types of "intelligence" and creativity? The diverse intelligences of students will be identified by the Multiple Intelligence questionnaire that they will fill out at the beginning of the course.

Purpose of the research:

Upon completion of their first year of study, about 11% of our first year students decide to switch to another program because they feel they lack innate talent or necessary design skills to succeed in the field of graphic and web design. A teaching strategy that improves the creativity skills of students can help them succeed in this profession and at the same time keep the number of students in the department at the desired level. This study will look into a technique to improve creativity of design-technicians and the findings are beneficial to teachers and students of any design-oriented program.

What is involved in participating?

The teacher will first model how to critique and analyze an artifact and then students will be divided into small groups for collaboration and interaction. Students will use the mockups that they have created for their web design project to critique the design element of each other's web project based on the criteria provided to them.

Issues relating to anonymity and informed consent

The teacher/researcher will arrange with another colleague in the department to distribute the surveys and supervise the activity. The documents will be locked with a third party at school (Professional Development Specialist) and they will only be available to the teacher/researcher after the grades have been submitted. Participation, or lack of participation in this research will NOT affect grades in any way.

There will be no mention of students' name or identification number in the results of this study.

Students' participation is voluntary and they can withdraw from participation at any time without penalty. The academic standing of students will not be affected in any way by consenting or not consenting to participate in this study.

Consent Form

Dear student,

I am in the process of finishing my Master degree in Education and I have decided to do an experimental research for my thesis on the effect of group work on students' creativity.

I will place you in different groups and you will criticize each other's artwork.

Your grade will not be affected in any way by not participating in this research.

There will be no mention of your name or student number in the documents that will be created for this study.

Pseudonyms (false name, aliases) will always be used in any publications that may result from this study as well as the stored data. There are no penalties for withdrawing from this activity.

No person at College or any other organization will have access to the materials collected.

Please tick the appropriate box, sign, date and return to

I have read and understood the information provided to me regarding this research and I agree to participate in this study. I understand that my participation is voluntary and I may withdraw from participation at any time.

I do not consent to participate in the described study.

Student's ID: _____

Student's Signature: _____ Date:

_____ signature dd / mm / yyyy

Parent's or legal _____ Date:

_____ signature dd / mm / yyyy
guardian's signature
if student is under 18 years old: