THE RELATIONSHIP BETWEEN COLLEGE STUDENT CRITIQUE ABILITY AND DESIGN ABILITY
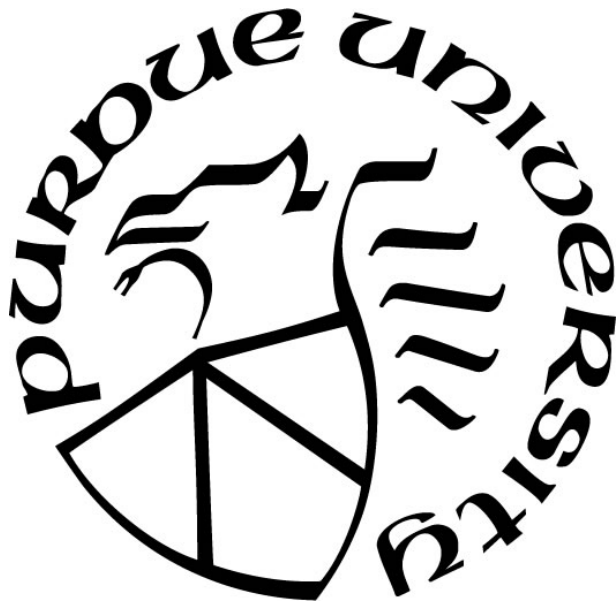
by

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A Thesis

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Master of Science

Department of Technology Leadership & Innovation

West Lafayette, Indiana

December 2019

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To my Wife, my Parents, and my Sisters

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LIST OF ABBREVIATIONS

ACJ: Adaptive Comparative Judgment

CompareAssess: Assessment tool that ranks student work and allows users to provide

feedback by allowing a judge (student or teacher) to assess pairs of student

work and deciding on which student work is better.

ABSTRACT

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Institution: Purdue University
Degree Received: December 2019
Title: Investigating the Relationship Between Student Critique Ability and Student Design
Ability
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While industry is looking to graphic design education for the next top designers who have

the knowledge and skills to be successful in their field (Bridges, King, Brown, & Luedeman,

2013), graphic design instructors often have a limited time to teach students the knowledge and

skills they need to become successful designers (Landa, 2010; Kennedy et al., 2012; Liu, &

Tourtellott, 2011). Most university-level graphic design courses, the traditional preparation

pathway for future designers, focus on improving student's design ability through hands-on

projects that teach students how to use graphic design technology (Motley, 2017). In addition to

hands-on graphic design experiences, many classrooms also use peer critique to allow students to

critique and give feedback to peers while identifying the positive aspects of a design and

suggesting improvements to be made (Motley, 2017). Students tend to improve their design

when a classroom implements critique, including self and peer assessment, into the curriculum

(Wanner, & Palmer, 2018). However, little is known about the relationship, if any exists,

between a student's ability to design and a student's ability to critique. Therefore, this study will

investigate the correlation between student critique and student design abilities with the intent of

improving graphic design educational practices. Understanding this correlation may assist those

involved with graphic design education to better prepare students for future employment by

assisting instructors in using their limited teaching time most effectively. Specifically, a

relationship between graphic design critique and graphic design skill may suggest that the

limited time available for teaching should emphasize improving critique skills with the goal of also improving graphic design abilities. If no relationship between critique and design abilities exists, this may suggest that limited time should be spent engaging students in critique and other forms of teaching should be emphasized.

CHAPTER 1.   INTRODUCTION

This chapter introduces the problem and research question that this study is focusing on. This chapter also defines the scope, assumptions, limitations, and delimitations. The goal of the information presented in this chapter is to serve as a backdrop for the research decisions made, the framework chosen, and the methodology used in this study.

1.1   Introduction to the Problem

University level graphic design instructors have a limited amount of time to teach their students the skills and knowledge they need to become successful graphic designers (Landa, 2010; Kennedy et al., 2012;). A typical semester is 16 weeks long with classes meeting during the week and most undergraduate class periods range from 50 minutes to two hours. The limited amount of time, coupled with the expectations for training industry-ready graduates, highlights the need for instructors to teach using the most effective and efficient practices (Nompula, 2012; Guanghui, Tong, Jing, Bailin, & Qian, 2013). In order to improve a student's design ability, instructors typically focus on two facets: foundational graphic design skills and assessing students.

The first of these facets, foundational graphic design skills, may be further divided into two portions: graphic design elements and software skills. Graphic design elements are principles of "good" graphic design (Landa, 2010) which can be exemplified, taught, and assessed in a variety of ways (Eshun, & Osei-Poku, 2013; Giloi, & du Toit, 2013). These elements include concepts such as: line, shape, balance, figure/ground, color, texture, format, hierarchy, emphasis and rhythm (Landa, 2010). Software skills, the second of the two foundational graphic design skills, center on various graphic design software applications for

creating designs (e.g., Adobe Photoshop© and Adobe Illustrator©) (Arntson, 2011; Tan, & Melles, 2010) and are typically demonstrated by instructors during classroom instruction. Class projects in graphic design classrooms typically combine both software skills and graphic design elements as students produce designs for assessment.

The second facet common to graphic design classrooms is a form of assessment known as critique. Critique is a form of assessment instructors and students use to provide feedback on student work. One of the common ways that is used to help students practice giving critique is through peer critique. This type of critique can also be used as a learning activity that allows students to provide feedback on their peer's work (Motley, 2017). In this scenario, students have the opportunity to give feedback on their peer's work by highlighting the positives and negatives of the work (Cennamo, & Brandt, 2012).

Importantly, the benefits of critique extend past the instructor in student-critique settings; research situated in graphic design education has shown that students who critique each other's work are better able to understand foundational graphic design concepts taught in class (Dannels, Gaffney, & Martin, 2008). Another subtle benefit of critique, suggested by Whittington (2004), is a student's ability to learn about the vocabulary of graphic design while using that vocabulary to critique their peers.

Recent research around student peer critique in graphic design education has shown that Adaptive Comparative Judgment (ACJ), an approach to automated comparative assessment, may be an effective, efficient, and feasible option for facilitating critique and feedback processes in graphic design settings (Bartholomew, Strimel, & Yoshikawa, 2018; Zhang, 2019; Bartholomew, Zhang, Garcia Bravo, & Strimel, 2019). Building on this previous work, this study, which utilizes *CompareAssess*—a web-based ACJ tool that give users the ability to compare items and

provide feedback on items displayed—also investigates how ACJ, as an assessment approach that facilitates the comparison of two items, may facilitate critique and assist in studying the relationship between student critique and design ability. As an ACJ tool, *CompareAssess* displays student work side by side and then prompts the user to identify which one is better. In this process users can also provide feedback on the items they are judging to recommend why they chose one over another. Inherent in the comparison-based nature of ACJ, and the ability to include feedback during the process, ACJ software (e.g., *CompareAssess*) ultimately provides a platform which allows a user to critique individual items while also contributing to decisions which ultimately determine a ranking of a collection of student work.

Based on previous work with ACJ and student critique in similar design education settings (Bartholomew, Strimel, & Yoshikawa, 2018; Yoshikawa, 2018; Zhang, 2019) this research will expand the existing research around ACJ for peer critique by specifically investigating the relationship between a student's ability to critique graphic design projects and their ability to produce "good" graphic design projects. In order to determine a student's design and critique ability, this study will implement a correlational analysis of the ACJ data to determine the relationship. Understanding this relationship may inform pedagogical practices of instructors towards a focus on teaching students how to critique with anticipation of students becoming better graphic designers. Conversely, no significant relationship may suggest an emphasis is more aptly placed on other approaches, outside of critiquing, for improving student design abilities.

1.2   Research Questions

The research questions that guided this study were:

1. What is the relationship between student graphic design critique abilities and student graphic design abilities?

2. What patterns or themes emerge that may explain the correlation between student design ability and student critique ability?

1.3   Significance

These findings may be beneficial for all involved in graphic design education at the collegiate level, including university students and graphic design instructors, because these findings may help instructors emphasize effective pedagogical practices, related to critique in design education, for their classroom and may help students become better prepared to enter the graphic design industry. Students who are able to identify strengths and weaknesses in other student's work may be able to identify strengths and weaknesses in their own work and subsequently work to fix those weaknesses. While related research has shown that students who simply observe other student's work have been shown to improve their own work (Ong, 2018); this study specifically focuses on a student's ability to actively critique another student's graphic design work and how that ability may or may not correlate with their ability to design.

1.4   Scope

Student work from 50 students enrolled in introductory graphic design courses were used in this study. The data used consisted of 1) student infographics created during an introductory university-level graphic design course and, 2) feedback, provided by students, on these items

collected from an ACJ session completed prior to the beginning of this study. In addition to the data describe, participants in this study included five university-level Teaching Assistants (TAs) teaching beginning classes in computer graphics technology. The TA participants in this study assessed student critique ability by engaging in an ACJ session consisting of student-produced critiques (see #2)—collected through *CompareAssess* during a previous semester—where they determined which student critique was better of those displayed. Following the critique skill determination, these results were compared with student design ability results. The design ability results were derived from data centered on designs produced by these students. The design ability and critique ability data were used to determine the potential relationship between student design ability and student critique ability as well as the magnitude of any identifiable relationship.

1.5   Assumptions

1. The instructors had a sincere interest in the study and were not influenced by any reward for participating in this study (i.e. money, extra-credit for the class, etc.).

2. Instructors were able to determine which students were better at critique than others based on the critique documents given.

1.6   Limitations

The limitations of this study were:

1. Research was conducted at the University-level, at the participating Midwestern University, in sections of one course.

2. The sample was limited to five TAs who taught different introductory graphic design course sections at the identified university.

1.7   Delimitations

The delimitations of this study were:

1. Data was not collected outside of the judgments made by the instructors and the judgments and comments made by students in the introductory graphic design course.

2. Research did not take into consideration that students were taught at different times of the day.

3. Research did not take into consideration the teaching style each instructor used.

1.8   Definitions

Adaptive Comparative Judgment (ACJ): adapted from the Law of Comparative judgment created by Louis Thurstone which describes how humans can compare two items with increased

reliability over making subjective decisions related to item quality (Thurstone, 1927). In educational settings this method has typically involved two student works appearing before a teacher (referred to as a "judge") for evaluation. The judge picks which of the two they believe is better based on a predetermined criterion (known as the "holistic statement"). This comparative judging process continues over the course of multiple rounds. A round is when each item has been compared at least once, and the judge, or group of judges, continues until a rank order of all items has been produced. ACJ, as an approach represents an extension to comparative judgments (Thurstone, 1927) based on work by Alastair Pollitt who illustrated how an algorithm and technology could be utilized to *adaptively* pair the items that participants were seeing in order to generate an even more reliable rank order by pairing similarly-ranked items (Pollitt, 2012a; Pollitt & Crisp, 2004).

Critique: a process where peers and instructors evaluate work and provide feedback for improvements. In graphic design education settings, critique is often conducted by the instructor in the form of summative assessment and by the students as a form of formative assessment (Whittington, 2004).

CompareAssess: an online tool which facilitates ACJ. The web-based interface facilitates the comparison of items and collection of feedback from judges. The software records wins and losses based on the judgments made over the course of several rounds. At round five, the algorithm governing the pairing becomes adaptive, comparing items that are similar in rank to each other to further solidify the rank order. At round 12, the reliability of the judges is typically established.

Design Project: An assignment that tests a student's skill and knowledge learned. Design

projects are typically assigned at the end of a unit and test a student's ability to use a

specific design software (Adobe Photoshop, Illustrator) and/or a specific design

application (infographic, billboard, business card).

1.9   Summary

The purpose of this chapter was to introduce the problem, research question, and scope of

this study. This chapter also explained the significance, assumptions, limitations, delimitations

and definitions of this study. The information summarized in this chapter seeks to provide a

backdrop for how this study will move forward.

The following chapter will summarize the literature on graphic design skills that are

taught in university graphic design classrooms. This chapter will also discuss the use of ACJ

with the intent of highlighting the potential for exploring the relationship between a student's

critique ability and a student's design ability.

CHAPTER 2.   LITERATURE REVIEW

The purpose of this chapter is to review the research related to graphic design education including a student's ability to design and a student's ability critique. As ACJ is the tool by which these two abilities are determined in this research, this chapter will also describe how ACJ has been used in the past, how it is being used in current research, and how ACJ may be a suitable tool to identify the relationship between student ability to critique and student ability to produce "good" graphic designs.

2.1   Research Questions

The research questions that guided this study were:

1. What is the relationship between student graphic design critique abilities and student graphic design abilities?

2. What patterns or themes emerge that may explain the correlation between student design ability and student critique ability?

2.2   Literature Review

Within graphic design education, instructors typically have a limited amount of time to teach budding graphic designers the skills they need to be successful in the graphic design field. Instructors typically focus on teaching different overarching elements and principles to their students as these elements and principles provide the foundational knowledge students need to begin designing (Poulin, 2011; Dabner, Stewart, & Vickress, 2017; Baldizan, & McMullin, 2005). In addition to a focus on elements of design, specific software interfaces, skills, applications, and techniques make up the foundation of many graphic design courses.

Knowledge of, and comfort with, these software applications is coupled with instruction on graphic design principles and then used by students to engage in the completion of assignments related to design.

       2.2.1   Graphic Design Skills Taught in University-level Design Education

In a university-level graphic design classroom, these courses are often intended to teach and prepare students for industry with the hope that students will become good or even great designers (Motley, 2017). In many graphic design courses, the instructor focuses on teaching two main skills in the classroom, software skills and design skills (Wang, 2006) with both skills deemed important to a student's development into a successful graphic designer (Bridges, King, Brown, & Luedeman, 2013).

Although instructors have access to a variety of software they can teach their students how to use (Barr, Krueger, & Aanstoos, 2002; Arntson, 2011), some of the more common software tools used in graphic design are Adobe Photoshop© and Adobe Illustrator© (Gorski, 2018; Arntson, 2011; Tan, & Melles, 2010). Both products are heavily used in the design industry primarily due to their ease of use, widespread adoption, and various tutorials offered in the form of books, websites and videos (Team, 2012; LinkedIn Corporation, 2019; Flow Graphics, 2019). As instructors implement curriculum and lesson plans that teach students how to use these programs, students will be able to develop the skills they need to succeed in the graphic design industry (Team, 2012).

In addition to learning about software, which may help students become better graphic designers, most graphic design classrooms also teach fundamental graphic design elements and principles including: line, shape, balance, and color, among many others (Lupton, & Phillips, 2015). Further, communication with others - another important skill to have in the graphic design

industry - is readily taught to students (Bridges, King, Brown, & Luedeman, 2013; Wang, 2006). Instructors often teach students this skill by having students work in groups and providing opportunities for peers to critique each other's work (Wanner, & Palmer, 2018). Although critique is an important part of communicating with others, students need coaching on how to provide their peers with meaningful critique (Ion, Sánchez Martí, & Agud Morell, 2019; Taylor, & McCormack, 2004). Students who are able to successfully give and receive critique may also be able to understand how they need to change and improve their own future designs (Wanner, & Palmer, 2018).

2.2.2   Critique Implementation in University-level Design Education

Critique, a common element included in graphic design education (Motley, 2017), often involves an instructor, a peer or the student themselves giving feedback on a design (Yoshikawa, 2018; Dannels, Gaffney, & Martin, 2008; An, 2015; Ellmers, 2006). Critique within graphic design education, has been deemed influential for improving student's designs (Weinstein, 2017; Wanner, & Palmer, 2018) and students who demonstrate good critique skills have been shown to have strong communication skills and have a strong grasp on the foundational knowledge they have been taught (Dannels, Gaffney, & Martin, 2008). Taken together, these previous findings seem to the suggest the potential for a relationship between how much design skills students are able to develop and their ability to critique in a graphic design classroom.

2.2.2.1   Instructor feedback

Implementing critique in the classroom takes on many different forms (Motley, 2017). In most cases the responsibility of teaching critique falls on the instructor, who provides an example to students of what critique looks like in the classroom (Fahim, & Masouleh, 2012). One perceived advantage to the instructor providing critique is that the student receives feedback

from an "expert" in the field. The instructor may be able to communicate the faults of the design and areas for improvement can be highlighted (Motley, 2017). nother common critique method is to give students the opportunity to give feedback to their peers (Ruegg, 2015; Wanner, & Palmer, 2018). According to research, students find both instructor and peer feedback beneficial when improving their design (Wanner, & Palmer, 2018) and this approach has seen growth in recent years. Peer feedback may include splitting the class into several groups and allowing peers to present their design in smaller groups and each group member provides feedback to their peer (Wong, 2011), or allowing each student to present in front of the class to their peers and the instructor who provides feedback (Weinstein, 2017). Research has shown that, while commonly used, peer critique and feedback does not always engage all students and some students may not have the confidence to verbalize their feedback (Schrand, & Eliason, 2012). Further, peer feedback and critique rely heavily on communication skills in the form of public speaking, a skill that needs to be taught and demonstrated by the teacher to improve successful use by students (Dannels, Gaffney, & Martin, 2008).

Fahim & Masouleh (2012) suggest implementing three processes which may help students improve their critique skills:

1. Annotating

2. Previewing

3. Contextualizing

Annotating refers to writing critique, highlighting what the design does well and what needs improving. This process is commonly used when giving written feedback and, in the case of this research, ACJ uses written feedback to record critique from students. Previewing is a holistic approach where a student can look at the design overall, or at the overall theme of the design,

and determine how well the design is implemented holistically. Finally, contextualizing is an approach wherein a student relates their own background and experiences to the design and looks at how the design influences or is influenced by their own perception. As an example, a student who knows someone who died from cancer, may be influenced by a cancer themed infographic may be influenced more than a student who does not know anyone who has died from cancer.

These processes can be facilitated by encouraging students to ask what Fahim & Masouleh call *Socratic questions* (2012). Socratic questions allow the receiver of critique to process and understand the critique they are receiving. If students are able to master the strategies and *Socratic questions*, they may also be able to improve their critique ability. While common critique techniques involve students submitting assignments and an instructor returning the assignment with feedback (Hyland, 2003) to help the student recognize what they need to improve on, some instructors may also allow students the ability to resubmit the assignment with improvements for a higher grade following a critique.

2.2.2.2 Self-Reflection

A third form of student-led critique involves self-reflection as a way generate feedback. In this approach students are given a set of prompts they must answer to help them see how they can improve their design (Ellmers, 2006, Grabinger, & Pollock, 1989). The types of prompts that students use to reflect may include a specific set of headings that encourage students to speculate how their skills and knowledge used on a design project may be applied to a future design project (Ellmers, 2006) or a list of questions students answered to help them reflect on their design project (Grabinger, & Pollock, 1989). Research has shown that self-reflection provides the same learning benefits as teacher feedback in terms of grades (Grabinger, & Pollock, 1989).

However, students who received feedback from the teacher did report having more creative designs compared to students who used self-reflection (Grabinger, & Pollock, 1989).

Critique has several benefits in the graphic design industry once students graduate. Both Bridges, King, Brown, & Luedeman (2013) and Wang (2006) surveyed several graphic design instructors and industry professionals to determine which skills a competent graphic design graduate should have. Among the many design skills listed, being able to communicate with others was one of those skills. Critique requires the ability to communicate well with others. In the industry, that may include communicating with coworkers on a project, or communicating with clients on how to meet their expectations. Although critique is not explicitly named as a necessary skill in the industry, critiquing requires an ability to communicate with others, a skill every graphic designer should have.

Critique in all of its forms and the design skills taught in the graphic design classroom are both used to assist the student in learning about graphic design. It is difficult to measure how critique, relate to and influence—if at all—a student's ability to design by simply observing how a student designs and critiques. While intuition and research hint at the possibility, the literature around graphic design education is not definitive around this relationship and leads us to question if there is a relationship between a student's ability to critique and a student's ability to design, and if there is, how strong that relationship is or how indicative one ability is of the other. These questions are specifically raised in recent research (Yoshikawa, 2018; Zhang, 2019) which highlighted the potential for using Adaptive Comparative Judgment (ACJ), to investigate student's ability to critique and design.

2.2.3   Adaptive Comparative Judgment

Adaptive Comparative Judgment (ACJ) was identified as a potential data collection tool for this study because ACJ has been shown to be reliable and allows users the ability to provide feedback on the items they are comparing (Pollitt, 2012a) – or, as is the case in this research, critiquing. ACJ, which allows users to compare two items side by side to determine which of the two is better, is well-suited for this project as students would be able to compare two design projects and determine which of the two is better. As students use ACJ, the students will be able to critique each item, citing what they like and what they don't like about each item by typing out their feedback, which will later be read by their peer. Students comments represent their critiques of items and the opportunity to assess these critiques presents a path for also identifying each student's critique skill.

In ACJ settings the judges, made up of students, instructors, or both, compare two items, side by side and judge which item is better (Pollitt, 2012b). As judges compare items, over the course of several rounds, a rank order is generated (Pollitt, 2012a) with items that are consistently chosen as "better" moving to the top of the rank order and those that are not moving towards the bottom. In addition to a rank order, ACJ also outputs a parameter value. A parameter value, which is based on Rasch-modeling statistics, is related to the rank but also shows the magnitude of difference in items contained in a rank order (e.g., parameter values of 2.38 and 2.01 represent both a rank and a greater difference than 1.45 and 1.43). These parameter values will be used in the correlational analysis between design and critique ability in students.

While the majority of research surrounding ACJ has traditionally focused on using ACJ as an alternative form of assessment (Bartholomew & Yoshikawa, 2018) other research has shown potential for ACJ to be used in other areas of education such as instruction (Bartholomew, Strimel & Yoshikawa, 2018; Yoshikawa, 2018) and recent research has focused on using ACJ as

a critique and feedback tool (Bartholomew, Strimel & Yoshikawa, 2018; Yoshikawa, 2018;

Zhang, 2019).

2.2.4   Using ACJ as a Method for Collecting Critique

Research that uses ACJ as a tool for giving feedback has shown that ACJ is a viable

option for instructors to use in the classroom. Bartholomew, Strimel and Yoshikawa (2018) used

ACJ as formative assessment tool by allowing students to critique their peers in the middle of a

project and then again at the end of the project. Four sections of a middle school class—all

taught by the same instructor—were assigned to either a control group or an experimental group

and the students in the control group shared their design in small groups with other peers and

received feedback on their design. Conversely, students in the experimental group used ACJ to

assess each student's design and provide feedback on each design at the same time period the

control group students were receiving feedback in small groups. In ACJ the designs were

assessed holistically based on the rubric of the assignment by the students. This particular study

showed several benefits to using ACJ as a peer feedback tool as well as the ability for comments

to be collected and organized within the *CompareAssess* system. Additionally, students were

exposed to their peer's work through involvement in ACJ, allowing students to view multiple

designs. The study highlighted the benefit of using ACJ as a way for students to critique each

other's work.

Other studies have shown the benefits of using ACJ as a form of peer assessment. For

example, Potter et al. (2017) used ComPAIR (another software very similar to *CompareAssess*,

which facilitates comparative judgments) with three university-level classrooms: an English

classroom, a Math classroom and a Physics classroom. While there were some minor differences

in the results of this study because classes were taught in different environments (lecture vs

online) and some classes were taught using different methods (lecture vs lab-based), this study showed that students found ACJ helpful in comparing peer answers and giving and receiving feedback (Potter et al., 2017). Students were required to submit an assignment to be uploaded to the COMPAIR website depending on which course they were taking: students taking English submitted an essay, students taking Physics submitted a scientific plan, and students taking Math submitted an assignment showing they knew how to use a specific math tool. Students then assessed their peers using the COMPAIR website and provided feedback on each of their peer's work. Students who participated in the study felt that ACJ had a positive impact on their learning. Additionally, the results of the study showed that students benefitted from using ACJ as a feedback tool, meaning that the feedback helped improve their peer's design and related to the requirements of the assignment. This result is important in establishing how ACJ can be used effectively as a tool that students can use to provide meaningful feedback.

Another study used ACJ to determine the quality of the feedback received during an ACJ session (Demonacos, Ellis, & Barber, 2019). Third year pharmacy students were asked to judge 10 of their peer's reports and give each of them feedback. Overall the feedback was high quality, and students had a positive experience participating in this study and were able to see how their design compared to their peer's design. Similar to the study conducted by Potter et al., (2017), this study demonstrated that ACJ can be used as an effective peer assessment tool that also helps students learn how to improve their own design and practice giving quality feedback to their peers. Additionally, ACJ automates the process of assessing the students (generating a rank order) and collecting the feedback from each student.

Closely related to this project, Zhang (2019) conducted a study using think aloud protocols and ACJ in graphic design education. Her study focused on determining if there were

similarities between how instructors assessed and gave feedback on graphic design projects and how students assessed and gave feedback on design projects. Each participant was recorded using a screen capture device that recorded mouse movement and any verbal cues made by the participant. This study found that instructors and students differ in both how they rank graphic designs and the type of feedback they give. Students tend to justify their choice and provide more positive feedback when compared to instructors. Additionally, instructors tended to make a judgment quickly and move on to the next comparison while students did not. Zhang conjectured that this could be due to the experience of the instructors. Zhang suggests that perhaps graphic design instructors are accustomed to making comparisons between student's designs and determining which design is better, without even knowing about ACJ (Zhang, 2019). This study also highlights the importance of using ACJ as a learning tool - throughout the process Zhang recognized how students changed and shaped their thoughts and opinions about certain design projects as the same design project came up. Both the positive feedback that students tended to give, along with the potential for ACJ to be used as a learning tool, may help shape students into better designers by allowing them to give and receive feedback.

Each of the highlighted studies connects with the proposed research and identifies potential benefits of using ACJ as a data collection tool. However, despite the research synthesized here, none of these studies investigated if there is a relationship between student's critique ability and their ability to design.

2.3   Summary

This chapter reviewed the literature behind the graphic design skills students are taught in university-level graphic design classrooms, the different types of critique used, and how teachers can improve critique skills in the classroom. This chapter also explained ACJ and how ACJ may

be used as a feedback tool to facilitate critique. Using feedback in ACJ has proven successful in identifying key components related to a student's ability to critique (Bartholomew, Strimel & Yoshikawa, 2018; Yoshikawa, 2018) and ACJ appears suitable to facilitate research into the relationship between student design ability and student critique ability. It is anticipated that the results from this effort will influence pedagogical decisions of graphic design instructors related to critique in the classroom.

CHAPTER 3.   METHODOLOGY

This chapter will highlight how data was collected and analyzed for this study. It will begin by discussing the research question, important background information, and how Adaptive Comparative Judgment (ACJ) was utilized, as a research instrument, throughout this study. Finally, this chapter will discuss how the collected data was investigated to explore the relationship between students' design critique abilities and their design abilities.

3.1   Research Questions

The research questions that guided this study were:

1. What is the relationship between student graphic design critique abilities and student graphic design abilities?

2. What patterns or themes emerge that may explain the correlation between student design ability and student critique ability?

3.2   Design of the Study

While research has defined different types of critique used in classrooms (Motley, 2017), different ways that students design (Tafur-Arciniegas, 2015), and differences in critique ability (Steinberg, 1994), little is known about the potential correlation between student critique and design abilities. Anecdotal evidence, and to some extent logical reasoning, suggests that student's improvement in both critique and design abilities may happen in parallel fashion (e.g., improvement in one may result from, or lead to, improvement in the other). However, research-based evidence to support or refute this relationship is lacking. Therefore, this study aimed to investigate the extent to which there may be a relationship between critique and design ability.

This study was focused through an a priori lens by looking at both critique ability and design ability as a whole. Results from this effort may serve to assist design instructors in emphasizing ideas, principles, or practices that are most effective in improving student learning and design. For example, if a positive relationship between student abilities in design and critique could be found this may suggest that improving student critique ability will improve student design ability and vice versa.

In this research, the student work, and the critiques made by students, were used to represent both a student's ability to design and a student's ability to critique, respectively. ACJ was used in this study because this platform gives students the ability to assess their peers work and provide feedback on that work at the same time as the work is being assessed. Student design work was ranked during one ACJ session and the parameter values from this session were downloaded and used to represent each student's design ability. In addition to designing, these same students also engaged in critique of peer work. Their critiques, as well as the item they critiqued (see Figure 3.1), were evaluated by course TAs, through ACJ, and the results of this second ACJ session were a rank order and parameter value for each student representing their critique ability. The results from both the students design and critique data sets were compared to investigate potential correlational relationships.
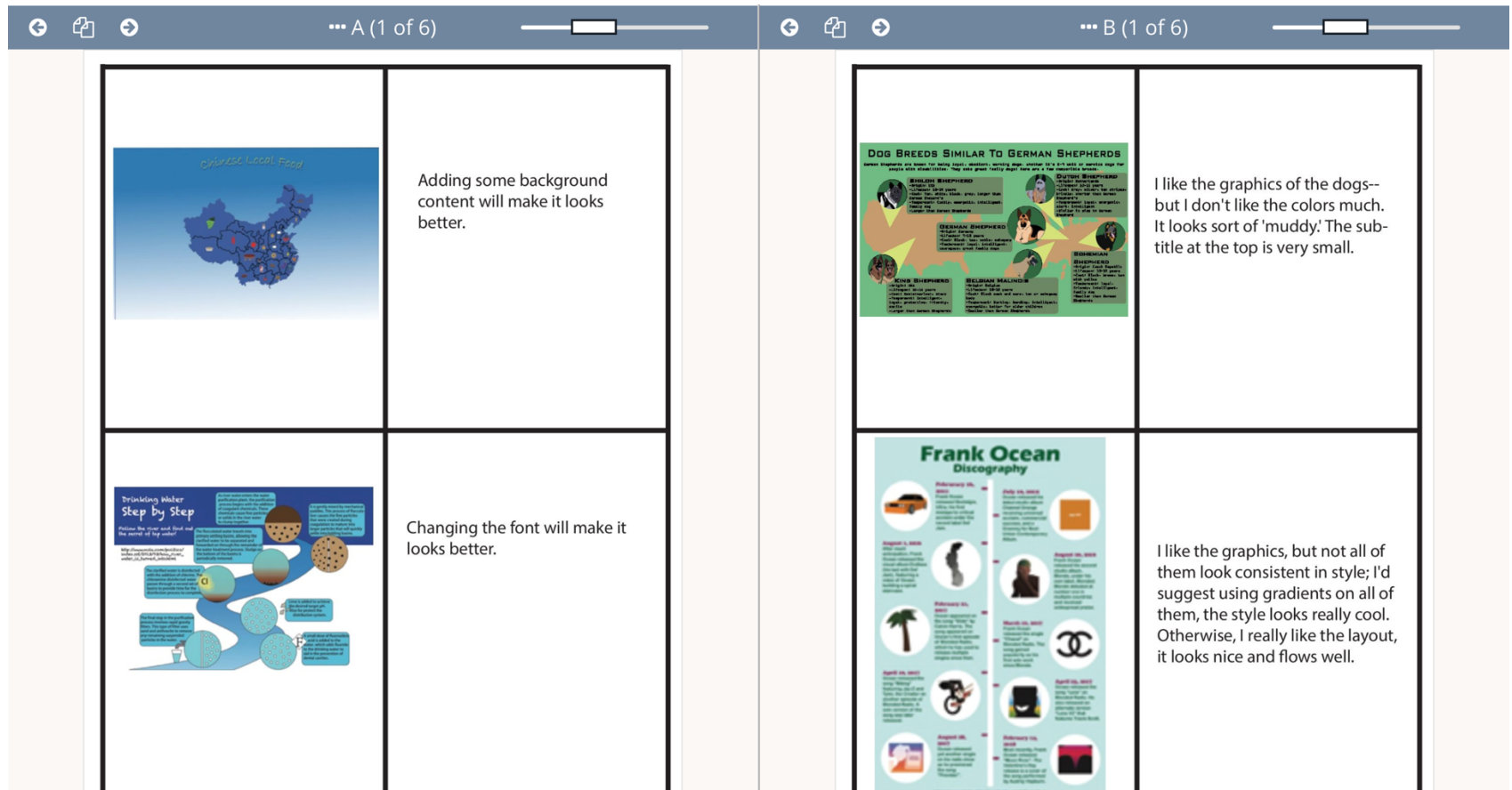
Figure 3.1 Example of student critiques judged by instructors.

Student submissions (N = 50), from three sections of an introductory graphic design course, were collected for use in this study. The student creators of these submissions also engaged in ACJ to both provide feedback and critique peer student work; their critiques were collected and both data sets—the student Design scores and their Critique scores—were used in a correlational research approach to investigate the potential relationship between student graphic design critique abilities and student graphic design abilities. Correlational research approaches were suited for this study due to the exploratory nature of this work and the potential for this work to serve as a catalyst for future research. Following the correlational analysis, an additional thematic qualitative analysis of selected comments was also completed to further investigate the identified research questions.

The qualitative analysis was used to investigate any patterns or themes that provided insight into the nature of the potential relationship investigated through the correlational analysis. This qualitative effort was accomplished by dividing students into four groups:

1. the top five students who were good at critique and design,

2. the top five students who were good at critique,

3. the top five students who were good at design, and

4. the top five students who had poor performance in both.

Five students were chosen for each group by comparing both the design score and critique score for each student. The researcher compiled each student's name and their associated design and critique scores into an excel spreadsheet, organized the data from lowest critique score to highest critique score, and selected the top five students who had a high score in both design and critique for the first group, the five students who had a high score in critique and a low score in design for the second group, the five students who had a high score in design and a low score in critique

for the third group, and the five students who had a low score in both design and critique for the final group. The groups needed to be large enough to ensure enough data would be present during data analysis, but small enough to ensure the students in that group best represented the group (i.e. students who are good designers and good at critique are in the first group). Chosen student critiques were qualitatively coded to identify themes that arose in each group and those spanning between all four groups.

3.3 Context of the Study

This study took place in a large public research university located in the Midwest United States. Student infographics and student feedback were collected from an introductory graphic design course and used in this study. This course, which is a 3-credit hour undergraduate course entitled "Fundamentals of Imaging Technology," revolves around elements of graphic design and skills in Adobe's Photoshop©, Illustrator© and After Effects©. The purpose of this class is to teach tools and skills students need to become good graphic designers by teaching students about foundational principles and elements of graphic design and providing students with opportunities to practice designing. Additionally, students were taught about, and practiced giving and receiving, critique throughout the semester. This class, which is typically comprised of freshman and underclassmen, is a required class for those who major in computer graphics, animation, video game development, and other related fields.

3.4 Participants

Prior to this study, 50 students from an introductory graphic design course judged 50 of their peers' infographics. The data was collected and used as each student's design ability for this study. Students also provided critique on each infographic they judged. Those critiques were

collected and judged by TAs to determine each student's critique ability. TAs were chosen as judges because they were seen as experts and taught students about critique throughout the semester. Five TAs who taught the introductory graphic design course participated in this study as judges in an ACJ session by judging the quality of the student critiques using data collected prior to this study.

3.5   Design Project

This introductory graphic design course uses several design projects that utilize a student's ability to design using different platforms (i.e. Adobe Photoshop©, Illustrator©, and After Effects©). This study specifically investigated one project from this course which tasked the students with creating an infographic on a topic of their choice using Adobe Illustrator©. This infographic was designed to convey information in a creative way and inform an audience about a particular topic (see Figure 3.2 for an example of a student-created infographic). This project was selected because the students work on this project after having completed several introductory experiences learning about and designing using graphic design elements and principles with the selected software. It was anticipated that this prior experience may help improve the potential for students to have a solid understanding prior to designing and/or critiquing these assignments.
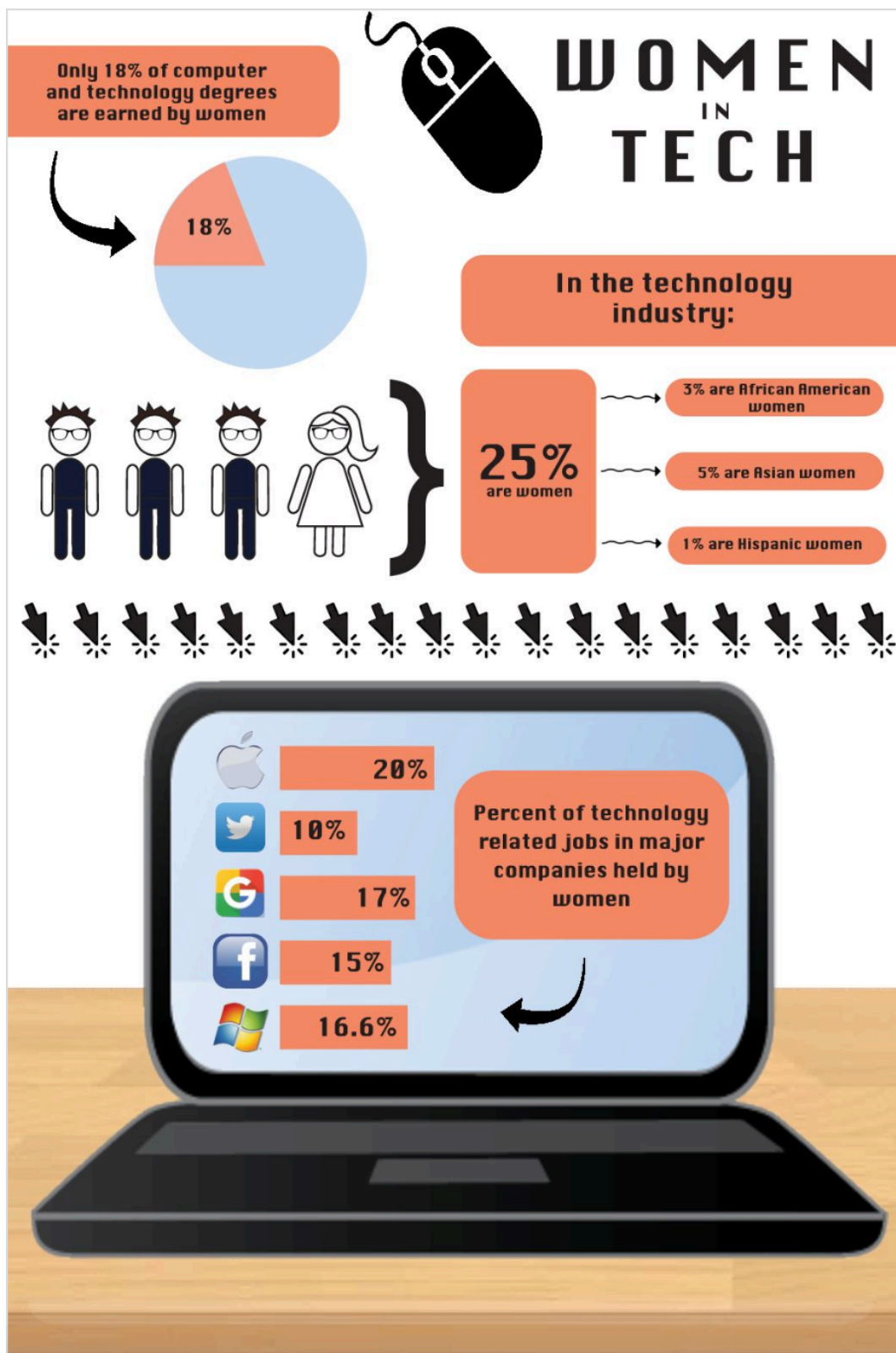
Figure 3.2 Example of a student created infographic.

3.6   Student Design Score and Student Critique Score Data Collection

Both the Student Design scores and the Student Critique scores were collected through separate ACJ sessions. The Student Design score was collected in a previously-completed project through ACJ judgment of student-created infographics. ACJ was used by students in comparative judgments of these items with the resulting rank order and parameter value for each student as the output. This parameter value was referred to as the Student Design score and was compared to the Student Critique score.

The Student Critique score was collected from judgements made by five TAs who taught the introductory graphic design course as they reviewed critiques made by the student-creators of the design projects assessed the Student Design scores session. Each TA judged students' critiques and determined which student they thought, of the pair displayed, demonstrated the best critique ability. To collect the Student Critique scores, the head instructor, who oversees the TAs and assists instructors with teaching the introductory graphic design course, randomly selected three sections of the introductory graphic design course for inclusion in this study. From these three sections, the researcher randomly selected 50 students, and their feedback provided to others as critique, to be used as the items that would be compared. The researcher created the critique documents for each student with the infographics judged in one column and the student critiques provided to peers in another column (see Figure 3.3). The researcher uploaded these documents to the *CompareAssess* website and trained five TAs, who have taught or are currently teaching the introductory graphic design course, how to use the *CompareAssess* website to complete judgments. TAs completed the ACJ judgments and based their decisions on the holistic statement "which of these students demonstrates a better critique ability?" TAs had one week to complete each of their judgments and all TAs completed an average of 50 judgments. The TAs achieved an inter-rater reliability of 0.84 suggesting consistency in judgment decisions among

TAs. A reliability higher than 0.70 was considered acceptable for this data analysis. The researcher downloaded the parameter values from this session and compared these with the Student Design score.

really well made, looks real.
maybe make the head in the
middle, like make his ears smaller
or even on both sides

really cool and well made, looks
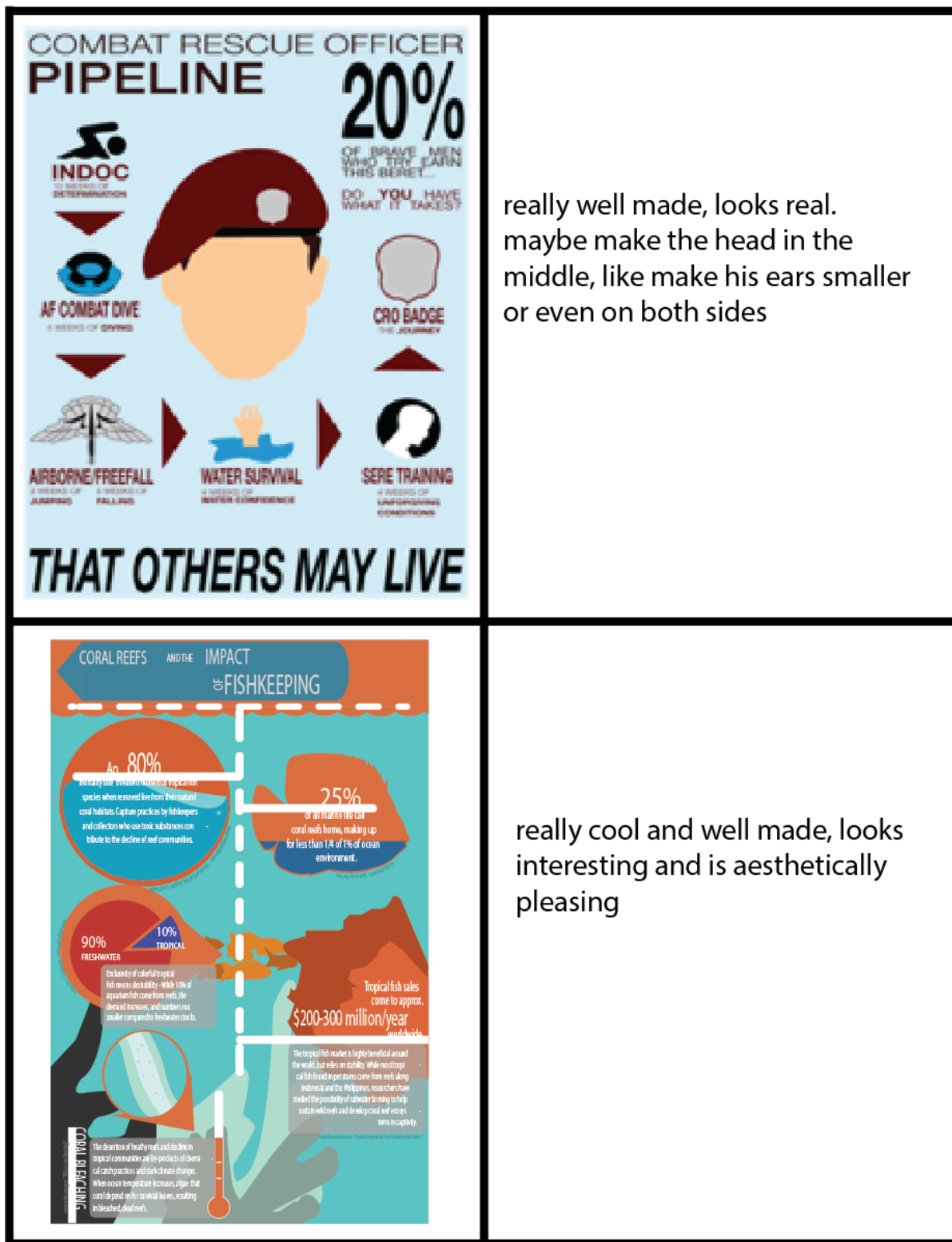interesting and is aesthetically
pleasing

Figure 3.3 Example of the first page of a critique document.

3.7   Data Analysis

The data analysis of this study was divided into three steps: the first was to determine each design ability (referred to as a Student Design score) and their critique ability (referred to as a Student Critique score), the second was to calculate the relationship between a student's Critique score and Design score, and the third was to determine if there were any themes that emerged between students who were good at both critique and design, students who were good at one and not the other, and students who were not skilled at either critique and design. The researcher collected the Student Design and Critique scores, following completion of judging by TAs, and compared the two scores using a Pearson Correlation test to determine if there was a relationship, and the strength of that relationship, between student design ability and student critique ability. The researcher used SPSS software as the primary tool to run this test.

3.8   Additional Insight

Following the correlational analysis, student critique documents were further analyzed to determine potentially common themes between students who were good at both design and critique (HDC), students who were good at critique but poor design (HCLD), students who were good at design but poor at critique (HDLC), and students who were poor at both design and critique (LDC). The thematic analysis was carried out in three separate phases (Saldana, 2013): first, identifying patterns and themes and generating a coding scheme, second, refining the coding scheme, and third, applying the refined coding scheme to the data.

In the first phase, the researcher identified common patterns in the data by comparing 10 critique documents and noting commonalities between them and creating a coding scheme based on common themes and patterns. These patterns included comments that referenced graphic

design elements in their comment, those that mentioned the specific content of the infographic, and those that discussed how well the infographic was organized and how readable the infographic was. The researcher made notes of the patterns that began to emerge in preparation for phase two.

In the second phase, the researcher, another graduate student, and a professor applied the codes generated from phase one over a series of rounds. Each round consisted of each coder applying a set of codes to critique documents and then discussing with the other coders to determine the reliability and make changes to the codes, if necessary. This phase was done in an effort to limit individual bias as three coders applied these codes independently. In the first round, the coders applied the code generated in phase one to 10 different critique documents. Each coder was given access to the same 10 critique documents randomly selected by the researcher. Following coding, the coders met together to discuss the coding scheme and adjusted it as necessary. After each round, the researcher used Krippendorff's alpha, a statistical tool to identify the reliability between multiple coders, to determine the inter-rater reliability between all three coders. The process of coding separately and then meeting together continued over four rounds, until the inter-rater reliability was high enough between all three coders ($\alpha \geq 0.70$). The coders achieved an inter-rater reliability ($\alpha = 0.7419$) at the end of the four rounds; specific findings and details from these meetings are shared in the following chapter.

In the third phase, the researcher first identified the top five students who achieved high scores in both the Student Design and the Student Critique (HDC). This was done by creating three columns in an excel spreadsheet. The first column was the student name and the second column were the design score. The third column was the critique score. The researcher organized the design score parameter values from highest to lowest, then identified the top five students

who had high design score and a high critique score. The researcher used the same data to identify the top five students who achieved a high critique score and achieved low design score (HCLD). The researcher identified the top five students who achieved high design scores and achieved a low critique score (HDLC). Finally, the researcher identified the five students who achieved low scores in both sessions (LHC). All groups were analyzed separately but followed the same procedure in phase three for the thematic analysis of comments.

During phase three, the researcher marked instances of each theme as they emerged in the comments and calculated totals for each. The researcher then analyzed how often each theme emerged, the relationships between themes, and used this data to further explore the conclusions related to the research questions.

3.9   <u>Summary</u>

This chapter discussed the methodology of this research study. This chapter identified the design of the study, the context of the study and the participants of this study. Using ACJ, this study attempted to identify the relationship between student's ability to design and student's ability to critique. Data was collected from the ACJ session to determine this relationship and the researcher will analyze student comments to help explore potential reasons why this relationship exists or does not exist.

CHAPTER 4.   FINDINGS

The purpose of this chapter is to discuss the results of the data after using quantitative and qualitative analysis to answer the research questions used in this study. This chapter is divided into two main parts: 1) the relationship between student's ability to design and student's ability to critique and, 2) the thematic analysis of comments from students who were ranked high, and low, for critique and design.

4.1   Research Questions

1. What is the relationship between student graphic design critique abilities and student graphic design abilities?

2. What patterns or themes emerge that may explain the correlation between student design ability and student critique ability?

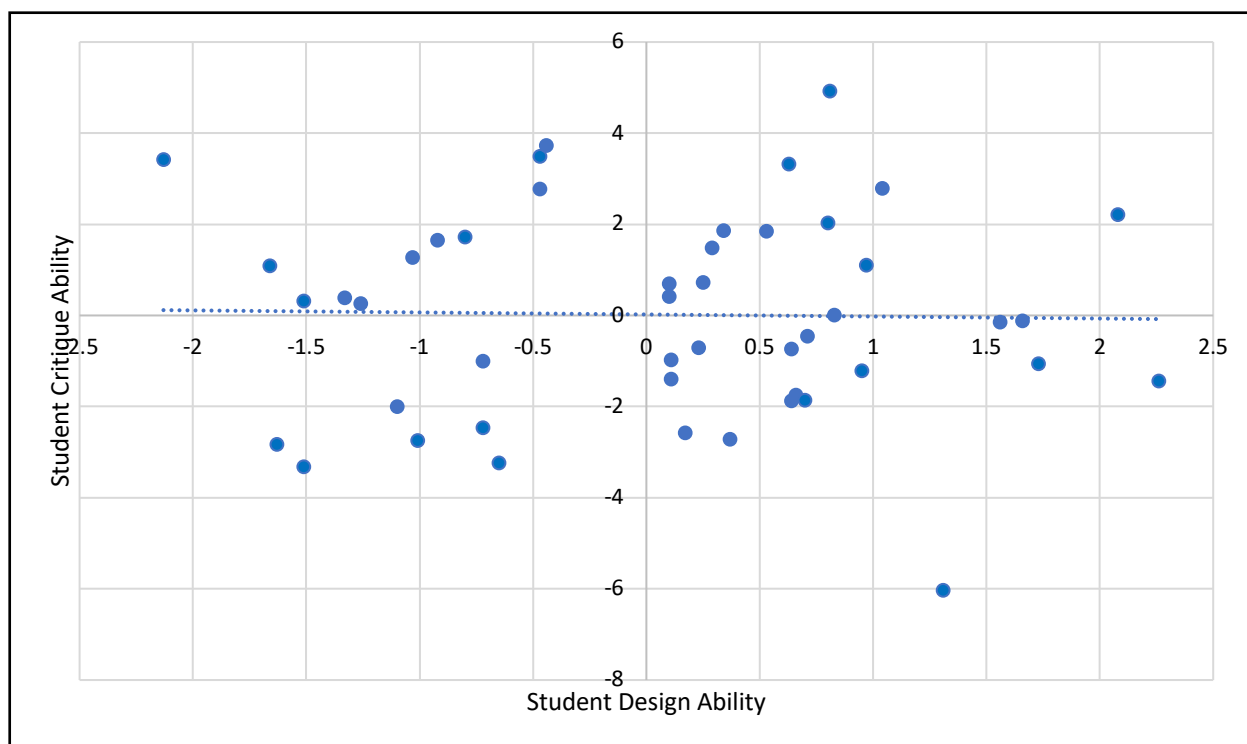## 4.2   Quantitative Analysis of the Relationship Between Student Critique and Student Design

The purpose of this section is to explore the first research question of this study: What is the relationship between student graphic design critique abilities and student graphic design abilities? This section aims to describe the process of analyzing the relationship between a student's ability to critique and a student's ability to design by using parameter values downloaded from the ACJ engine *CompareAssess*.

The researcher downloaded both the Student Design scores and the Student Critique scores from their respective ACJ sessions. The ACJ output included the parameter values and other data that was not used in this study (average decision time on making judgments and the number of judgments made). The unnecessary data was removed and only the students name and parameter

value were retained. Three students' data were not used as these students had completed their

critiques but did not submit an infographic to be judged which would have represented their

design ability. The data were organized alphabetically by student's first name for both the

Student Design score and the Student Critique score. Both scores were entered into SPSS and a

Pearson Correlation test was run (see Table 4.1). The results showed no significant relationship

between a student's ability to design and a student's ability to critique. By plotting the

parameters values of both sessions on a scatterplot, with student critique ability on the y-axis and

student design ability on the x-axis, the degree of scatter in data can be readily seen visually (see

Figure 4.1).

Table 4.1 Pearson Correlation test comparing both the Student Design Ability Session and the Student Critique Ability Session.

		Design Ability	Critique Ability
Design Ability	Pearson Correlation	1	-.021
	Sig. (2-tailed)		.888
	N	47	47
Critique Ability	Pearson Correlation	-.021	1
	Sig. (2-tailed)	.888	
	N	47	47

Figure 4.1 Scatterplot showing the relationship between student critique ability and student design ability.

Of note, the student design ability axis ranges in values from -2.13 to 2.26 and the student critique ability axis ranges from -6.03 to 4.93. The smaller student design ability range indicates that there was a smaller range between all student's design ability. The larger student critique ability range indicates a larger variability between students in overall critique ability.

4.3   Thematic and Pattern Analysis

The purpose of the qualitative effort, following the quantitative analysis, was to determine if there were any themes or patterns that emerged that may explain why some students were good at critique, some were good at design and some were good/bad at both. These themes were used to explore if there was a difference between students who are good at critique and design, students who were good at critique and students who were good at design. It was anticipated that

students who were better designers may focus on certain themes while students who were good at critique may gravitate towards similar or other themes. Initial coding processes were used to generate a coding scheme over a series of phases; these were used to analyze the student critiques and determine a coding scheme that would capture the overall themes of the critiques (Saldaña, 2019).

The researcher followed the same three phases discussed in chapter three by first analyzing 10 random critique documents to determine if there were common themes between the critiques. The critiques, in association with the accompanying graphic would help the researcher identify the themes that emerge from the critiques. The themes generated during this phase would be used as a coding scheme for the following phase. Four themes were identified: graphic design elements, content of the infographic, organization of the infographic, and the readability of the infographic.

1. **Graphic design elements**: The graphic design elements theme was used when critiques included any of the graphic design elements and the following subcodes of the graphic design elements code were also included: color, text, unity, background, flow, and use of space.

2. **Content:** The content theme was used when student liked or disliked the content of the infographic or thought the infographic had too much or too little information.

3. **Organization:** The organization theme was used if the critique contained problems with the organization of the infographic or the critique contained mention of how well the infographic was organized. Some critiques mentioned the problem with some infographics being hard to read.

4. **Readability:** The readability themes were generated to be used in this situation.

The researcher, another graduate student, and a professor coded one set of 10 critique documents. The intent of this initial effort was to attempt to determine if the codes could be applied to all of the data without unintentionally misrepresenting the themes that certain critiques have because they did not fit into one of the generated codes. Once all three participants finished coding, the researcher uploaded the codes from each coder to SPSS to be analyzed. Due to the nature of the data, Krippendorff's alpha, a statistical test that identifies the inter-rater reliability between multiple raters, was used to determine the inter-rater reliability between the three coders. The inter-rater reliability between all three coders ($\alpha = 0.4664$) was deemed unsatisfactory for proceeding. The coders met together to discuss the codes and determine refinements to the codes that may capture the themes of each critique without causing confusion. The seven codes created after this discussion were *color, typeface* (text, font)*, unity* (including background)*, layout* (including flow, size, spacing and organization)*, understandability* (amount of information and simplicity)*, personal preference and unrelated* (comments that do not relate to the codes above). The coders then practiced with the new codes by coding one critique document consisting of 10 critiques, and then discussing any discrepancies between the codes. In this particular round, the coders had a higher inter-rater reliability than before ($\alpha = 0.6172$), but not high enough to be acceptable ($\alpha > 0.70$). The coders then revisited the codes and decided to remove the *unrelated code* as it wasn't used and the other codes seemed to better explain the main themes of each critique. The coders applied this new coding scheme, without the removed code, to five critiques. The inter-rater reliability for this round was once again low ($\alpha = .5793$) suggesting the need for a new approach. Specifically, the coders had a difficulty choosing and applying any number of codes to each critique which caused a great deal of variability in the data. Because of this, the researcher reworked the way coders recorded their data; instead of

choosing specific codes for each comment, the researcher and coders simply made a binary

decision (yes or no) as to whether a critique included each specific code by marking "Y" for yes

or "N" for no (Table 4.2 and Table 4.3). The coders, using the new data collection method and

the refined code list, coded again with the new approach and achieved an acceptable inter-rater

reliability (α = .7419). Following this result, the researcher proceeded to phase three.

Table 4.2 Example of how coding was done in the first three rounds.

	Coder 1	Coder 2	Coder 3
	3	3,2	3
	1	1,2	1
	3	1,2,3	2,3
	1,3	1,2,3	2,3
Critique Document 1	3	2,3	1
	1	1,2	1
	1	1,2,3	1,3
	1,3	1,2,3	3
	1,2	1,2	1
	1,3	1,3	1,3
	3	1,2,3	1
Key	1-Graphic Design Elements	color, text, unity, background, flow, and use of space	
	2-Content	like or dislike, amount of information	
	3-Organization	how well the information is organized	
	4-Readability	if the infographic was hard to read	

Table 4.3 Example of how codes were recorded during the last round.

	Coder 1	Coder 2	Coder 3
Color	N	N	N
Typeface (font, text)	N	N	N
Unity (background)	N	Y	Y
Layout (flow, size, spacing, organization)	N	N	N
Understandability (amount of info, simplicity)	Y	N	Y
Personal preference	N	N	N

Phase three involved the researcher applying the codes generated in phase two to several students' comments. The researcher first identified four groups of comments to analyze as outlined in chapter three:

1. The top five students who had a high score in both design and critique,

2. the top five students who had a high score in critique and a low score in design,

3. the top five students who had a high score in design and a low score in the critique, and
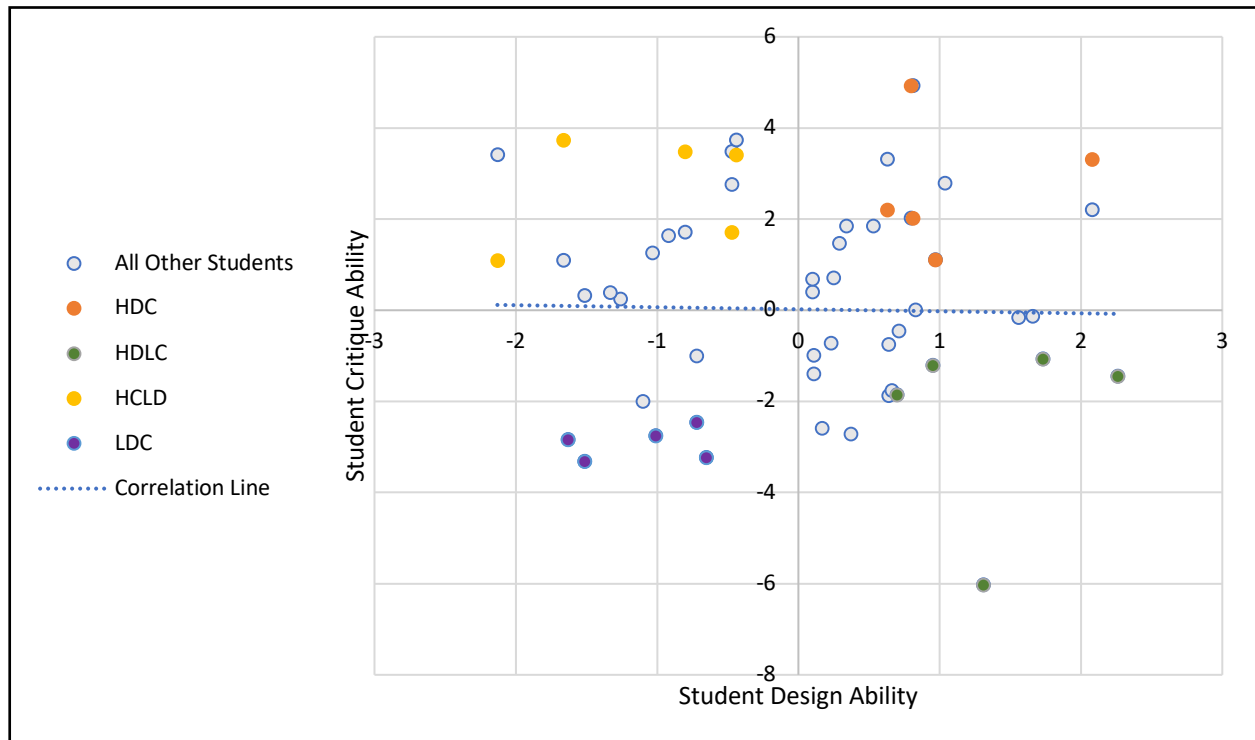
4. the bottom five who had a low score for both.

Figure 4.2 Each color represents a different group of students.

The five students from each group were selected using a spreadsheet that had the student name and their associated Design Ability score and Critique Ability score. The researcher organized the data from lowest Critique Ability score to highest Critique Ability score. The researcher then selected the top five students who had high scores in both critique and design. The next group was selected by looking for students who had a high Design Ability score and a low Critique Ability score. Students who had a high Critique Ability score and a low Design Ability score were selected for the next group. The final group was selected by looking at the students who had the lowest score in both critique and design. *Figure 4.2* shows the students in each of the four groups and where they are located on the scatterplot.

The researcher coded each critique document for the students identified above. The codes were then tallied up to determine if there were specific codes that certain groups identified more

with. The purpose of this step was to determine what patterns or themes emerged between students who were good at critique, good at design, good at both, and bad at both (Table 4.4).

For brevity purposes, in the remainder of the document the students who have a high score in both critique and design will be designated as HDC, students who have a high score in design and a low score in critique will be designated as HDLC, students who have a high score in critique and a low score in design will be designated as HCLD, and students who have a low score in both critique and design will be designated as LDC.

Table 4.4 The four student groups identified and codes tallied for each group.

	High score in both design and critique (HDC)	High score in design, low score in critique (HDLC)	High score in critique, low score in design (HCLD)	Low score in both design and critique (LDC)
Color	22	15	23	11
Typeface	25	16	18	13
Unity	16	8	15	4
Layout	31	22	23	14
Understandability	23	14	15	8
Personal Preference	10	14	14	12
Total	127	89	108	62

By further analyzing the data, students who had a high score in both design and critique (HDC) had double the amount of codes compared to students who had a low score (LDC) in both design and critique. As an example, one HDC student commented,

Very good info with good graphics. Everything is spaced and sized excellently. You have a

lot of info but it is not overwhelming, and it is also very easy to read. Color palette is also

fitting to the theme and works well. Maybe do something with the background to add some

illusion of movement.

While one LDC student commented on the same portfolio, "*too simple*." In this instance the HDC student would be coded as including the codes layout, understandability, color and unity. The LDC student would be coded as including understandability. The HDC student's comment demonstrates an understanding of the positive aspects of the infographic and also offers suggestions as to how to improve the infographic while the LDC student only indicated that the infographic was too simple without any context or suggestion on how to fix it. This pattern continues across most HDC and LDC students.

The HCLD student group also identified more codes than the HDLC group. This seems to reinforce the idea that there was not a significant relationship between student critique ability and student design ability – i.e., if there was a relationship, then the students designated as HDLC would have a similar total to those students who were designated as HCLD.

Interestingly, unity was the highest in both the HDC and HCLD students groups. It seems that students who were good at critique were able to see the overall unity of the infographic and comment on it. For clarity, student comments were coded with unity when the background or overall cohesiveness of the infographic was mentioned. In relation to unity one student who was designated as HDC commented

I really love the idea of the watercolor, the flower coming out of the head is also very

cool but the white background is a little bit overpowering so maybe adding a very light

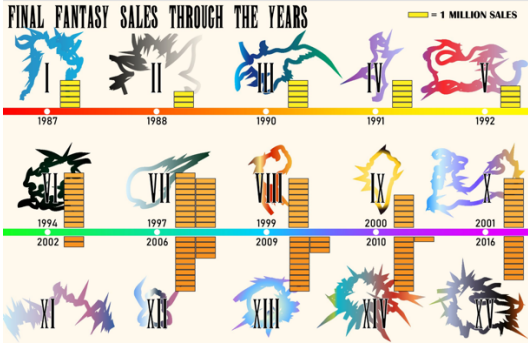*color in the back instead of just white would work well!*

Those students who were designated as LDC did not comment on unity nearly as much as students who were designated as HCLD. The LDC student group had a total of four unity

comments and the HCLD student group had a total of 15. The HDLC group also had a low amount of unity comments; HDLC students had eight unity comments, lower than the HCLD group's 15 and the HDC group's 16. In reference to research question 1, if there was a relationship between critique and design, it would stand to reason that the HCLD student group and the HDLC student groups would have similar scores. However, as noted, the HCLD student group had almost double the amount of unity codes compared to the HDLC student group.

Further, the HDC students had the lowest personal preference code with only 10, indicating that they spent less time sharing their opinions of the infographic and instead focused on identifying what needed to be fixed. The HCLD, HDLC and LDC commented on personal preferences 14,14 and 12 times, respectively. While these results are closer together, each group's total number of codes were less than the HDC group, meaning that the HDC group proportionally had less comments describing personal preference. Additionally, critiques that focus less on personal opinions and focus more on identifying where the infographic can be improved appeared to be easier to understand and potentially more helpful. Students who focused less on opinion also seemed to understand how to communicate faults easily and clearly, something that other groups struggled with.

By comparing student comments side by side, the difference between each group becomes more readily recognizable. Table 4.5 compares comments from one HDC student, one HCLD student, and one LDC student. All three students commented on the same infographic, shown in the leftmost column, and both the HDC student and the HCLD student focused on what was wrong with the infographic and offered suggestions on how to fix it. Alternatively, the LDC student only talked about what was wrong with the infographic and did not offer any suggestion on how to fix it.

Table 4.5 Compares comments from different students who rated the same infographic.

Infographic	Student with high PV in both critique and design (HDC)	Student with high PV in critique and low PV in design (HCLD)	Student with low PV in critique and design (LDC)
	Inconsistent with the positioning of bars. Moving bottom bars to their own line at the bottom of infographic would help. Simple style, easy to understand, is good	*Change of color seems nice but is not appropriate because it is supposed to be a info graphic and the information has to be crystal clear. Yellow block means 1 million but orange block in the second phase? I know it is 1 million but has to be same color or mentioned. I like the background designs for every number, seems cool.*	*my mind jumps around the paper*

As another example, table 4.6 compares one HCLD student, one HDLC student and one LDC student. Interestingly, both the HCLD and the LDC student discussed the amount of information included in this infographic. Although both students would have a similar code, the HCLD student continued on to discuss what would happen to the reader and to include more icons to break up the information. This indicates that this student potentially has a deeper understanding of graphic design elements and infographic design layout, or they were at least more willing to share such information in a critique.

Table 4.6 Another analysis of students who commented on the same infographic.

Infographic	Student with high PV in critique and low PV in design (HCLD)	Student with high PV in design and low PV in critique (HDLC)	Student with low PV in critique and design (LDC)
	Is it the correct size? I feel like there is way too much information and readers would lose their interest coming towards the end. *I like the icons, it would be nice if you could include more icons within the text. The heading font and color seem to go in hand with your topic.*	*Very interesting information, title texts look great, maybe different font for the information*	*There is a lot of text but it's easy to read.*

Table 4.7 includes another example of how students from various groups commented on the same infographic. The HDC student commented on how much they enjoyed the look of the infographic along with a recommendation to change the layout. The HCLD student thought that the layout looked fine but recommended changing the font. The LDC student also recommended changing the font. It is interesting to note the difference of opinion between the HDC and HCLD student regarding the layout of this infographic. Both students noticed that there was a problem with the information but the HDC student recommended reorganizing the information and the HCLD student recommended changing the font.

Table 4.7 Table comparing an additional set of critiques.

Infographic	Student with high PV in both critique and design (HDC)	Student with high PV in critique and low PV in design (HCLD)	Student with low PV in critique and design (LDC)
	That burger is amazing! The information part of the infographic is a little scattered - maybe change the layout a little.	*Very good layout, info and illustrations except you might want to try making the info pop more by either changing the font or the illustrations around the font.*	*The hamburger looks good but I think the font and the size of your words are hard to see.*

4.4   <u>Summary</u>

This chapter identified the data analysis process that was used for this study. The design and critique scores showed that there was no significant correlation between a student's ability to design and a student's ability to critique design. Additional insight split students into groups to determine if student who were good at critique, good at design, good at both, and bad at both gravitated towards specific codes. Those student groups who were good at critique were able to identify more codes when compared to student groups who were better at design. Additionally, students who were good at design commented on different aspects of an infographic compared to students who were good at critique. This reinforces the conclusion that there does not seem to be a relationship between student critique ability and student design ability.

CHAPTER 5.   DISCUSSION AND CONCLUSIONS

Both design and critique are common concepts taught in graphic design classrooms. The relationship between the two is unclear. This chapter will discuss the implications of the data collected and analyzed. The purpose of this chapter is to provide an overview of the study, provide a possible reasoning behind the results of the data, and offer potential for future research.

5.1   Study Overview

This study aimed to identify if there was a relationship between a student's ability to critique design and a student's ability to design. By investigating this potential relationship, it was anticipated that the results would assist university-level introductory graphic design courses in focusing their teaching on the most important elements for improving students design abilities.

The data collection for this study took place over the course of three weeks with one week for TAs to complete their judgments, one week to identify themes and code the critiques, and one week to analyze the data. Prior to this study, students completed infographics on a topic of their choosing and completed an ACJ session critiquing their peers work. Topics of these infographics included video games, oceanography, TV shows and many more.

Each student's critiques, and the associated infographics, were downloaded from *CompareAssess* and compiled into critique documents with each student's critique they provided on the right and the infographic on the left. These documents were uploaded to *CompareAssess* and another ACJ session was created. Five TAs completed the ACJ session by determining which student demonstrated a better critique ability. TAs were given one week to complete their judgments. Chapter four discussed how the data was analyzed and the results will be discussed in this chapter along with opportunities for future research.

5.2   Research Questions

The research questions guiding this study were "What is the relationship between student graphic design critique abilities and student graphic design abilities?" and "What patterns or themes emerge that may explain the correlation between student design ability and student critique ability?" Findings suggest two main ideas:

1) There does not appear to be a relationship between student design ability and student critique ability. This was reinforced through both the quantitative and qualitative analysis.

2) There are differences in what students focus on while critiquing. As an example, students who were good at critique focused more on the overall unity of the design when compared to other student groups.

5.3   Discussion

The findings discussed in Chapter four will be further discussed in this chapter. Each research question will be discussed along with any implications found in analyzing the data. This section will be divided into a quantitative section and a qualitative section.

5.3.1   The Quantitative Relationship Between Student Critique Ability and Student Design Ability

The first research question asked, "What is the relationship, if any exists, between student graphic design critique abilities and student graphic design abilities?" After analyzing the data, there was no significant correlation found between a student's ability to design and a student's ability to critique. This could have implications for graphic design instructors and the content they teach in their classrooms. Additional implications, including implications with using ACJ, will also be discussed.

The data indicated that there was no significant relationship between a student's ability to critique and a student's ability to design, which may imply there should be a change in graphic design teaching methods. As mentioned in previous chapters, graphic design instructors typically teach graphic design content, assign graphic design projects, then provide different forms of critique (peer, instructor or self). If there does not seem to be a relationship between critique and design, instructors may focus less on critique and more on design to ensure their students are provided with an appropriate amount of information in the limited amount of time offered in a semester long class. Instructors may conclude that they should solely focus on teaching about design, rather than teaching critique in addition to design. The qualitative data analysis from this study suggests that there are two fairly distinct groups of students: those who are good at critique and those who are good at design. Focusing only on design may alienate students who are good at critique.

The scatterplot (Figure 4.2, below) also reveals some differences between critique and design. The data is more spread out on the x-axis when compared to the y-axis indicating that Critique Ability was more widely spread when compared to Design Ability. Design ability is taught throughout the semester, while critique is only taught during major projects. The different ranges could indicate the difference in the amount of time Design Ability and Critique Ability are taught. Additionally, the different ranges could show student's overall understanding of critique and design. Since design is taught more in the classroom, most students have a good understanding of how to design. Critique on the other hand, is not taught as much and perhaps students struggle to understand how to provide quality critiques.

Figure 4.2 Scatterplot comparing student design ability and student critique ability.

5.3.2   The Qualitative Relationship Between Student Critique Ability and Student Design Ability

The second research question asked, "What patterns or themes emerge from students who are good at design and students who are good at critique?" The main goal of the qualitative analysis was to answer this question and determine if there were any common themes that emerged between students who had various proficiencies in critique and design. This section highlights the conclusions found in the qualitative data and attempts to explain the patterns that emerged in the data.

Students who were high ability in both critique and design had the most codes out of all of the other groups, meaning their critiques were full of graphic design elements and many of the students provided recommendations on how to fix their peer's infographics. On the other hand, students who had low ability in both had the least amount of codes, meaning their critiques

mentioned less graphic design elements. Both the student group that high design ability and the student group that had high critique ability were somewhere in the middle, with the student group that was had high critique ability having more codes. If there was a relationship between critique and design, there should be more similarities in themes between each group. Instructors may conclude that if there is not a relationship, they should focus less on critique and more on design. However, the data suggests that there were at least two main groups of students in the classroom in this study: those who are good at design and those who are good at critique. As instructors are required to teach a wide variety of students with a wide variety of skills in both design and critique they may find it difficult to identify which students are better at critique or design. Therefore, it may also be most beneficial to all students in the classroom for instructors to teach both design skills and critique skills with different emphases for different students.

Another consideration is the timing of when design and critique are taught. It is possible that the relationship between design and critique hinges on which one is taught first. In the case of this study, design was taught before critique. This could impact the relationship between the two because design abilities would be developed while critique abilities would be neglected. Additionally, switching the two could show improved critique ability at the beginning of the course. This could assist students in improving better communication with their peers and help students improve their critique abilities. This potentially could help them improve their design abilities by helping them improve their communication.

By comparing the critiques from each group, the length of the critiques also was a factor in how successful a student was in their critique. Many of the students who had a high critique ability, either a high ability in both critique and design or critique only, had a longer phrase or multi-sentence critiques that captured multiple recommendations for improvement. Although

length in and of itself does not indicate a good example of critique, many of these students discussed what they thought the design did well and then offered suggestions for improvement. By having both a positive and negative aspect to the critique, it made many of the critiques easier to understand. On the other hand, students who had low ability in both critique and design had very short comments - anywhere from two words to a short phrase. Many of these comments were not long enough to be able to determine exactly what needs to be fixed. Other comments focused on the content and didn't provide any critique whatsoever. Therefore, it may be useful for instructors to emphasize with their students how to create meaningful feedback to help students communicate their feedback to their peers.

Interestingly, one of the codes that seemed to determine if a student was good at critique was unity. Unity was the highest with both the students with high ability in both design and critique and the students who had high ability in critique. Both groups were able to determine if all of the parts of an infographic fit together to form a cohesive design. Students who can separate the parts of infographic and determine which parts fit together and which parts need to be improved seem to be better at critique. It may be in the best interest of the instructor to emphasize unity and instruct students on how to identify the different parts of an infographic and be able to determine what needs to be fixed.

Opinions in critique were also a common differentiator between students who were good at critique and students who were not. Many of the students who had a low critique ability focused more on what they thought about the theme of the design (i.e. "*I like it*," "*Halo is for noobs*," etc.). These types of comments are not helpful for the designer because they do not show what a designer needs to fix to improve their design. Students who had a high critique ability focused less on opinions and more on how well the design implemented the graphic design elements. As

an example, *"The colors seem a little weird. I'm having a hard time following it. Your icons are awesome though! I would maybe change the layout"* This example demonstrates how this student implemented graphic design elements into their critique; they first discussed how the colors are "weird" which may indicate to the designer that they may want to work on the colors; next the critiquing student mentioned they like the icons the designer created, which indicates the designer may not have to alter the icons; finally, the student suggests changing the layout, meaning the designer should look into changing the layout to make the information clearer. This critique demonstrates a potential "formula" for others to follow – focusing positive and negative aspects of the design with an emphasis on design elements and how cohesive the design is.

ACJ is not a common assessment tool used in the United States. Additionally, students using ACJ during this study were not given any incentives or compensations for completing the session. It is possible that students who had low design and critique ability lacked the motivation to give adequate feedback. Many of the comments were short and indicated a lack of effort put into each critique. Examples included, *"too much text,"* and *"my mind jumps around the paper."* The lack of effort is evident in the brevity of each comment and many of the comments made from this group of students were similar. The other groups often included concepts they liked about the infographic and concepts they think needed fixed. The low design and critique ability students rarely had both something they liked and something that needed fixed. There are a few potential reasons for the perceived lack of motivation and effort displayed from this group of students. The first being that the lack of incentives or compensation could be a reasoning for this behavior. Another reason may be the introductory graphic design course itself - some students lack motivation to do well in introductory courses because of the basic content taught and the ease of the workload. This may be something instructors may need to look into and implement

content, activities, assignments and projects that help motivate a wider range of students to become better at critiquing and design.

5.3.2.1   Qualitative Conclusions on the Lack of Relationship Between Critique and Design

One conclusion that may explain why there doesn't seem to be a relationship between student critique ability and student design ability is Bloom's taxonomy, which discusses different levels of learning. Each level of learning represents the depth at which a student understands a concept (Bloom, 1956). Two of the higher levels of thinking include design and critique. According to the revised version of Bloom's taxonomy, design is the highest level of thinking and critique is the second highest (Krathwohl, & Anderson, 2009). Those students who possess a high performance in design may have a higher level of thinking compared to those students who have a high performance in critique. The data also showed that students who possess a high performance in both critique and design had better scores in both critique and design when compared to those who performed well in just critique. Applying Bloom's taxonomy to this study shows that students who have a higher performance in both design and critique may have a deeper understanding of graphic design principles and may be able to communicate their thoughts easier than other groups.

Similarly, there may be a different thinking process involved in designing and critiquing. Designing requires creativity and a knowledge of software to create the design. Critique requires the ability to communicate well and the ability to find problems in designs and offer suggestions on how to fix it. Although both design and critique fall under graphic design as a whole, both thinking process may require different skills and be exhibited in different ways. It is possible that certain students possess both the skills and mindset for critique while not being talented in design.

5.4   Recommendations for Future Research

Future research should further investigate the relationship between a student's ability to critique and a student's ability to design because there could be other facets of the relationship between student design ability and student critique ability that are currently unknown. Understanding this relationship further and how students learn and develop skills in a graphic design classroom may help instructors know how to improve student's design and critique ability. By using different forms of critique, researchers may find out more about teaching critique and design in graphic design classrooms.

This study used data from three different introductory graphic design courses taught by three different instructors. The curriculum taught in all three courses was the same but the way it was delivered by each instructor may have been slightly different. Further research may need to investigate the relationship between student design ability and student critique ability by using student work taught by the same teacher. At the university location where the study took place, instructors only teach one class per semester which meant limiting the data to just one instructor would not be feasible.

The timing of when design skills and critique are taught is an important consideration. In this study, design was taught before critique. This could have an impact on the relationship between the two. It is possible that teaching critique before design helps students better learn design because they have been able to practice how to communicate with each other. Additional research may need to investigate if the timing between when critique and design are taught have any impact on the relationship between the two.

Using ACJ in this study made collected data easier and convenient because ACJ is able to record comments and assess students at the same time. As mentioned above, ACJ does have its

limitations with how ranks are determined. By using a different type of assessment, researchers may be able to further analyze design and critique skills and how they relate.

This study recorded and analyzed written critique. Part of the reason for this is a limitation with the ACJ tool used in which comments can only be typed out. One main form of critique used in the classroom is in the form of written critique, however, there are other forms of critique including differences in medium (i.e., oral critique versus written), setting (i.e., critique in front of a classroom versus in person), and evaluator (i.e., critique from a teacher versus a peer). Differences in the medium, setting, and evaluator may yield different results that will ultimately help inform how critique and design interact in the classroom.

This study relied on a previous ACJ session completed by students and an ACJ session completed by TAs as part of this research. This may have caused discrepancies in the data because students may judge differently than TAs. TAs have more experience assessing and grading students and may be able to observe certain aspects of a design that students may not be able to see. Future research needs to address this issue and determine if the relationship still exists and it may depend on who participates in each ACJ session. As an example, future research could look into using TAs as participants in both ACJ sessions, or using students in both ACJ sessions. Using different groups may eliminate the discrepancy and shed some additional light on the relationship between student design ability and student critique ability and what instructors could do to improve student learning in a graphic design classroom.

Comparing each student's grades and which of the four groups they are in could also be another part of future research. Understanding how grades correlate with each student's design and critique abilities may shed light on how the relationship between critique and design is

represented and any changes that may need to be made to better show each student's design and critique abilities.

Identifying if there is a gap between a student's critique ability and another student's design ability may also be of use. By researching how students react to designs that are better than their own and how they give feedback, instructors may be able to further understand the difference between low design and critique ability students and high design and critique ability students. Students may react differently and give different feedback if they are presented with a design that is near perfect in their eyes. Investigating how students react to designs better than their own may also be of interest.

5.5 Conclusion

Although this study did not find a relationship between design and critique, there are several new opportunities for research into this relationship, the different student groups identified herein, and their skills. This study did reveal that there are different groups of students that demonstrate different abilities. Some students are good at critiquing other student's work and communicating the positive and negative aspects of a design. Other students are good at creating good designs. Instructors should be able to identify which students are good at which abilities and be able to help them improve those abilities.

This study also found some of the elements that students who are good at critique observe while critiquing a design. Students who were able to understand how cohesive a design was were able to successfully communicate the positives and negatives of a design. This could play into the content that instructors teach while teaching about critique. Instructors may want to teach their students to look at the elements of design and how they combine to form a cohesive design. According to the data, unity is an important aspect of becoming student who is good at critique.

Students who are good at critique also add detail to their critiques. These students often wrote about the facets of the designs that they liked. Then they wrote about facets that needed to be fixed. The idea of providing positive and negative feedback was a common pattern found in many of the high critique ability student's critiques.

This study set out to find if there was a relationship between student critique ability and student design ability. Although this study found no relationship between the two, this study did uncover four different types of students in a graphic design classroom and some of the patterns that emerged in students with a high critique ability. More research should be done in this area to help instructors and students further understand how skills in critique and design could be developed to further improve teaching and learning.

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