2020

Exploring Destination Imagination Alumni Perceptions of 21st-Century Skills and Workforce Readiness

Sharon Kovalevsky
Walden University

Walden University

College of Education

This is to certify that the doctoral dissertation by

Sharon Kovalevsky

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Darci J. Harland, Committee Chairperson, Education Faculty
Dr. Gladys Arome, Committee Member, Education Faculty
Dr. Dimitrios Vlachopoulos, University Reviewer, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Exploring Destination Imagination Alumni Perceptions of

21st-Century Skills and Workforce Readiness

by

Sharon Kovalevsky

MS, California State University, East Bay, 2008

BEd, University of Technology, Sydney, 1998

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education: Learning, Instruction, and Innovation

Walden University

September 2020

Abstract

Workplace requirements are vastly different from the past due to rapid changes in technology and globalization, and they require graduates to have well-developed 21st-century skills and innovation strategies. The problem addressed in this study was the lack of understanding of how 21st-century skills that alumni learned through academic extracurricular experiences informed their early career and workforce readiness. The purpose of this qualitative study was to explore how Destination Imagination (DI) alumni perceived that the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career readiness. The study was grounded by the 3 constructs of work ethic, innovation, and career readiness found in Rojewski and Hill's career-technical and workforce education framework. Using a basic qualitative methodology and semistructured interviews, the research questions explored the perceptions of 11 adult DI alumni with 3 or more years of experience and up to 4 years in the workforce. The qualitative interview data were analyzed in two cycles of emergent coding based on the framework. The key finding was that DI alumni perceived their experiences developed a wide variety of skills desired by employers necessary for successful entry into the workforce. Specifically, these skills included teamwork, communication, innovation, critical thinking, creative problem-solving, initiative, and life-long learning. The results of this study may contribute to positive social change by providing administrators, teachers, and parents insight into the potential of academic extracurricular activities to enhance student skills, thereby decreasing the performance expectation gap between graduates and employers.

Exploring Destination Imagination Alumni Perceptions of 21st-Century Skills and Workforce Readiness

by

Sharon Kovalevsky

MS, California State University, East Bay, 2008

BEd, University of Technology, Sydney, 1998

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education: Learning, Instruction, and Innovation

Walden University

September 2020

Acknowledgments

Foremost, I would like to express my love and appreciation to my wonderful husband, Adam, without whose support and encouragement, this journey would simply not have been possible. To my daughters, Emma and Heidi, who inspire me every single day. To my mum, Marcia, who held the beacon and always hoped I would. To Lyn, who knew I could write the first one, even before I did. To Judy, who propelled the ship in my absence. To DI for allowing me in, and to the participants in this study for their passion and insight. Finally, to my stellar Walden team, Dr. Arome and Dr. Harland, for their guidance and patience throughout this journey. Thank you!

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

Global economies and the future of work are rapidly changing due to globalization and technological innovation (Penprase, 2018). Indeed, in 1982, Buckminster Fuller claimed that human knowledge doubled every century until 1900, and following that, every 13 months. Then in 2013, IBM predicted that by 2020, human knowledge would double every 12 hours (Jenson et al., 2017). To keep up with such rapid change, industries require graduates to arrive prepared to work, with skills and competencies to meet these 21st-century challenges (Makulova et al., 2015; von Glasersfeld, 1995). Industry relies on human capital to provide the skills required for success (Malin et al., 2017). However, a review of the current literature reveals that, on the whole, this is not the case. Current empirical studies from around the world reflect that employers perceive a significant gap between their expectations and graduate performance (Abbas & Sagsan, 2019; Kunz & de Jager, 2019; Triyono et al., 2018). Employers, educators, and students agree that necessary 21st-century skills might be bolstered through participation in various academic extracurricular activities (ECAs; Nuijten et al., 2017; Pinto & Ramalheira, 2017). In this study, I sought to gather evidence of ways that this expectation performance gap might be narrowed. I used a basic qualitative methodology to interview 11 academic ECA program alumni to gather rich, thick descriptions of their perspectives and experiences of how the skills they learned in Destination Imagination (DI) influenced their entry into the workforce.

This study adds a unique contribution to the existing literature that is currently lacking by gathering alumni perspectives of how their experiences influenced their entry into the workforce. These perspectives are important because they may inform innovative instruction by reinforcing practices or extending thinking into creative ways to develop much needed 21st-century skills, knowledge, and abilities. The potential social implications of the study may include raising administrator, educator, and parental awareness of the influence of academic ECAs to improve the performance expectation gap between graduates and employers.

Chapter 1 details a brief summary of recent empirical literature that situates this study. This includes a description of the partner organization DI. I describe the problem and the purpose of the study, followed by the research questions and a description of the framework upon which they are based. I include a description of the basic qualitative methodology used to guide the study, as well as definitions of key terms, assumptions, scope, limitations, and delimitations for the study. This chapter concludes with a statement justifying the significance of this study and the implications it may have for social change.

Background

In a review of empirical studies from the past 5 years, I explored the 21st-century skills developed through participation in ECA, how the skills transfer to support graduates' early careers, and employers' perspectives on graduate career readiness. ECAs discussed in this study included those related to science and engineering, international, experiential, and performance-based activities. Students of all ages described a wide

range of 21st-century skills to which they ascribed development through participation in various academic ECAs. These skills are organized into the three constructs of Rojewski and Hill's (2017) framework of work ethic (Cushing et al., 2019; Khanlari, 2013; Mislia et al., 2016), innovation (Eguchi, 2016; Li, 2017; Nazha et al., 2015), and career readiness (Miller et al., 2018; Tiessen et al., 2018; Wong & Leung, 2018). Researchers acknowledged that the type of program influences student learning (Chan, 2016), and the general conclusion was that participation in ECAs nurtures skills vital for career success in the changing workplace (Ozis et al., 2018). However, little is known about how ECA participants who identify and attribute skills built through participation in ECAs as students perceive influence on their skills and abilities in the workforce years later. ECA and 21st-century skill research studies have elicited data from students still participating in a variety of ECAs (Eguchi, 2016; Fondo & Jacobetty, 2019; Sahin et al., 2015), from mentors and teachers who lead ECAs (Cushing et al., 2019; Mirra & Pietrzak, 2017), and from parents of students who participated in particular ECAs (Batubara & Maniam, 2019; Behnke et al., 2019). However, this leaves a gap related to alumni reflections on their ECA experiences and how alumni regard the impact of those experiences on their entry into the workforce. Concerning the specific ECA of DI, the literature has largely focused on program evaluations, leaving a gap pertaining to alumni outcomes.

Employers value a variety of 21st-century skills, placing a high importance on soft skills in particular (Pazil & Razak, 2019; Stewart et al., 2016). However, on the whole, employers perceive a significant performance expectation gap between their needs and graduate abilities (Brown, 2019; J. D. Cohen et al., 2017; K. Jackson, 2016; Pazil &

Razak, 2019). Some of this discrepancy is industry and location dependent (Makulova et al., 2015), and employers and academics perceive that clear communication describing industry requirements to academic institutions is vital (Baird & Parayitam, 2017; Low et al., 2016). Employers, academics, and graduates perceive that these skills can be strengthened by a variety of internships and activities (Alshare & Sewailem, 2018; K. Jackson et al., 2016). This leaves a gap, however, in understanding the perceptions of ECA alumni as to what activities they deem helpful as they enter the workforce. An increased understanding of these issues may inform educators, administrators, and parents regarding the future development of ECA experiences focused on promoting student career readiness and success.

Four aspects of 21st-century skills not typically found in the frameworks surfaced in recent studies. The first, psychological safety, related directly to teamwork and collaboration. The development of successful teams relies on trust, mutual respect, the ability to admit mistakes, and jointly accepting failure (Edmondson, 1999). Secondly, emotional intelligence is a concept that encompasses many 21st-century work ethic skills vital for success in the workplace and life. Skills such as self-awareness, flexibility, empathy, and stress tolerance are but a few traits encompassed by this term. Mobility is an attribute newly emerging from participant discussions in various studies (Makulova et al., 2015). Recent graduates refer to this concept to mean the willingness to change in a variety of ways to cope with new situations, geographically, socially, economically, and professionally. Finally, the learning approach of design thinking encompasses imagination and builds confidence and empathy through problem-solving (Carroll et al.,

2010). It is a five-step process used by designers that incorporates many 21st-century skills. These four concepts may lead to deeper discussion related to data emerging from this study.

Problem Statement

Workplace requirements are vastly different from the past due to rapid changes in technology and globalization, and they require well-developed 21st-century skills and innovation (Penprase, 2018). Examples of these skills include collaboration, life-long learning, communication, initiative, creativity, and entrepreneurship to name a few (Rojewski & Hill, 2017). However, research shows not only that students are inadequately prepared to meet the needs of a changing business environment (Cohen, J. et al., 2017) but also that employers are generally dissatisfied with 21st-century skill levels of incoming graduates (Baird & Parayitam, 2017; Stewart et al., 2016). Additionally, Hendrix and Morrison (2018) found that employers and graduates perceived differing levels of competence regarding these skills. Some have suggested that to address this problem, students should develop and meet competency requirements before entering the workforce (Pang et al., 2019). Wasik and Barrow (2017) suggested utilizing existing programs such as DI to develop these work and 21st-century skills. Meanwhile, Falco and Steen (2018) noted the dearth of published studies examining the impact of career development interventions on college and career readiness outcomes overall. In particular, there is no research exploring DI alumni perceptions of career and workforce readiness.

The influence of academic ECAs on student learning has also been examined. Studies revealed increased student creativity in DI elementary teams (Shin & Jang, 2017), increased engineering skills among alumni of various ECAs (Fisher et al., 2017) and higher employability among college and university graduates who participated in cocurricular activities (Pinto & Ramalheira, 2017; Tiessen et al., 2018). Additionally, science, technology, engineering, and mathematics (STEM) competitions and clubs have been found to effectively foster student interest in STEM-oriented careers (Miller et al., 2018; Ozis et al., 2018). Further, Haddad and Marx (2018) added that participation in curricular activities increased high school student's career decision self-efficacy and soft skill development. Despite the body of evidence that academic ECAs improve students' 21st-century skills, there is a lack of research investigating whether students carry these skills with them into their early careers. Additional research is needed to determine if the skills students learn in academic extracurricular programs influence students when they move to the workforce. The results from this study may inform educational practice by providing data to teachers, administrators, and parents that may broaden and strengthen academic ECAs and school-based programs, thereby improving student readiness for a changing workforce. Therefore, by seeking alumni perspectives as their careers begin, this study will extend understanding of innovative practices in education preparing graduates for the workforce. The problem addressed in this study is the lack of understanding of how 21st-century skills, categorized by work ethic, innovation, and career readiness, that alumni learned through academic extracurricular experiences, informed their early career and workforce readiness.

Purpose of the Study

The purpose of this basic qualitative study was to explore how DI alumni perceive the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career and workforce readiness. These skills and competencies are essential to transition successfully into the workforce. To fulfill this purpose, I explored DI alumni perceptions of how their DI experiences informed their early careers and workforce readiness by collecting data from individual semistructured interviews.

Research Question

To organize my study, I developed one central research question (CRQ) and three subquestions (SQ).

CRQ: How do DI alumni perceive the 21st-century skills they learned through their DI experiences informed their early career readiness and workforce readiness?

SQ1: How do DI alumni perceive their DI experiences informed their work ethic?

SQ2: How do DI alumni perceive their DI experiences informed their ability to be innovative?

SQ3: How do DI alumni perceive their DI experiences informed their career navigation?

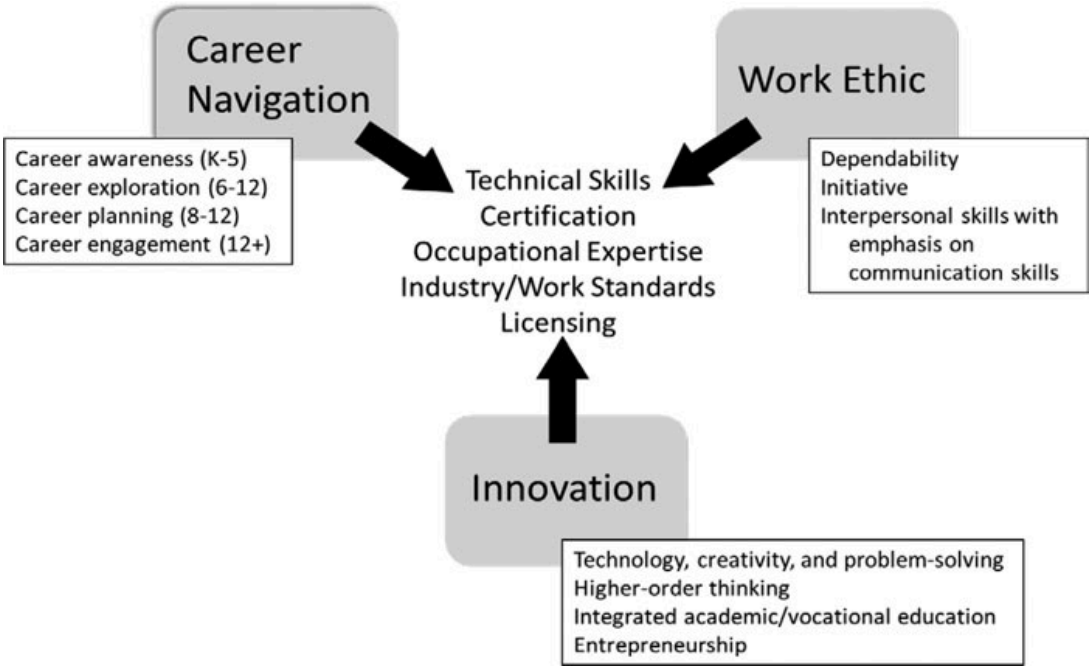
Conceptual Framework

The conceptual framework I used to ground this qualitative study was the career-technical and workforce education (CTWE) framework (Rojewski & Hill, 2017). Based on 21st-century skills, the framework was designed to guide research and develop

curriculum, preparing students for a rapidly changing workplace characterized by unpredictability due to innovation, emerging technology, and exponential knowledge growth (Rojewski & Hill, 2017, p. 8). The CTWE framework, shown in Figure 1, includes three constructs: career navigation, work ethic, and innovation (Rojewski & Hill, 2017). Work ethic incorporates communication, collaboration, interpersonal skills, and personal skills, for instance, dependability, initiative, perceptiveness, honesty, appreciativeness, conscientiousness, likeability, and enthusiasm (Rojewski & Hill, 2017, p. 9). Innovation involves creativity, problem-solving, higher-order thinking, entrepreneurship, and the ability to use technology in novel ways (Rojewski & Hill, 2017, p. 10). Career navigation includes life-long learning, understanding technology, ability to work in nonlinear and discontinuous work environments, ability to self-start, coping-behaviors, and taking initiative (Rojewski & Hill, 2017, p. 9).

Figure 1

Career-Technical and Workforce Education Framework



Note. From "A Framework for 21st-century Career-Technical and Workforce Education Curricula" by Rojewski and Hill, 2017, *Peabody Journal of Education*, *92*(2), p.180–191. https://doi.org/10.1080/0161956X.2017.1302211 Used with permission (See Appendix A).

Twenty first-century skills and frameworks have been developed for use in both educational research and organizational settings. Numerous models have been developed to organize the growing list of skills for various purposes. There are even models of the models (Kereluik et al., 2013). The most notable is arguably the Partnership for 21st-Century Learning framework (P21, 2009). Yet other studies have been conducted focusing on various skills, some creating frameworks that have been developed for various purposes such as the student involvement framework (Fisher et al., 2017) that identifies 20 specific skills attained through ECA involvement. Whilst the work of

Rojewski (2002) and Rojewski and Hill (2014, 2017) has been extensively referenced in the literature regarding 21st-century skills and CTWE (Malin et al., 2017; Ortz, 2015; Penprase, 2018), the framework has not been used to underpin any previous empirical research. Nevertheless, this framework was particularly well suited to my study because it specifically describes 21st-century skills in relation to workforce readiness, the phenomena I sought to explore, specifically, how adult alumni perceived the 21st-century skills they learned during academic ECA and how those skills informed their early career readiness. I aligned my research questions to the three framework constructs and used the framework to develop data collection tools such as interview questions. The 21st-century skills described within the CTWE framework provided support for coding during data analysis. The use of this framework was justified because it provided an organization of 21st-century skills, explained in context for successful entry into the changing workforce, which aligned with the purpose of my study.

Nature of the Study

I applied a basic qualitative design in this study. This method was appropriate to explore simple questions without employing specific philosophical, theoretical, ontological, or epistemological positions (see Patton, 2015). The use of a basic qualitative design was justified for several reasons. One reason was that the use of semistructured interviews aligned best with the goal of exploring perceptions and collecting rich, thick descriptions (see Rubin & Rubin, 2012) of how DI alumni experiences have influenced participants' early career and workforce readiness. This method aligned best with the purpose and problem in this study. The questions followed the constructs of the CTWE

framework. Thus, the design, data collection, and participant selection were aligned. Other authors cited in this study who have approached similar problems using a basic qualitative design include Donald et al. (2018), Nair and Fahimirad (2019), and Sahin et al. (2014).

In this study, I used semistructured interviews. Interviews provided the most appropriate method of data collection for this study because they provide rich, thick descriptive data on participants' perceptions (see Ravitch & Carl, 2016) and are a powerful way to gain insight on a phenomenon (see Siedman, 2012). I used purposeful sampling to recruit information-rich cases as suggested by Burkholder et al. (2016). I recruited participants to the study via a global DI alumni database. Inclusion in the study was limited to adults who had at least 3 years participating in DI as a team member and had worked for at least 6 months, yet not more than 4 years. Data were collected in 45–60 minute Zoom interviews and audio recorded. Online, audio-recorded interviews were the most practical choice of data collection because participants were geographically distant from me. I transcribed the recordings using Kaltura and emailed the transcriptions to participants for member checking. Then I coded in two cycles (see Saldaña, 2016) using Microsoft Word, Excel to store and organize data, and the software program, Dedoose, to help me organize data during the analysis phase.

Definitions

Career readiness: A framework construct involving key 21st-century skills that help people succeed in dynamic, flexible, and discontinuous work environments of the

future that include life-long learning, self-starting and coping-behaviors, taking initiative, and entrepreneurship (Rojewski & Hill, 2017).

Design thinking: An approach to learning and a way of exploring systems (Calkin & Karlsen, 2014) that involves imagination and builds confidence and empathy through problem-solving (Carroll et al., 2010) to enhance learning (Cutumisu et al., 2020)

Emotional intelligence (EI): A 21st-century skill involving "a cross-section of interrelated emotional and social competencies and skills that determine how effectively we understand and express ourselves, understand others and relate with them, and cope with daily demands" (Bar-On, 2006, p. 14).

Extracurricular Activities (ECAs): Organized student clubs or programs that carry no academic credit, are elective, and are pursued outside school hours. This is to exclude cocurricular activities that may be tied to an institution by credit or conducted during school hours (Fisher et al., 2017), such as sports activities and social clubs.

Innovation: A framework construct involving creative and innovative 21st-century skills including problem-solving, critical thinking, decision making, adaptability, and knowledge of and capability with various technologies (Rojewski & Hill, 2017).

Mobility: A 21st-century skill involving the willingness to change social, economic, geographic, and professional roles to cope in uncertain times (Makulova et al., 2015).

Ownership: Student ownership of learning involves motivation, engagement, goal orientation, self-direction, self-efficacy, confidence, metacognition, self-monitoring, and

persistence. Ownership is enhanced by active, independent participation and may lead to deeper learning, subject mastery, and career and life readiness (Conley & French, 2014).

Perception: To use the senses to construct understanding or interpret a situation (Bruner & Postman, 1949).

Psychological safety: A mental state developed in a social environment where "shared beliefs held by members of a team that the team is safe for interpersonal risk-taking," and "a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up ... that stems from mutual respect and trust among team members" (Edmondson, 1999, p. 354).

Work ethic: A framework construct involving essential 21st-century skills and attributes required for success in 21st-century work environments that include teamwork, communication, interpersonal skills, and personal skills such as dependability and initiative (Rojewski & Hill, 2017).

Assumptions

This study was based on several assumptions. Firstly, I assumed that participants would be forthcoming and honest in offering their perceptions and experiences when answering these questions. This assumption was important in lending credibility to the study. Secondly, I assumed that virtual interviews would provide a comfortable environment in which participants from across the country could speak freely, not concerned with safety, and where I may be able to read facial and nonverbal communication better than audio-only telecommunications. This assumption was important because it added reliability to the study.

Scope and Delimitations

The scope of this study was based on certain boundaries related to the purpose, methodology, framework, and rationale, ensuring that all aspects remained aligned. The purpose of the study was to obtain rich, thick descriptions of participant experiences. Interviews provided the best method to obtain this data. The interview questions evolved as a direct result of the CTWE framework. The framework was ideally focused on the intersection between education and careers. This decision, in turn, defined the boundaries of the participant selection. Each decision in the development of the study enforced boundaries that shaped the study.

There were four delimitations of this study. Whilst I believed that there might be many potential participants willing to volunteer to take part in this study, my time in undertaking the study was a delimiting factor. Guest et al. (2006) recommended that interview-based studies are likely to reach saturation with between 8-12 participants; therefore, I anticipated conducting 10 interviews and actually interviewed 11 participants. I set the inclusion criteria to only include adults who have been in paid work for longer than 6 months and shorter than 4 years and who were team members on a DI team for more than 3 years. I could have set these criteria for a longer work period, thus limiting the study to people with more work experience; however, it would have increased the time since they were involved on a DI team. Similarly, I could have invited only high school graduates who were in the workforce; however, this may have limited the participant pool. Finally, I could have changed the criteria to include only those with

many more years of DI experience. These inclusion criteria may have affected the transferability of the study (see Merriam & Tisdell, 2015).

Limitations

The research design of a study often creates limitations. As the researcher of a basic qualitative study using interviews, I acted as the primary instrument of data collection and analysis. This was a limitation because it was open to my biases and filters (see Burkholder et al., 2016). In Chapter 3, I describe my attempt to reduce bias by being transparent in all methodological choices, by keeping a reflective journal (see Orange, 2016), by field-testing the research questions, and through member checking (see Carlson, 2010) with participants to ensure a correct interpretation of their meaning. A second limitation of this study was that the participant pool was somewhat self-selecting. The participants who responded to the initial invitation were likely to have opinions on the topic. I attempted to reduce this concern by opening the study to as many as 1,600 individuals across the United States and internationally. Despite a large number of potential participants, this study only involved 11 interviews. A third limitation of the study was that participants may not accurately attribute their learning of a specific skill to one specific set of events (Thiel & Marx, 2019) or be able to accurately account for prior knowledge acquisition (Aristawati et al., 2018). A final limitation was the transferability of the results. I attempted to minimize this limitation through member checking, reflexivity, and maximizing the variation of possible participants (see Burkholder et al., 2016) as described in Chapter 3.

Significance

The significance of a study can be judged by the potential contributions made to advancing knowledge in a discipline. This study is significant because it contributes in several ways, by (a) adding a unique contribution to the body of literature, (b) furthering innovative learning and instruction practice, and (c) contributing to positive social change. Firstly, numerous studies have investigated academic ECAs and the 21st-century skills that they promote. However, few have explored alumni perceptions as graduates reflect on their skill set entering the workforce. Indeed, Tymon (2013) described student perspectives as "missing" from the literature, despite the fact that students are the stakeholders in their workforce preparation education. Moreover, student perceptions remain a "valuable barometer of the current snapshot of perceived employability" (Donald et al., 2018. p.532). Further, no previous study has focused specifically on DI alumni.

Secondly, the results of this study provide insight into the perceived benefits of participation in innovative instructional environments, such as DI, describing whether and how these experiences contribute to 21st-century skill acquisition, innovation, and workforce readiness. The DI program is innovative in that the challenges change every year. It is unique because no other program blends performing arts with critical thinking and creative problem-solving and teamwork with science and engineering. These findings inform educational practice by providing data to teachers, administrators, and parents that may lead to improving, broadening, and strengthening academic ECAs, thereby improving student readiness for a changing workforce. Finally, the results of this study

contribute to positive social change by raising awareness of the potential outcomes that academic ECAs may have affecting the performance expectation gap between graduates and employers in the workplace.

Summary

In Chapter 1, I introduced the study and situated the research in a background of recent literature. I clearly defined the problem statement and purpose of the study. The research questions were listed, based on a known conceptual framework that was described in detail. I explained the nature of the study and defined key terms. I explained the assumptions and limitations, discussed the scope and delimitations of the study, and provided a justification of the significance of the study. Chapter 2 includes a description of the literature search strategy and a discussion of the conceptual framework of the study. I provide a thorough examination of the related literature to situate key concepts in the study.

Chapter 2: Literature Review

Introduction

The problem addressed in this study was the lack of understanding of how 21st-century skills, categorized by work ethic, innovation, and career readiness, that alumni learned through academic extracurricular experiences, informed their early career and workforce readiness. These skills and competencies are essential to transition into the workforce. To fulfill this purpose, I explored DI alumni perceptions of how their DI experiences informed their early careers and workforce readiness by collecting data from individual semistructured interviews. This study was underpinned by the three constructs provided by Rojewski and Hill's (2017) CTWE framework. Participants in studies in this literature search have reported developing 21st-century skills through participation in specific academic ECAs (Cushing et al., 2019; Tiessen et al., 2018), and the DI program advertises the ability to build participants' 21st-century skills (DI, 2019a). In general, students and graduates reported confidence in many 21st-century skills as they headed into the workforce (Jackson, 2019; Thiel & Marx, 2019). However, employers perceive a performance expectation gap in soft skills particularly (Abbas & Sagsan, 2019). The purpose of this qualitative study was to explore how DI alumni perceive the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career readiness.

Chapter 2 includes information about the search strategies employed in locating and vetting research relevant to this study. A section is devoted to describing the conceptual framework and the three constructs that underpinned this study. Finally, the

remainder of the chapter is devoted to reviewing and synthesizing the relevant literature. This review is divided into three sections. Firstly, I focus on types of academic ECAs and 21st-century skills, with a specific look at DI. Secondly, I recount student, employer, and various stakeholders' perceptions of career and workforce readiness and provide a discussion of specific 21st-century skills. Finally, I summarize the major findings of the literature review and identify the gap in the research that this study was intended to address.

Literature Search Strategy

The literature in this review was sourced from peer-reviewed academic journals, dissertations, books, and research reports published within the last 5 years. The databases used included Academic Search Complete, Business Search Complete, Education Source, ERIC, Google Scholar, ProQuest, SocInDEX, and Walden University's database, Thoreau. Table 1 shows the keywords used in various combinations in the search for this literature. The reference lists and citation lists of particularly pertinent articles revealed additional authors and articles that deepened the review. The search for literature in this study was iterative, with many probes continuing until the same sources reappeared or the topics veered too far from my purpose, ensuring saturation. Initially, I sought a deep understanding of authorities on various 21st-century skills frameworks. Probing further, I found Rojewski and Hill's (2017) CTWE framework, upon which this study is based. Interested in existing research on DI specifically and finding almost none, I widened the search into academic ECAs and 21st-century skills. Then I investigated research on the perceptions of students, employers, employees, and educators concerning workforce

readiness and 21st-century skills. This search ultimately led to the need to further describe specific 21st-century skills. Irrelevant studies were removed and stored separately. I saved and organized all research using Zotero reference management software. Once categorized, I summarized articles in a color-coded literature review matrix using a Microsoft Excel spreadsheet that allowed me to see patterns and make connections regarding methodology, participant pool, and findings.

Table 1

Research Topics and Search Terms

Research topic	Search term
Extracurricular activities	Extracurricular activities or clubs or field trips, experiential learning, apprenticeship or internship, Lego, makers, STEM, robotics, Science Olympiad, organized gaming, chess, debate, Mock UN or Model United, DECA, Future Farmers of America, 4-H, agricultural education, scouts, exchange program or study abroad, theatre or drama or musical, debate, Destination Imagination or Odyssey of the Mind.
21st-century skills	21st-century skills and soft skills, academic achievement or academic performance, outcomes or benefits or effects
Workforce readiness	Workforce readiness, career readiness or preparedness
Student perception	Student, graduate and adult perception, perceptions or attitudes or opinions or views
Employer perception	Employer or industry perception, educator or university perceptions, perceptions or attitudes or opinions or views
Methodology	Research or study, quantitative, qualitative or mixed methods

Conceptual Framework

The conceptual framework underpinning this study was Rojewski and Hill's (2017) 21st-century CTWE. Based on the 21st-century skills and knowledge required by

employees to successfully transition into the changing global workforce, the model has three components: career navigation, work ethic, and innovation. In this conceptual framework section, I discuss the identification of 21st-century skills, the concept of workforce readiness, the three CTWE framework constructs, and a rationale for using this framework in this study.

21st-Century Skills

At the turn of this century, as globalization and emerging technologies began to alter the workplace, businesses required their workforce to develop additional skills beyond those valued in the past (Penprase, 2018). The term 21st-century skills refer to the core competencies of knowledge, skills, attitudes, and character traits required for success in the information age of the 21st-century (Partnership for 21st-Century Learning, 2001; Rojewski & Hill, 2014; Voogt & Roblin, 2012). As a result of this awareness, several international and United States based groups began to identify and define key competencies to improve pedagogy, curriculum, and assessment in classrooms to alter policymaking. Consequently, many frameworks have been developed over the past 20 years describing the nature and scope of 21st-century skills. The frameworks cover all aspects of teaching and learning from the skills themselves, such as creativity, communication, digital literacy, initiation, and citizenship, to describing ideal learning environments, teacher training, pedagogy, assessment, and administration. One notable characteristic of this body of research is the diversity of the research stakeholders. Interested parties range from international government agencies, private sector businesses, philanthropic organizations, and media groups, to educational institutions.

Nine major frameworks are summarized in Table 2, displaying the name of the framework, the year they were first published, the authors, and a list of their constructs that cover 21st-century skills from a variety of perspectives.

Table 2

A Summary of Major 21st-Century Skills Frameworks

Framework	Year	Authors	Constructs
Framework for 21st Century Learning (Partnership for 21st-Century Learning. 2001).	2001	Partnership for 21st-Century Learning - US government, educational organizations, private sector, and media groups (P21)	Four student outcomes: core subjects, life skills, learning and innovation, information, and media. Also four support systems: assessment, curriculum, professional development, and learning environments.
enGauge	2003	Metiri Group and the North Central Regional Educational Laboratory	Four competencies: digital-age literacy, inventive thinking, effective communication, high-productivity, and information technology.
21st-Century Skills and Competences for New Millennium Learners	2005	Organization for Economic Co-operation and Development (OECD)	Three competencies: using tools interactively, interacting in heterogeneous groups, acting autonomously.
Key Competences for Lifelong Learning (European Parliament and Council, 2006)	2006	European Parliament and Council	Eight key competencies: communication in the mother tongue, foreign languages, mathematics, science and technology, digital competence, learning to learn, social and civic competences, initiative and entrepreneurship, cultural awareness and expression.
National Educational Technology Standards (NETS)	2009	International Society for Technology in Education, (ISTE)	Standards for students, educators, leaders, and coaches. Standards for students: creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem-solving, and decision making, digital citizenship, technology operations, and concepts.
Assessment and Teaching of 21st-Century Skills	2010	International project sponsored by Cisco, Intel, and Microsoft	Four sets of skills: ways of thinking, ways of working, tools, and living in the world.
Information and Communication Technologies (ICT) Competency Framework for Teachers (United Nations Educational, Scientific and Cultural Organization, 2011)	2011	United Nations Educational, Scientific and Cultural Organization (UNESCO)	Three competencies: technology literacy, knowledge deepening, and knowledge creation, and six aspects of a teacher's work: understanding ICT in education, curriculum assessment, pedagogy, ICT, organization and administration, and teacher professional learning.
Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century	2012	National Research Council of National Academies	Three domains of competence: cognitive, interpersonal, and intrapersonal.
New Vision for Education: Unlocking the Potential of Technology	2015	World Economic Forum	16 crucial proficiencies under 3 headings: foundational literacies, competencies, and character qualities.

Workforce Readiness

Workforce readiness is defined as the preparation of K-12 students as they transition to college and employment (Malin et al., 2017). The 21st-century frameworks referenced in Table 2 provide background and categorization of various skills that graduates may need to be successful in the changing workplace. There has been much written on workforce readiness over many years, and Rojewski has been at the forefront of this conversation resulting in the CTWE framework (Rojewski, 2002; Rojewski & Hill, 2014, 2017).

Today's rapidly changing workplace requires substantially different skills from those of the past (Rojewski & Hill, 2017). One hundred years ago, jobs were available, stable, and long-term employment was expected (Penprase, 2018). Tasks were simplified and productivity was the goal. To prepare the workforce, education focused on the foundational skills of reading, writing, and basic arithmetic, and training was clear, with technical content presented in logical steps with a direct correlation to the tasks (Rojewski & Hill, 2017, p 183). However, now, modern technologies compete with human problem-solving (Rojewski & Hill, 2017, p. 183), three-dimensional printing is changing manufacturing, and communications technology enables a global workforce. These rapid technological advances are creating constant change across industries, and therefore postsecondary education is becoming increasingly important to enable graduates to stay current now (Rojewski & Hill, 2017, p. 185) and prepare students for the future. Rojewski and Hill's (2017) framework is designed to aid educators in preparing students for future jobs that do not yet exist.

Defining the Constructs

The CTWE framework incorporates three constructs: work ethic, innovation, and career navigation. As the workplace becomes increasingly dynamic, with constant connectivity and new technologies creating innovative and varied businesses at an exponential rate, students need to become aware of new opportunities in the workplace as they emerge. Rojewski and Hill's (2017) first construct, work ethic, includes the interpersonal skills that have always been important but have increased in value as the work environment has grown increasingly competitive. The 21st-century personal skills related to work ethic include dependability, initiative, communication, interpersonal skills, perceptiveness, honesty, appreciativeness, conscientiousness, likeability, and enthusiasm (Rojewski & Hill, 2017, p. 188) that increase an employee's effectiveness. As humans rely more on machines, work ethic will become increasingly important, making building these skills critical for work preparation, and they must be explicitly promoted with greater intent (Rojewsky & Hill, 2017).

The second construct of the CTWE framework, innovation, describes the creativity and innovation that businesses require to successfully solve ill-structured problems and grow industries in competitive markets (Rojewsky & Hill, 2017). The innovation construct includes skills such as creativity, problem-solving, higher-order thinking, entrepreneurship, adaptability, decision-making, ability to use technology in novel ways, the ability to work in teams on projects (Rojewski & Hill, 2017, p. 188), and skills that are critical for collaborative and technological work environments of the future. Innovation skills are required by all workers, not just a select few, and are fluid

and will require life-long learning (Rojewski & Hill, 2017, p. 188). Innovation is reshaping society, affecting wages, the physical work location, and the availability of work (Rojewski & Hill, 2017, p. 188).

The third construct of the CTWE framework, career navigation, is driven by the need to increase student awareness, exploration, planning, and engagement in alternative careers. Rojewski and Hill (2014; 2017) called for improved preparation supporting all students as different opportunities arise throughout their lifetime. Career awareness according to this model begins with exposing early elementary school students to different types of work, extending this exposure by providing middle school students with opportunities to explore various industries. In secondary schools, high school students should participate in substantial career planning and decision-making, and finally, college students should engage in a variety of internships and apprenticeships (Rojewski & Hill, 2014; 2017). Career navigation involves promoting self-awareness of students' interests and abilities, goal setting, and coping behaviors, so that students may create their own opportunities for successful careers. This construct focuses on 21st-century skills such as life-long learning, understanding technology, ability to work in nonlinear and discontinuous work environments, flexibility, ability to self-start, coping-behaviors, taking initiative, adaptability, and collaboration (Rojewski & Hill, 2017, p. 187).

Rationale for Using this Framework

The CTWE framework was developed to guide research and curriculum development (Rojewski & Hill, 2017). Rojewski and Hill (2014, 2017) are at the

forefront of the workforce and readiness literature and have often been quoted in relation to this field (see Deng, Ma, & Fong, 2018; Helwig, 2004; Lekes et al., 2007; Penprase, 2018). However, no study has previously utilized the CTWE to frame research. Nevertheless, the innovative use of this framework is particularly well-suited to this study as it provides a clear structure demonstrating the connection between 21st-century skills learned in academic ECAs such as DI and the experiences of graduates as they enter the workforce.

In this study, I explored how DI alumni perceive the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career readiness. This study benefits from the framework in several ways. Firstly, the CTWE framework limits the parameters of the study by keeping the focus on workforce readiness, without encompassing the many different aspects of the 21st-century skills described in Partnership for 21st-Century Learning (2001). Secondly, the three constructs give more specific direction guiding the research questions and analysis of this study toward workforce readiness than would the use of Assessment and Teaching of 21st-Century Skills, for example, which is directed at educational institutions, (Binkley et al., 2012; Cisco, Intel and Microsoft, 2010). Finally, the three constructs of this framework, career navigation, work ethic, and innovation (Rojewski & Hill, 2017), provide a clear structure that guides and aligns the research questions, and focuses code for the data, and analyses in this qualitative study.

Academic Extracurricular Activities and 21st-Century Skills

In the context of this study, ECAs are defined as organized student clubs or programs that carry no academic credit and are elective and pursued outside school hours. This is to exclude cocurricular activities that may be tied to an institution by credit or conducted during school hours (Fisher et al., 2017). In this study, I will specifically explore academic ECAs, therefore the literature on sports activities and social clubs has been excluded. I have organized this section of the literature review into two headings; types of academic ECAs and DI.

Types of Academic Extracurricular Activities

There is limited research regarding academic ECAs and the impact that they have had on 21st-century student learning outcomes (Chan, 2016; Milner, Cousins & McGowan, 2016). Science and engineering ECA-related research stand out as a noted exception because of additional attention to these fields than all other ECA types. I have divided all existing ECA research of the past 5 years into five subheadings: science and engineering activities, international activities, experiential activities, performance, and multiple ECA studies. Results are organized according to Rojewski and Hill's (2017) three-construct framework.

Science and Engineering Activities

Science, technology, and engineering activities are currently the most commonly studied academic ECAs. This research is further organized into four groups: STEM activities, robotics and Lego League, makerspaces, and Science Olympiad. Research into

STEM ECAs provided the most compelling evidence that participation in ECAs contributes to 21st-century skill development.

In the literature on STEM activities, researchers demonstrated that 21st-century skills improve through participation in academic ECAs. For example, in one study using a survey and activity logs, female students involved in an ECA STEM program reported improved motivation, confidence, and the ability to set career goals (Jang, 2018). Researchers reported similar results in a second study, triangulated by pre and post-test scores, fieldnotes, observations, and the daily diaries of 24 secondary students. Participants cited increases in the work ethic skills of social responsibility, decision making, and cooperation, and additionally the innovation skills of reasoning, creative thinking, and problem-solving, as immediate benefits of their exposure to ECAs (Altan et al., 2019). These participants attributed skill development to participation in these ECAs.

Further illustrating the benefits of ECAs, in a case study using interviews and journals of 11 middle and high school students respondents singled out the importance of using problem-solving as a meta-cognitive tool for developing their thinking (Ferrara et al., 2018). They also emphasized the importance of developing collaboration and communication skills in STEM pursuits (Ferrara et al., 2018). Echoing the importance of collaborative learning and communication for developing 21st-century skills, Sahin et al. (2014) conducted a case study including observations and interviews of 10 middle school students in Texas across various STEM ECAs. Highlighting changing workplace requirements, Hinkle and Koretsky (2019) interviewed 27 German engineering students, calling attention to the pivotal importance of communication. Researchers emphasized

the need for graduates to successfully interact more meaningfully with community partners, as well as people in different positions, disciplines, and from varied walks of life (Hinkle & Koretsky, 2019).

Career awareness and exploration are extremely important experiences, making successful entry of graduates into the workforce all the more vital (Rojewski & Hill, 2017). Supporting this claim, in 2013 a large-scale quantitative survey of 15,847 high school students across the United States conducted by Miller et al. (2018) found that STEM competitions effectively increased student interest in STEM careers. Ozis et al. (2018) echoed this finding with quantitative survey evidence of 1,167 STEM club students showing a significant positive impact on STEM attitudes and perceptions, regardless of gender or the type of ECA. These two studies provided evidence that ECA participation contributes to the development of various 21st-century skills and increase student interest in STEM careers, thereby promoting career readiness.

Robotics and Lego League form the second category of scientific academic ECAs. Three authors conducted different empirical studies attributing 21st-century skill growth to ECA participation. In a small study, Khanlari (2013) interviewed seven teachers who described their opinions on how robotics experiences influenced student growth. These teachers reported improvement in student creativity, collaboration and teamwork, communication, self-direction, social and cross-cultural skills, and social responsibility (Khanlari, 2013). Eguchi (2016) found similar results using Likert scale questions to illuminate student perceptions of skill development in the RoboCupJunior World competition, identifying collaboration, cooperation, communication, problem-

solving, technical awareness, and career awareness as growth areas. Further, in a study of 366 participants on Pennsylvanian Lego League teams, Menekse et al. (2017) used regression analysis to show a relationship between quality collaboration and superior performance in Lego League participants. Collectively, through qualitative and quantitative measures these studies show that Lego and robotics experiences develop 21st-century skills.

In other robotics ECAs, students perceived minor gender differences between soft skill development in a quantitative study of 91 middle school students. Females in this study cited improvements in collaboration and creativity skills, while males perceived improvement in computational thinking and computer sciences skills (Negrini & Giang, 2019). Both groups identified growth areas, however, women in the social and males in the technical domains. In another literature review, this one of coding and robotics, authors Kanbul and Uzunboylu (2017) noted the importance of 21st-century thinking skills incorporated in coding and computational thinking. Authors pointed out that these skills underpin technological developments in the Internet, mobile technologies, and wireless communication, all thinking skills vital to future student success. In another qualitative study related to computational thinking skills involving eight university undergraduates building Lego Mindstorms robots, Aristawati et al. (2018) recognized that a student's prior knowledge could not be measured. This recognition is pertinent as it underlies all these studies, including my own, that attribution of learning cannot be definitively designated to one source. This body of research offers evidence that higher-quality collaboration increases performance output, and in turn improves creativity

(Menekse et al., 2017). That male and female students perceived improvement across different skills (Negrini & Giang, 2019) reinforces researchers' calls for continued deeper thinking and computational skills in the future (Kanbul & Uzunboylu, 2017). Finally, authors recognized that prior knowledge could not be measured (Aristawati et al., 2018). This highlights an inherent limitation in my study, as participants may not be able to accurately attribute learning to any specific experience in the past.

Makerspace activities are considered academic ECAs because they may be elective and pursued outside of school hours without credit. The purpose of makerspaces is to provide a space to collaborate, tinker, build, and learn new skills, with digital or tangible products (Hira & Hynes, 2018). Students may tinker independently or attend organized classes, typically in community centers, schools, museums, or libraries (Hira & Hynes, 2018). Technologies may include mechanical tools, 3D printers, laser cutters, robotics, electronics, sewing, and crafts (Papavlasopoulou, 2017). In a literature review of 53 sources, Hira and Hynes (2018) reported 21st-century skill benefits of the makers movement including creativity, personal agency, and motivation. In a second literature review of 43 empirical studies, Papavlasopoulou et al. (2017) reported that student enjoyment increased in lockstep with their motivation, confidence, and self-efficacy. Collaboration factored in all studies reviewed, and students of both genders developed positive attitudes to STEM-related careers (Papavlasopoulou et al., 2017). Thus evidence showed that makerspaces produced both work ethic and innovation skill development, clear career worthy skills.

The final science and engineering ECA study is regarding the Science Olympiad, an annual, international STEM competition for middle and high school students. In a mixed-method study, Sahin et al., (2015) investigated perceptions of 172 secondary participants from 31 countries, to reveal a variety of 21st-century skills students developed participating in the Science Olympiad. Students described improvement in work ethic skills including communication, collaboration, and presentation skills. Additional vital skills included career development, and innovation skills, such as problem-solving, creativity, and critical thinking (Sahin et al., 2015).

In summary, science and engineering experiences have received the most attention of all academic ECAs and have addressed student outcomes related to STEM, robotics, Lego, makers movement, and Science Olympiad ECAs. Participants provided strong evidence of improvement in 21st-century skills related to work ethics, innovation, and career readiness regardless of gender (Papavlasopoulou et al., 2017), with the recognition that prior knowledge cannot be measured (Aristawati et al., 2018). Researchers note that improved collaboration increases performance, and in turn, creativity (Menekse et al., 2017). Educators need to improve collaboration experiences, metacognition, and career readiness preparation, in addition to increasing expectations of student communication (Hinkle & Koretsky, 2019) to ensure that students become effective communicators across a wider range of audiences.

International Activities

The connection between ECAs and international travel at first may seem tenuous; on the contrary, these experiences abroad provide opportunities for the development of

deep understandings across a variety of competencies including intercultural skills and second language acquisition vital in a global economy (Fondo & Jacobetty, 2019). Students receive no academic credit for these programs, however, schools and colleges increasingly support experiences abroad. Four studies reported improvements in work ethic skills of university students on international programs. In one such qualitative study, interviews of 27 Chinese college students at a British university reported that they believed that the program helped them develop increased tolerance, decision-making, self-awareness, and time-management skills (Li, 2017). In a second study, 18 U.S. college students engaged daily with Scottish primary school students in a weeklong agricultural service-learning program. Student journals revealed that students reported increased maturity, risk-taking, and open-mindedness after their overseas experiences (Rubenstein et al., 2018). These studies provided evidence that international experiences are effective tools for teaching young people work ethic skills necessary to compete in the changing workplace. Further, in a mixed-methods study of 285 university students involved in an exchange program between the United States and Mexico, student questionnaire responses reported positive effects in communication and intercultural skills (Fondo & Jacobetty, 2019). Finally, 15 tour leaders noted that international short-term study students became more independent, confident, respectful, ambitious, empathetic, and self-aware and, significantly, these soft skills rated as the most important outcome of such experiences (Cushing et al., 2019). International experiences described in these studies help students develop a range of skills in a condensed timeframe. The trips are often of short duration and students experience situations out of their normal

comfort zone and range of experiences so that their learning is deeper and faster than students without these experiences.

Of further relevance, Cushing et al. (2019) also indicated that typically, formal assessment does not include soft skills, and that future assessment needs to incorporate 21st-century skill development. In summary, these studies collectively provide evidence that international study ECAs develop a broad range of 21st-century work ethic related competencies, including many important skills not identified as outcomes in science and engineering ECAs, such as time management, independence, tolerance, and risk-taking ability. Furthermore, assessment of all soft skills remain understudied and under measured by researchers (Cushing et al., 2019).

Research shows that international activities also improve innovation and career readiness. For example, tour leaders reported that students became more imaginative (Cushing et al., 2019), while students reported improvement in higher-order thinking and creative problem-solving skills (Li, 2017). University students cited improved critical thinking and curiosity (Rubenstein et al., 2018) due to their time abroad. Further, these authors identified benefits of international academic ECAs that fit into career navigation constructs. Li (2017) concluded that international experiences positively impact students' career plans, and Cushing et al. (2019) found that ECA experiences improved the possibility of gaining employment internationally. Gaining these career readiness skills proved vital as students graduated and headed into the workforce. Similarly, in a mixed-methods survey of 1,901 international development studies alumni across Canada, graduates reported higher rates of employment, increased earnings, and higher matches of

interest to vocation compared to peers who had not participated in international ECAs (Tiessen et al., 2018). In conclusion, participants contend that international ECAs provide experiences that improve career readiness and long-term success.

Experiential Activities

Despite the existence of many different types of experiential and simulation academic ECAs, the body of literature remains sparse. Only five studies over the past 5 years reported learning impacts across a diverse range of experiential ECAs. These programs include Scouts (Mislia et al., 2016), Juntos 4-H program (Behnke et al., 2019), supervised agricultural experiences (Haddad & Marx, 2018), DegreePlus (Huffman et al., 2019), and a peer-organized, research-based ECA at a medical college (Nazha et al., 2015). Through these studies, researchers explore how diverse academic programs develop 21st-century student skills.

Scouting in Indonesia forms the focus of a qualitative study on character development (Mislia et al., 2016). Through observations, interviews, and documents, researchers identified 21st-century skills that students developed as part of their participation in Scouting. Whilst vague, the authors' description of methods and participants concluded that participants learned a large range of work ethic skills, including attention to detail, patience, cooperation, responsibility, courage, confidence, perseverance, environmental awareness, independence, discipline, curiosity, hard work and the innovation skill of creativity (Mislia et al., 2016). Whilst Scouting may be a surprising addition to the list of academic ECAs, the article justifies its inclusion by describing many and varied 21st-century skills.

The Jantos program is an academic ECA based in North Carolina that supports Latin students and their families (Behnke et al., 2019). The program has four parts: 4-H clubs, family engagement, a mentoring program, and a summer academy (Behnke et al., 2019). Using parent and youth focus groups, Behnke et al. (2019) investigated this program's strengths and weaknesses. Participants revealed improved student work ethic skills including public speaking, self-confidence, motivation, pride, empathy, and the courage to ask for help. Students also reported that they developed college readiness skills, such as applying for financial aid and scholarships. Programs such as this academic ECA are beneficial to developing skills in underserved communities.

In reviewing supervised agricultural experiences, Haddad and Marx (2018) used a quantitative survey to uncover the perceptions of 216 high school students concerning soft skill attainment and self-efficacy career decision-making processes. The supervised agricultural experiences included "student-led, instructor supervised, work-based learning experiences" (Haddad & Marx, 2018, p. 160) and ranged from high school agricultural experiences to long-term projects outside school, including internships, entrepreneurship, service learning, and research. Students reported a positive impact on both their soft skill development and career decision-making self-efficacy. Haddad and Marx (2018) noted that students who invested more time, effort, and initiative felt that they experienced greater benefits, a concept echoed in a quantitative online survey of older university students who participated in ECAs (Guilmette et al., 2019).

DegreePlus was a North Carolina University program offering students 93 academic ECA classes (Huffman et al., 2019). The purpose of these classes aimed at

developing important career readiness skills absent in regular classes. Curriculum incorporated work skills such as, how to dress appropriately for interviews, exploring cultural issues such as racism, sexism, and gender issues, and cultural responsiveness (Huffman et al., 2019). This mixed-methods survey including eight focus groups, and students reported that these activities successfully broadened various work ethic and career readiness skills.

To develop research skills, medical students at Beirut's American University organized their own ECA. Volunteer university faculty-supervised the 14-week, peer-led research course. In the fourth year of the program, Nazha et al. (2015) used qualitative focus groups to investigate how a peer-led project might change student attitudes towards research. Students recognized that they developed confidence, a new appreciation for research skills, improved critical thinking and writing skills through participation in this unique academic ECA (Nazha et al., 2015).

These five studies examining diverse experiential ECAs highlight student learning in academic ECAs across many 21st-century skills work-ethic-related benefits necessary for innovation and successful career navigation. ECAs have provided learning opportunities for niche populations such as new immigrants (Behnke et al., 2019), agricultural (Haddad & Marx, 2018), and medical students (Nazha et al., 2015). Participants across the research reported developing a wide variety of skills through ECA experiences, including vital concepts, such as the courage to ask for help (Behnke et al., 2019) and research skills (Nazha et al., 2015). Researchers also noted that students who

put forth the most effort during their ECA experiences gained the most from their experiences (Guilmette et al., 2019; Haddad & Marx, 2018).

Performance Activities

Despite the existence of numerous performance-based academic ECAs, there is a dearth of research investigating their impact on student skills. In the past 5 years, three studies reported on debate teams, and only one each regarding musical drama and learning musical instruments. Given the number of United States students who participate in music, dance, and drama instruction outside of school, and given the perception that art and music contribute to academic professional success, this research is all the most striking. In interviews, 34 New York City middle school students and teachers claimed that debate programs built students' critical thinking skills and fostered college and career readiness (Mirra & Pietrzak, 2017). Similarly, another survey-based study involving 6,411 Chicago high school debate students echoed this finding that ECAs improved college readiness (Shackelford et al., 2019). In a longitudinal study using questionnaires completed by 12,197 high school students across Chicago, Anderson and Menzak (2015) found that debate league participants reported greater social, civic, and school engagement than non-debaters. Results from these three studies collectively support claims that participants in academic ECA debate teams developed improved critical thinking and college and career readiness.

Other performance activities found in the literature included two studies related to the 21st-century skills learned in musical drama and while learning an instrument. Batubara and Maniam (2019) explored the benefits of musical drama with students of

various ages with severe Down syndrome. Through qualitative interviews with parents and teachers, as well as observations of students, participants reported that musical drama improved students' abilities to work with others, express themselves, and to be creative. Further, in a longitudinal quantitative study undertaken in Germany, 3,941 high school students completed a household government youth questionnaire from 2001 to 2012 (Hille & Schupp, 2015). The report affirmed that students who studied music for more than 8 years obtained school grades higher than their peers who did not study music or did so for fewer years. Hille and Schupp (2015) make the point that these results may indicate that conscientious and ambitious students study music. Interestingly, this improvement gap increased among adolescents with lower socio-economic backgrounds. As a result, these five studies demonstrate evidence that participation in debate teams, musical drama, and learning an instrument may help students of varying ages develop the 21st-century skills of critical thinking, communication, teamwork, creativity, and college and career readiness.

Multiple Extracurricular Activities

Six studies focused on 21st-century skills using multiple ECAs rather than one specific activity as in the research described above. In one study, 852 university students responded to a questionnaire and triangulated data using focus groups. ECAs significantly positively correlated with employability and participants perceived that involvement depended on the student's initiative to join in (Milner et al., 2016). Similarly, a Hong Kong study of 435 students echoed these results. University participants perceived that ECAs increased job opportunities, improved interview skills,

and leadership qualities (Wong & Leung, 2018). In another survey of 620 university alumni, supported by 18 interviews, graduates reported that most types of ECA developed long-lasting and non-industry-specific employability skills (Clark, Marsden, Whyatt, Thompson, & Walker, 2015). Focusing on barriers prohibiting student participation in ECAs, a mixed-method study, surveyed 423 university students and followed up with 18 interviews, identifying five factors that inhibited student participation in various ECAs. Researchers recommended ways of circumventing these challenges to promote ECAs based on these factors.

Contrary to all the research above, the only study that did not find positive correlations between ECAs and learning outcomes involved a small survey with 131 community college students in Hong Kong in 2013. It did, however, demonstrate a positive correlation between learning outcomes and the specific learning approach known as the Biggs' Presage-Process-Product model (Chan, 2016). This unique perspective raises the importance of the type and quality of the experience, a concept not discussed elsewhere in the literature.

Further research projects created two new frameworks in different ways. In a literature review, Simmons et al. (2017) reviewed 50 empirical studies of ECAs, categorizing skills into a framework identifying eight outcomes. These categories incorporated similar aspects to Rojewski and Hill's (2017) three constructs of work ethic, innovation, and career navigation. A second framework, developed by analyzing 436 university ECAs and triangulated by student interviews (Fisher et al., 2017) listed 14

major skills that participants developed through ECAs, making these frameworks insightful guides in future research (Fisher et al., 2017; Simmons et al., 2017).

Destination Imagination

In this section, I describe the DI organization, the two types of challenges, previous research, and the 21st-century skills that DI promotes in participants. DI is a combination of both science and engineering, and performance activity, according to the previous categorization of academic ECAs.

The Organization

DI is a global educational nonprofit, volunteer-led organization, "dedicated to inspiring the next generation of leaders, innovators, and creative problem solvers" (DI, 2019b, para. 1). Founded in New Jersey in 1999, as an offshoot of a similar program, Odyssey of the Mind (Richard, 1999), DI focuses on small group, STEAM (Science, Technology, Engineering, Arts and Mathematics), creative problem-solving, academic ECAs (DI, 2019s). Involving more than 150,000 students annually from kindergarten through to college, DI operates in 48 US states and 30 countries throughout the world (DI, 2019q). The organization defines its mission statement to "engage participants in project-based challenges that are designed to build confidence, develop creativity, critical thinking, communication, and teamwork skills" (DI, 2019, para. 2). DI has established partnerships with business leaders in innovation, technology, and creativity to provide "education in 21st-century learning and career readiness" (DI, 2019r, para. 1). Presently, the large corporations of Disney, IBM, and Motorola, and in the past others, such as

NASA and LEGO, have supported DI financially. They have also provided 21st-century focused interactive activities for children at the Global Finals Expo event (DI, 2019i*)*.

DI teams consist of up to seven team members facilitated by adult team managers (TMs). Teams form with students from the same local area and in the same age group (DI, 2019p). Kindergarten to second-grade students make up non-competitive teams called Rising Stars; the goal is an early introduction to DI practices. Elementary level teams are students in third to fifth grade, while middle-level teams consist of students in sixth to eighth grade, and secondary-level teams are students in ninth to 12th grade. The most advanced competitive teams are made up of college-level students. TMs are parent volunteers or teachers who meet weekly with their teams in classrooms, living rooms, and garages (DI, 2019m). TMs are trained as project managers who steer students as they develop teamwork, organize materials, and learn new skills. A core DI principle makes clear that TMs may not interfere with the decision-making process of the team nor guide their solution in any way. This concept of *No Interference* is the major tenet of DI (DI, 2019k) precisely because it is rare for students, especially such young ones, to experience such autonomy. The learning made possible from such student-led projects contributes powerfully to increased 21st-century skill development.

The Challenges

The program consists of two types of challenges: Instant Challenges (IC) and Team Challenges (TC; DI, 2019c). Teams meet weekly from August until February when at their regional tournament students solve an undisclosed IC and also present their TC solution. The top three teams in each age group and each category progress to the state

tournament, with the hope of progressing to Global Finals, held annually in Kansas City, Missouri, each May (DI, 2019g).

ICs are five-minute, creative problem-solving activities presenting either construction or performance-based challenges (DI, 2019o). An example of a typical construction IC could look like this:

Tall Tower

Task: Build a freestanding structure as tall as possible.

Time: You will have 5 minutes to build your tower.

Set-up: On a table are materials for building your structure.

Procedure: Using only the materials provided, your team is to construct a tower that is as tall as possible. It must stand on the table without being attached to the table or being held upright by your team members. It must also stand for at least 25 seconds. After the time is up, the tower will be measured.

Materials: 1 index card, 1 mailing label, 2 straws, and 2 paper clips.

Scoring: You will receive:

A. 1 point for each inch of tower height (up to 25 points)

B. 1 point for each second your tower is free-standing (up to 25 points)

C. Up to 25 points for effective use of materials

D. Up to 25 points for how well your team works together.

(Cre8Iowa, 2019)

Teams practice several ICs every week to prepare for a comparable undisclosed challenge presented to them at their regional tournament. Hundreds of ICs are available online for TMs to train students in a range of possible challenges (DI, 2019j).

In addition to preparing for ICs, DI teams also work on one TC each season. Six new TCs are developed each year, one in each of the six categories: scientific, technical, engineering, fine arts, improvisation, and service-learning (DI, 2019c). Teams chose to focus At each meeting, students work collaboratively when solving the chosen technical problem, drafting a storyline, and making costumes, scenery, and props to integrate into an eight-minute performance or play, to present at their regional tournament in February. TCs are structured so that teams understand the basic requirements of what to achieve, though they are intentionally written to be as open-ended as possible to encourage creative team problem-solving skills in how teams solve them. Points are awarded at the tournament on 21st-century skills, such as creativity and originality, workmanship and effort, integration into the presentation, technical and visual design, effective storytelling, with each element earning individual points. The 2011 engineering challenge reflected the self-directed problem-solving skills sets privileged in DI.

Verses! Foiled Again!

> Place weights on a structure of foil, glue, and wood, and tell us a story - one that's thoroughly good! When a character is foiled, what will you do? Will you laugh, will you triumph, or will you be foiled too?
>
> - Design and build a structure made only of aluminum foil, wood, and glue
> - Test how much weight the Structure will hold

- Present a story about a character that is Foiled
- Integrate team-written verse and published verse into your story
- Cost Limit $100

(DI, 2019d)

In the Verses! Foiled Again! example, teams would have designed, built, and tested many structures throughout the season. The second-placed team in the elementary level of this challenge at Global Finals held created a 65.03-gram structure that held (DI, 2019h. p. 2*)*. Whilst this team's design impressed, with it's lightest structure and by withstanding the most weight, the team came in second place because another team scored higher in other individual point-earning aspects of the challenge. In addition to the engineering component, the challenge included a performance component. For example, in this same 2011 challenge, a college-level team performed a skit as super villain sea creatures. Team members became an octopus, seahorse, crab, and snail who planned to kidnap King Neptune's daughter from their sandcastle. However, a lack of oxygen foiled their plans and their characters changed for the better to become good sea creatures that sang about their foiled plans (Carlington, 2011). Each team integrated the structure testing into their original eight-minute performance whilst also solving the engineering challenge. In short, DI places students in challenging situations thus promoting 21st-century skills by letting students' creativity and teamwork guide them to solutions.

Prior Research on Destination Imagination

Few research studies have been done on DI, with only three empirical studies, three dissertations, and three program evaluations, published to date. Twenty-first-

century skills are the focus of all nine documents, investigating skills learned through participation in DI. Incidentally, it should be noted that of these nine documents, Missett authored three; a journal article, a program evaluation, and a dissertation (Callahan et al., 2011; Missett, 2012; Missett et al., 2013) further narrowing the variety of perspectives.

Three empirical studies relate to soft skills development. Most recently, Shin and Jang (2017) investigated creativity training in two Korean elementary teams that progressed to DI Global Finals in 2011. Results from the yearlong mixed-methods study showed that students' emotional security increased their ability to take risks, and therefore increased autonomy, ownership, curiosity, and originality (Shin & Jang, 2017). The authors concluded that the effects of creativity training may not be immediate and recommended longitudinal studies into creativity development (Shin & Jang, 2017). In a second, quantitative study, Calkin and Karlsen (2014) compared imagination - specifically divergent thinking, fluency, flexibility, and originality - of 251 DI and non-DI middle and high school participants in Virginia, Illinois, Texas, and California. Researchers found that those who participated in DI scored higher in critical and creative skills than their non-DI counterparts (Calkin & Karlsen, 2014). In a third, quantitative study, Missett, Callahan, and Hertberg-Davis (2013) found that 347 middle-school students who participated in DI in 2009-10 had statistically higher creative problem-solving, critical and divergent thinking, and teamwork skills than peers who had not participated in DI. Researchers concluded that further studies might investigate the length of time students participated in DI and how their skills transfer long after participation in the program ended (Missett, 2013). These three studies are the only empirical, peer-

reviewed studies published on DI so far. As described in the results, two authors recommended further research into investigating the creative growth of participants some time after participating in the program allowing time to reflect on potential growth of creativity (Missett et al., 2013; Shin & Jang, 2017). Additionally, these authors investigated 21st-century skills promoted by DI, however, no studies have been done to investigate participants' own perspectives of their learning. There again, my scholarly research will correct this dearth of data.

In addition to the studies published in journals, three dissertations focused on 21st-century skills fostered by DI. Firstly, through qualitative interviews with middle school students, Greenberg (2016) explored how DI participation supported friendship development, improved coping skills, perseverance, and critical and creative thinking to positively impact students' mental health and well being. Secondly, in a qualitative case study, Armstrong (2015) explored how effective communication skills improve group dynamics and motivation thereby improving creative problem-solving abilities in three college DI teams. Finally, one dissertation Missett (2012) reported three studies on critical and divergent thinking with the first and last not relating to DI. However, the second, a quantitative study, in which Missett compared multiple measures of creative problem-solving, critical thinking, and teamwork in DI middle-school participants against non-DI peers, showing that DI participants outperformed non-DI students. Missett (2012) suggested the need for further research investigating whether increased time in the DI program enhanced creativity outcomes and transfer of skills.

DI commissioned three independent program evaluations conducted by outside agencies using different data sources and participants. The first series of open-ended questionnaires targeted TMs, regional, and affiliate directors by the Center for Creative Learning (Treffinger et al., 2004). Responses reflected high levels of satisfaction with the program across all surveyed groups and described the program as being effective in developing a range of skills necessary for school and life, such as autonomy, critical thinking, and collaboration (Treffinger et al., 2004, p. 21). Seven years later, UVA's Curry School of Education, (Callahan et al., 2011) conducted quantitative tests on creative problem-solving, critical and creative thinking, teamwork, verbal, and performance tasks on middle and high school DI students, and also qualitative surveys of DI directors, TMs, parents, and middle and high school students. Participants reported high parent and participant satisfaction with the outcomes of participation, and statistically higher mean scores for creativity, problem-solving, and critical thinking skill development in DI students compared to non-DI students. In a third quantitative survey of 500 DI participants at Global Finals, conducted by the University of Tennessee (DI, 2012), a majority of DI participants reported developing 21st-century skills, such as teamwork and collaboration, critical thinking, perseverance, creativity, communication, leadership, and confidence. In summary, all three reports commissioned by DI show the program in a favorable light, both in terms of satisfaction and skill attainment. Therefore according to these evaluations, DI delivers on its promise of teaching the 21st-century skills, though no study to date has sought the opinions of alumni, particularly those now in the workplace.

Collectively, all prior research on DI and 21st-century skill development found favorable outcomes. Three of these reports recommended investigation into the development of creativity several years after the DI experience to find if there has been a perceived increase in skills. Whilst my study is not longitudinal, it does explore alumni perspectives many years after their DI experiences, thus allowing time for reflection and maturity to enhance their awareness of creativity and other soft skill development and to measure those skills against the background of 21st-century workplace expectations.

Destination Imagination and 21st-Century Skills

The mission statement and other DI documentation specifically identify a variety of 21st-century skills that students have the opportunity to practice as part of their academic extracurricular participation in DI. These skills are listed in Table 3 and range across the spectrum of 21st-century skills described in various frameworks (Fisher et al., 2017; Partnership for 21st-Century Learning, 2001; Rojewski & Hill, 2017). My study qualifies and bridges the gap between stated goals and how adult alums now reflect on the skills developed in DI have paid dividends as real-world skillsets.

Table 2

21st-Century Skills Associated with Destination Imagination

DI resource	21st-century skills identified by DI
Destination Imagination (2019a)	Respect for others, self-confidence, perseverance problem-solving, risk-taking, project management
Destination Imagination (2019e)	Public speaking, reasoning, design skills
Destination Imagination (2019f)	Growth mindset, resilience, flexibility
Destination Imagination (2019l)	Creativity, critical thinking, communication, teamwork
Destination Imagination (2019m)	Curiosity, focus, reflection, collaboration
Destination Imagination (2019n)	Engagement, imagination, tenacity, idea generation
Destination Imagination (2019s)	Social entrepreneurship

Identified Gap

Results from this empirical research review helped me identify a wide range of 21st-century skills shown to have developed in youth through participation in various academic ECAs. These skills span all three Rojewski and Hill (2017) constructs of work ethic (Cushing et al., 2019; Khanlari, 2013; Mislia et al., 2016), innovation (Eguchi, 2016; Li, 2017; Nazha et al., 2015) and career readiness (Miller et al., 2018; Tiessen et al., 2018; Wong & Leung, 2018). Researchers acknowledge that the type of program influences student learning (Chan, 2016), and recognize that prior knowledge cannot be accounted for (Aristawati et al., 2018). Nevertheless, the general conclusion is that participation in ECAs nurtures skills vital for career success in the changing workplace (Fisher et al., 2017; Li, 2017). However, little is known about skill-building, identification, or attribution of these skills by former ECA participants, or how ECAs may have influenced their skills and abilities in the workforce years later. Further, ECA and 21st-century skill research studies have elicited data from students still participating

in ECAs (Eguchi, 2016; Fondo & Jacobetty, 2019; Sahin et al., 2015), from mentors and teachers who lead ECAs (Cushing et al., 2019; Mirra & Pietrzak, 2017), and from parents of students who participated in particular ECAs (Batubara & Maniam, 2019; Behnke et al., 2019). One study investigated U.K. college alumni views of general ECAs 10 years ago (Clark et al., 2015). However, this still leaves a gap related to alumni reflections on their ECA experiences, and how alumni regard the impact of those experiences on their entry into the workforce. Regarding DI, the literature has largely focused on program evaluations. The few studies that do exist, center on elementary (Shin & Jang, 2017), middle and high school (Calkin & Karlsen, 2014; Missett et al., 2013) students whilst they are still participating in DI. This lack of data on alumni perspectives leaves a gap in the literature where ECAs and DI overlap. Further, Missett (2013) recommended investigating the length of time students participated in DI and how their skills transferred long after participation in the program ended. Increased understanding could inform the development of future of ECAs and DI involvement, focused on promoting student career readiness and success. In this study, I explored the perceptions of DI alumni years after participation and as they enter the workforce to fill this lacuna.

Perceptions of Workforce Readiness and 21st-Century Skills

As technology and global markets develop, bringing rapid change, industry requires a reskilled workforce (Penprase, 2018). However, over the years, both media and research have reported ongoing employer dissatisfaction with graduate performance of these skills (Alshare & Sewailem, 2018; Dua, 2013; Jaschik, 2015; Peddle, 2000). In this

section of the literature review, I synthesize the current state of student and employer perceptions of graduate preparation.

Student Perceptions of Career and Workforce Readiness

This section focuses on student perceptions; reporting on the 21st-century skills perceived to be the most valued, gender equality, and student perceptions of their preparedness to participate in the workforce, and of ECA and authentic learning. This international body of research largely utilizes quantitative methodologies, with participants of different ages, elementary to graduate level. On the whole, research reveals that most graduates feel prepared for the workforce in their chosen industry.

Most Valued 21st-Century Skills

In recent research, participants of different ages revealed the 21st-century skills they perceived as most highly valued. Perhaps not surprisingly, students in several studies identified common skills of communication, teamwork, and creativity, as the competencies they felt were most critical to their future (Frichtel, 2017; Teng et al., 2019; Tharumaraj et al., 2018). For example, 27 elementary students recorded in writing, their experiences of weekly in-school dance class (Frichtel, 2017). Describing and illustrating their frustrations, joys, and successes, researchers observed student growth in communication, teamwork, and creativity, as students taught and learned from each other each, and responded to criticism and praise from teachers and peers (Frichtel, 2017). Using a more traditional, quantitative methodology, Tharumaraj et al. (2018) surveyed 197 Malaysian high school students. Echoing the elementary children in their identification of the same three skills, the teenagers added digital literacy, innovation,

problem-solving, and critical thinking as skills they anticipated as most necessary for their future (Tharumaraj et al., 2018). Further contributing to this research, in an online survey, 361 Malaysian and Chinese university students, concurred, again highlighting communication, teamwork, and creativity as the most important skills. Participants included, as equally important, critical thinking, self-management, interpersonal skills, the ability to work under pressure, willingness to learn, attention to detail, responsibility, organization, insight, maturity, professionalism, and emotional intelligence as valued skills (Teng et al., 2019). Recording similar results, in a pretest-posttest experimental study using project-based learning STEM activities, 22 Turkish high school students indicated that the same skills were important to them (Sari et al., 2018). Further, two US studies involving college students found similar results. College psychology students again recognized that communication, collaboration, and added self-management as the most valued skills in the workplace (Scott, 2017). Moreover, 106 business college alumni reported that presentation skills, leadership, and problem-solving skills should be given more emphasis in their undergraduate classes (Garner et al., 2019). Other researchers noted that over the past 20 years, the value that graduates ascribed to 21st-century skills has increased (Sari et al., 2018; Teng et al., 2019). Interestingly, students in all age groups, elementary to college and alumni, identified the 21st-century skills of communication, teamwork, and creativity as being critical to their future success. Researchers recommended that future studies investigate skills valued by post-graduate students (Tharumaraj et al., 2018), thus confirming a participant gap addressed in this study.

Gender Inequality

Whilst 21st-century skills may be valued across different regions, it appears that not all student's perceived equal access to these skills. International research may help focus attention on the importance of 21st-century skills across genders. A study of 60 college engineering students in Japan highlighted the extreme inequality of females at university and in technical workplaces. Citing gender-bias and lack of respect from male peers, discrimination by lecturers, and socio-cultural pressures as reasons for female attrition from science and engineering university courses (Balakrishnan & Low, 2016). Even in the United Kingdom, interviews of 38 university seniors revealed that male students reported higher self-confidence compared to female students (Donald et al., 2018). Thus raising important concerns related to the gender pay gap. Participants suggested that increasing the number of female role models in universities may go part way to supporting gender equity (Balakrishnan & Low, 2016).

Student Perceptions of Extracurricular Activities and Authentic Learning

Students perceived that various in school activities, such as ECAs, STEM, agricultural experiences, and work placement opportunities contributed to their 21st-century skill acquisition. In one study, Turkish high school students' revealed that not only their skills towards science careers improved through involvement in problem-based STEM activities but so did their attitudes (Sari et al., 2018). In a different study, Texas high school seniors reported that ECAs provided vital sources of competency development and hands-on experience related to specific careers (Greathouse-Holman et al., 2017). In a third study, college students reported that their leadership, networking,

and communication skills improved after one year in a college ECA (Kovarik & Warren, 2020). These studies showcased the skills that high school students' learned during authentic hands-on experiences that may help prepare them for future careers.

In studies of tertiary students, participants made direct connections between their learning and their perceived future skill requirements. Portuguese college students, specifically those who were proactive in their education, took on various work-related ECAs. These students attributed gains in employability to skills learned in ECA participation (Sin et al., 2016). This finding was supported by a recent Australian study of 510 college graduates who suggested that EACs might provide even better opportunities to enhance employability than work-related learning opportunities (Jackson & Bridgstock, 2020). A three-year longitudinal, mixed-methods study in the United Kingdom further shows this connection between authentic activities and career success. Students who undertook work placement were compared with students who did not, across six disciplines, including business, engineering, sciences, and arts degrees. Researchers found statistical significance that work placements improved academic performance, enhanced the graduates' ability to secure graduate-level work, and at a higher starting salary. Work placement offered students real-world experiences that developed transferable skills and enabled students to differentiate themselves from others in applying for jobs (Brooks & Youngson, 2016).

Demonstrating further support for the benefits of international programs, Chinese students studying in the United Kingdom cited improved career prospects in China as the main reason for their study abroad (Huang & Turner, 2018). Schworm (2017) found that

business students deepened understandings of international business issues and became global citizens when engaging in study aboard programs (Schworm et al., 2017). Additionally, Thiel and Marx (2019) invited 300 agricultural high-school students to rank their self-efficacy of 21st-century skills. Students self-reported higher self-efficacy of critical thinking skills compared to students taking traditional high school studies. As a caution, researchers noted two important limiting factors; that self-efficacy does not equal ability, and that soft skill development has many influences (Thiel & Marx, 2019), factors that must be acknowledged in my study. In another study, researchers investigated student perspectives of capstone projects. By asking open-ended questions to 22 MBA graduates, researchers revealed that students valued this authentic project because it meaningfully connected their university experiences to real-world business problems, building confidence and practicing the theory (Witt et al., 2019).

Student Perceptions of Workforce Readiness

According to current research-based in both qualitative and quantitative studies, students perceived that high school and college programs provided solid preparation for their future careers (Donald et al., 2018; Greathouse-Holman et al., 2017; Jackson, 2019; Rayner & Papakonstantinou, 2015). As evidence of their confidence, U.K. college seniors identified several benefits of attending university, such as developing social and business networks, providing real-world experiences, personal growth, and increased employability (Donald et al., 2018). Similarly, a study of over 200,000 Australian university students, reported increased confidence in work-related knowledge and skills, integration of practice and theory, increased professional worth, and workforce

preparedness through participation in higher education programs (Jackson, 2019). A different Australian survey of 42 science undergraduates, corroborated positive student support that university preparation aligned well to job placement (Rayner & Papakonstantinou, 2015). Students reported adequate assignment preparation and relevant internship placement that they felt strongly supported their future careers (Rayner & Papakonstantinou, 2015). Even high school seniors, enrolled in Texan career and technology education programs, indicated in a survey that they felt well prepared for higher education and a career (Greathouse-Holman et al., 2017). Interestingly, researchers have attributed this student confidence to superior teacher knowledge, experience, and high credentialing requirements leading to improved student-teacher relationships, increased engagement, and decreased dropout rates (Greathouse-Holman et al., 2017). To further illustrate student confidence in their skills, Finish middle school students generated a list of 21st-century science career skills that aligned with local employer demands of recruit's skill sets. Researchers concluded that young students were aware of workforce requirements and that schools should continue to introduce career opportunities much earlier in school (Salonen et al., 2017). A statement supports Rojewski and Hill's (2017) career navigation construct to make young students aware of career opportunities earlier.

While some studies show student confidence in their workforce preparation, not all studies share this outcome. For example, one study noted a decline in student employability confidence in their final year of university (Donald et al., 2018). As college students approached graduation, participants became increasingly concerned about the

competition for graduate jobs and repaying their accumulated debt. Researchers suggested that increased student awareness of market realities and job application rejections may have contributed to this change in attitudes, and noted that these results varied across industries (Donald et al., 2018). As if to combat this downturn in student confidence, Jackson (2019) noted the necessity of boosting student self-perceptions amid uncertain economic times and changing markets.

The net result of this research is that students generally feel prepared for the workforce. Students of all ages can identify skills that they perceive as necessary for a successful career and that these skills align with common 21st-century skills frameworks. The following section explores current employer and various stakeholder perceptions of student competencies.

Employer and Stakeholders Perceptions of Career and Workforce Readiness

Over the years, much has been reported on gaps between employer expectations, graduate abilities, and university preparation (Abbas & Sagsan, 2019; Jang, 2016; Peddle, 2000). In the following section, I compare the alignment of employers, employees, academics, and student views regarding recent graduate workforce readiness. Perhaps as expected, the viewpoints of these stakeholders vary greatly between industry and location.

Employer Versus Educator Perceptions

A review of employer and educator perceptions of graduate workforce readiness revealed mixed results. While some studies highlighted a mismatch between employer expectations and university standards (K. Jackson et al., 2016) others demonstrated

alignment (Mardis et al., 2019). For example, a New Zealand study of accounting firms found that more than half of the employers believed that universities prepared students adequately for the workplace (Low et al., 2016). Similarly, in the information technology sector, a study comparing job advertisements and employer interviews in Florida, revealed that university curricula largely aligned with industry certifications (Mardis et al., 2019). Also in Australia, Rayner and Papakonstantinou (2015) concurred, complementing the strong alignment between university course work and industry requirements. On the other hand, in the U.S. health industry, of 100 employers and educators surveyed, employers perceived a lack in graduate technical and leadership skills, and both employers and educators agreed that communication and workplace etiquette required improvement (K. Jackson et al., 2016). Similarly, a survey of the business industry in Qatar provided concurring evidence demonstrating that employers valued transferable soft skills, whereas educators focused on teaching measurable hard skills (Alshare & Sewailem, 2018).

Researchers noted that employer requirements change over time, and develop in different ways, in different countries, to suit local needs (Makulova et al., 2015). For example, a quantitative study of human resources employers and university educators compared skills between Morocco, Europe, and the United States. Mansour and Dean (2016) found that communication and technology skills are not viewed as necessary skills in Morocco. Reinforcing that different locations and different fields require different skills. To connect this issue to university curricular, researchers recommended that employers should frequently communicate their business requirements to universities,

thus enabling students to navigate rapidly changing market places, a sentiment echoed by several authors (Abbas & Sagsan, 2019; Baird & Parayitam, 2017; Brown, 2019; Donald et al., 2018; Dunbar et al., 2016; Low et al., 2016; Matsouka & Mihail, 2016). To deal with this problem many researchers recommended closer communication between industry and institutions of higher education. Baird and Parayitam (2017) urged employers to take more responsibility for developing talent and as industry partners and suggested that employers visit classrooms to increase student awareness of different careers, serve on boards and panel discussions to communicate employer needs, and conduct mock interviews to support graduate applicants. Dunbar et al. (2016) recommended that future university curricula should place increased emphasis on soft skills. Employers and educators also agreed that real-world work experiences of volunteering, apprenticeship, or internship programs better-prepared graduates for the workforce (Alshare & Sewailem, 2018; K. Jackson et al., 2016), a concept echoed by college students (Rayner & Papakonstantinou, 2015). Consequentially, these varied results offer no generalization as to the alignment of university outcomes and employer expectations, other than to reiterate that employers and educators must continue to collaborate on educational outcomes to best serve all stakeholder needs.

To rebut the argument that graduates are poorly prepared, Moore and Morton (2017) argued that a certain amount of on-the-job training was necessary and that employers should not expect graduates to be "oven-ready" (Jackson & Bridgstock, 2018). Having interviewed employers from a range of professions, Moore and Morton (2017) found that employers expected the work of employees to represent the company and

required a certain standard. Specifically, that the nuances of various communications were tailored to their company and therefore required on-the-job training to bridge the gap between university coursework and the particular requirements of each company (Moore & Morton, 2017).

The perceptions of graduate readiness by employers and educators vary greatly depending on location and industry. Most agree that internships and work placements better prepare students for specific careers. Also, that clear communication between employers and educators should is vital student success.

Employer Versus Student Perceptions

Recent literature highlights gaps between employer expectations and graduate abilities of 21st-century competencies (Makulova et al., 2015; Stewart et al., 2016). These discrepancies range from total disagreement on the skill set required in a specific industry, to prioritizing different skills, and agreement on the skills necessary for graduate success (Chowdhury & Miah, 2019; Hendrix & Morrison, 2018; Stewart et al., 2016). For example, U.S. college students rated their soft skill abilities very highly, showing confidence in their problem-solving skills, communication, and teamwork. However, the majority of employers reported that student abilities were overrated (Stewart et al., 2016). Supporting this gap, employers in a European study reported poor practical skills among graduates (Makulova et al., 2015). Additionally, in Greece, human resources graduates believed that university had prepared them for the workforce through internships and volunteer work. However, human resources employers found students lacking in emotional intelligence, goal-setting, and professionalism (Matsouka & Mihail,

2016). Also, a quantitative study of high school engineering students in Indonesia showed a significant difference between student abilities in higher-order thinking skills and work ethic skills compared to employer expectations (Triyono et al., 2018).

In some studies, graduates and employers ranked different skills as more important. Hendrix and Morrison (2018) compared United States entry-level job announcements to agriculture student perceptions regarding 54 specific work-related skills. Participants ranked themselves highly on core competencies required in the job descriptions, such as cooperation, independence, flexibility, and organization. However, students ranked verbal and written communication skills as less important than employers did, thus identifying an important gap between employer and graduate expectations (Hendrix & Morrison, 2018). Further, in a Bangladesh study, employers and marketing students identified a similar gap regarding communication skills (Chowdhury & Miah, 2019). Students felt confident in their verbal communication abilities, but lacking written skills that they saw as less important to a career in marketing. An additional gap reflected employer preference for goal setting skills, whereas students prioritized teamwork and integrity, perhaps reflecting their lack of experience in the field (Chowdhury & Miah, 2019).

Some research indicated that employer and student expectations aligned. For example, in the Bangladeshi marketing industry, both employers and students highly valued the ability to conduct research (Chowdhury & Miah, 2019), a skill not usually mentioned in 21st-century skills frameworks, but vital, as markets change rapidly and employees need to be able to locate and analyze up-to-date strategic information. The

ability to lead and influence teams were important to both groups, as was fluency in multiple languages (Chowdhury & Miah, 2019). Additionally, researchers interviewed ten New Zealand accounting firms of various sizes and found alignment between employer expectations and graduate performance. Employers required graduates to have fundamental technical accounting skills, but more importantly, employers valued non-technical skills and hired personalities that matched the company culture (Low et al., 2016). These mixed results reflect a gap between employer and student expectations.

Yet in other studies, employers and student perceptions aligned, with both parties agreeing that graduates lacked important skills (Cohen et al., 2017; Hartley et al., 2019). In several surveys involving half a million U.S. college students between 1994 and 2006, students identified growth across 15 skills whilst at college (Hartley et al., 2019). Marketing students, in particular, ranked themselves as having stronger public speaking skills than other majors (Hartley et al., 2019). Even so, student perceptions in this study, aligned with employer data revealing they agreed on significant gaps between industry demands and student skills, citing inadequate student preparation especially regarding communication and cultural awareness (Hartley et al., 2019). Similarly, middle school students learning STEM content reported weakness in their communication skills (Cohen et al., 2017). In this study, information technology professionals ranked communication, information literacy, problem-solving, and critical thinking as the most critical 21st-century skills, clearly a mismatch of abilities between employer needs and student abilities (Cohen et al., 2017). However, this result may have been a function of the age and inexperience of the students.

The subtle differences in viewpoints provided in these studies may provide new understandings. For example, a mixed study involving 12 European countries, including Russia, Kazakhstan, and the United States, surveyed 560 college graduates and interviewed employers to compare the importance placed on professional skills (Makulova et al., 2015). Both employers and graduates jointly recognized communication, teamwork, problem-solving, critical thinking, foreign languages, numeracy, and life-long learning as important qualities. Interestingly, graduates added mobility as an important competency, describing it as the willingness to change social, economic, geographic, and professional roles to cope in uncertain times (Makulova et al., 2015). Mobility is a new attribute, not described in any 21st-century skills framework, yet the Makulova et al. (2015) study highlights how young employees feel mobility is an important factor when looking for jobs. Data from my study may provide insight into ways in which graduates cope with various situations requiring them to be more flexible in where they live and the social and professional roles.

Employee Perceptions

In the only study of its kind found, Brown (2019) explored employee views of skills required in the workplace today. He interviewed 15 employees, between 21 and 48 years old, employed in a variety of jobs between 1 and 17 years in the United States. Participants asserted that employees could no longer rely on one skill or specialization throughout their lives and that future industries would need employees to be able to combine knowledge across disciplines. Indeed, this notion that future industries will require creative problem-solving across disciplines is born out with the emergence of

various multi-disciplinary fields such as artificial intelligence, robotics, the Internet of Things, biotech, and nanotech industries requiring interdisciplinary knowledge (Penprase, 2018, p. 215). Employees concluded that traditional education was outdated, citing a need to focus on flexibility, problem-solving, creativity, and innovation in the future (Brown, 2019). This study provides rare insight into the views of current employees, reinforcing the need for various 21st-century skill development and continued investigation into opportunities to develop these skills in future students. Here my study may provide understandings on this gap.

Employer Perceptions of Workforce Readiness

A review of employer perceptions revealed a global performance expectation gap. Five international studies demonstrated this gap between employer expectations and graduate performance. A study of 1,500 marketing managers in Germany, Spain, France, Italy, and the United Kingdom reiterated the need for soft skills and reported that many graduates lacked the relevant skills necessary to gain employment, such as basic soft skills, marketing and analytical skills (Di Gregorio et al., 2019). Employers the Chinese service industry rated graduate performance and found significant gaps in 10 of 11 categories (Abbas & Sagsan, 2019). In South Africa, accountant managers reported skills gaps in all 22 areas measured, especially regarding graduates' responsibility for their development and written communication (Kunz & de Jager, 2019). In Scotland, 71 employers across all sectors reported that graduates lacked the necessary skills required for business (McMurray et al., 2016). Finally, in Malaysia, accounting graduates lacked

the required employability skills and personal attributes required by employers (Lim et al., 2016).

In other studies, employers recognized the need for soft skills. These skills are categorized into two of Rojewski and Hill's (2017) three constructs; work ethic and innovation. For example, Pang et al. (2019) asked 260 Hong Kong companies to complete a questionnaire ranking the importance of 26 hard and soft competencies. Employers reported that the five highest-ranking competencies were teamwork, willingness to learn, diligence, self-control, and analytical thinking (Pang et al., 2019), work ethic skills. Dunbar et al. (2016) found similar results by analyzing 1,594 Australian accounting job advertisements over 4 years, revealing that Australian employers also place the greatest emphasis upon soft skills over technical skills. The highest-ranked skills were communication, teamwork, interpersonal skills, leadership, and technology (Dunbar et al., 2016). In a literature review of Asian employers' perceptions of graduate soft skills over the past 10 years, Pazil and Razak (2019) compiled a list identifying 11 domains of important soft skills including, communication, entrepreneurial, interpersonal, life-long learning, management, numeracy, professional ethics, self-management, problem-solving, technological, and thinking skills (Pazil & Razak, 2019). 250 manufacturing industry managers across the United States identified specific skills that graduates lacked. They identified collaboration, self-motivation, verbal communication, problem-solving, and being proactive as skills requiring improvement (McGunagle & Zizka, 2020). Each of these skill sets can be subsumed within the constructs of work ethic and innovation. In a slightly more generalized finding, Baird and Parayitam (2017)

surveyed 50 employers from US chambers of commerce, to discover that employers valued soft skills, relevant work experience, analytical and technical skills, noting that each of these experiences was pivotal in their hiring decisions (Baird & Parayitam, 2017).

Ironically, in one study, Mardis et al., (2019) noticed a mismatch between the most valued skills as stated by employers during interviews and skills employers requested in job advertisements. These employers expressed the importance of leadership, communication, and teamwork in interviews, whilst conversely in their own job advertisements focused on technical skills and overlooked these general competencies (Mardis et al., 2019). Perhaps this finding speaks to the complexity of identifying skills required to do a job and expressing these needs.

Focusing on STEM competencies, Jang (2016) found current 21st-century skills frameworks, themselves, to be lacking categories necessary for STEM fields. Using a U.S. Department of Labor database of 50,527 employees, Jang (2016) identified several STEM competencies. Matching these to existing frameworks he found no category for solving ill-defined problem-solving. Jang (2016) commented that "students should be motivated to solve integrated, interdisciplinary sets of complex problems, collaboratively using critical thinking and knowledge of STEM disciplines" (Jang, 2016, p. 296) thus promoting real-world problem-solving. However, I find that despite the broad range of skills that Jang (2016) assessed, the concepts within existing frameworks are broad enough to cover ill-defined problem-solving for STEM fields and that this problem is a matter of semantics. In summary, employers have become acutely aware of the need for a variety of soft skills to support technical skills, (Abbas & Sagsan, 2019) work ethic and

innovation constructs, to support their business success, and report that graduates lack these essential skills.

Employer Perceptions of Extracurricular Activities and Authentic Learning

A few studies have explored employers' perceptions of ECAs and other authentic learning activities. Two studies reported on ECA's as vehicles for developing soft skills that underpin workplace success. Firstly, researchers asked 22 company recruiters in the Netherlands to rate 396 student resumes to ascertain how ECA participation influenced the selection of candidates (Nuijten et al., 2017). Recruiters in the study valued ECA experiences even more highly than academic success, arguing that international studies and other activities developed soft competencies and interpersonal skills, such as communication, dedication, and integrity. Hiring graduates with this skillset meant that companies did not have to spend resources developing them once candidates were hired. Conversely, students in this study expected the reverse to be true, anticipating that academic success would be more important to employers than the benefits of ECA participation (Nuijten et al., 2017). Similar results emerged from a Portuguese study, in which nearly 350 human resource managers rated business student resumes. In their view, a combination of ECA experiences and academic performance provided the highest rating of job suitability. Indeed, recruiters used ECA participation to differentiate between applicants (Pinto & Ramalheira, 2017). In follow up research Pinto and Pereira (2019) used a similar methodology to reveal employers' bias towards hiring candidates with internship experience. Reviewing six fictions resumes, Portuguese managers favored graduates with internship experience because it helped transfer skills from college to a

career (Pinto & Pereira, 2019). These studies reveal a gap in the literature that supports the need for my study. That is to explore participants' perspectives of skills that would have helped them find work and contribute to a company. Alternatively, a study provided a novel view of these issues. Researchers in the United Kingdom invited 57 employers to compare graduate profiles to determine perceived employability (Byrne, 2020). Altering demographic data in the graduate profiles that employers responded to, Bryne (2020) found that factors such as study abroad, ECAs, work experience, age, degree type, disability, and ethnicity affected their employability. Bryne (2020) suggested that some of these employability gaps in graduate recruitment might be a result of social inequalities. Adding that these characteristics were lacking in previous studies.

This review comparing recent employer, employee, educator, and student perceptions of graduate workforce readiness highlights significant performance expectation gaps (Brown, 2019; J. D. Cohen et al., 2017; Jackson, 2016; Jackson & Bridgstock, 2020; Pazil & Razak, 2019). Some of this disparity is location and industry dependent. However, stakeholders agree on the need for clear communication between employers and educators to provide skills training required by each industry. Additionally, agreement exists across all stakeholders supporting authentic activities, such as internships, international studies, and ECAs in providing students with necessary workforce skills. Finally, employers valued a wide variety of 21st-century skills and competencies when hiring.

21st-Century Skills and the Career-Technical and Workforce Framework

The purpose of this section of the literature review is to explore specific 21st-century concepts relating to workforce readiness. The first concept, psychological safety, relates directly to effective teamwork. The second concept is emotional intelligence and here I describe the various work ethic competencies that this idea subsumes and how it relates to career success. Thirdly, I discussed the emerging notion of mobility concerning to 21st-century frameworks. Finally, the process of design thinking is described in relation to 21st-century skills.

Psychological Safety and Teamwork

Teamwork is one of the most important 21st-century soft skills desired by employers (Chowdhury & Miah, 2019; Pang et al., 2019). Twenty years ago, Harvard Professor Amy Edmondson (1999) studied work teams to identify what makes them effective. Edmondson (1999) discovered that the most important factor was psychological safety. Psychological safety is "a shared belief held by members of a team that the team is safe for interpersonal risk-taking" (p. 350), that is "a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up ... that stems from mutual respect and trust among team members" (Edmondson, 1999, p. 354). This means that team members can admit mistakes, learn from failure, take criticism, and openly share ideas leading to improved decision making and innovation. In 2012, Google started Project Aristotle, an extensive research project with 180 employee teams to find the key to developing the most effective teams (Duhigg, 2016). They found that it is not the group composition, motivation, or education level that creates an effective team, but

rather how teammates treated one another. Standardized norms for developing psychological safety include equal talk time or conversational turn-taking, and empathy or social sensitivity, and skill in understanding others through nonverbal cues (Duhigg, 2016). More recently, O'Neill and Salas' (2018) literature review added that effective teams take time to develop these norms and must allow for individual members to grow over time (O'Neill & Salas, 2018). In their study of two elementary DI teams, Shin and Jang (2017) called psychological safety the Safe Nest Effect. This term describes the development of a low-risk environment that promotes trust, personal growth, and idea development between team members. Discussion of psychological safety is helpful because it promotes understanding of the conditions necessary to build environments promoting effective teamwork that is vital for workforce success. Psychological safety and the soft skills it subsumes fit neatly into Rojewski and Hill's (2017) work ethic construct.

Emotional Intelligence

The term emotional intelligence (EI) was conceived by Salovey and Mayer (1990) and popularized by Daniel Goleman (1995) in his best selling book of the same name. Over the years the constructs have evolved slightly and a current working definition is provided by Bar-On (2006) "emotional-social intelligence is a cross-section of interrelated emotional and social competencies, skills and facilitators that determine how effectively we understand and express ourselves, understand others and relate with them, and cope with daily demands" (p.14). The Bar-On model currently provides the most widely used inventory to assess these traits and abilities, such as self-regard, interpersonal

relationships, impulse control, problem-solving, emotional self-awareness, flexibility, reality-testing, stress tolerance, assertiveness, and empathy.

Goleman (1996) found no connection between IQ and professional success, but rather that career success directly correlated to EI. The demand for human skills, such as higher EI, is predicted to increase as technology influences the workplace (World Economic Forum, 2018). Indeed, in an Irish survey across five industries, 238 employers rated all social, cultural, and self-awareness EI competencies as important. However, employers rated graduate employee abilities in this area far below their expectations (Jameson et al., 2016). As a solution, a Malaysian study exploring the effects of life skills courses found that EI could be taught. Students reported that these classes developed social and personal competencies including enhanced coping skills, in addition to increasing academic scores (Nair & Fahimirad, 2019). Participants in a second Malaysian survey concurred that their college courses helped develop EI (Teng et al., 2019). Additionally, a South African survey showed that students with higher EI displayed increased self-confidence, and as a result, enhanced their EI abilities to set goals, communicate, and influence others (Coetzee & Beukes, 2010). Indeed, as more instruments are developed to measure EI and its relationship to leadership, conflict management, team effectiveness, and occupational stress, Rathore et al. (2017) go as far as concluding that EI may be a way of predicting workplace success in future. The many characteristics incorporated under EI can be subsumed in Rojewski and Hill's (2017) work ethic construct and are highly sought after by employers.

Mobility

The notion of mobility is not referenced in any 21st-century skills framework. However, some studies highlight mobility as an increasingly important factor for young employees. Graduates described mobility as an important competency, involving the willingness to change social, economic, geographic, and professional roles to cope in uncertain times (Makulova et al., 2015). A study of employers and college graduates across 12 European countries, including Russia, Kazakhstan, and the United States, compared the perceived importance of professional skills (Makulova et al., 2015). Both employers and graduates jointly recognized many of the common important 21st-century skills, critical thinking, foreign language, and life-long learning and added mobility to this list of abilities. In another study, 450 business alumni reported that developing a global identity through living abroad and learning to speak different languages increased their career satisfaction and opportunities for international jobs (Schworm et al., 2017). Indeed, in 1997, the term "war for talent" was coined by Steven Hankin of McKinsey & Company (Chambers et al., 1998) to describe the increasing international competition for human capital. As communication and transportation have become cheaper and easier, and various international trade agreements have contributed to the multi-directional international movement of goods and people, recruiting and retaining top talent has become a top priority (Baruch et al., 2016). Indeed the concept of mobility as a desirable competency for graduates is increasingly referred to in the recent literature (Teng et al., 2019). Mobility also falls under the construct of work ethic.

Design Thinking

Design thinking is an approach to learning that involves imagination, and builds confidence and empathy, through problem-solving (Carroll et al., 2010), all critical 21st-century skills. Whilst not specifically described in any 21st-century skills framework it subsumes many skills. It involves a five-step collaborative process of observing and understanding the design issues, appreciating the problem from the users' point of view, creating multiple ideas, building prototypes, and testing solutions (Carroll et al., 2010). This process incorporates many work ethic and innovation skills (Rojewski & Hill, 2017), such as iteration, perseverance, resilience, curiosity, trial and error, scientific process, constraints, optimization, outside-the-box thinking, ill-defined problem-solving, creativity, and project management. Design thinking is a way of exploring systems (Calkin & Karlsen, 2014), promoting real-world problem-solving, and developing social-emotional skills (Lim et al., 2018) that develop skills highly valued by employers (J. Cohen et al., 2017).

Summary and Conclusions

Chapter 2 included details on the search strategy employed to locate relevant research conducted from the past 5 years. I included a description of Rojewski and Hill's (2017) CTWE framework and its three constructs of work ethic, innovation, and career readiness that underpin this study. I summarized and analyzed the body of literature regarding these three constructs under three headings: a) Types of academic ECAs, b) Perceptions of workforce readiness and 21st-century skills, and c) 21st-century skills and the CTWE framework.

Several themes emerged from my review of the literature. Firstly, ECA participants in these studies identified a wide variety of 21st-century skills that they developed through engaging in academic ECA's. Whilst the vast majority of this data were collected while students were still involved in EACs, or immediately after, but not years later. I identified skills DI alumni perceive as important, and how they were able to transfer and apply this learning as they entered the workforce, years after their ECA experiences. Secondly, research on DI is almost nonexistent. In the only three studies undertaken, two focused on creativity and one on design thinking, with elementary and middle school students. None, however, explored DI participant transferal of skills they learned to the workforce. Thirdly, on the whole, students and graduates feel confident in their abilities of 21st-century competencies (Donald et al., 2018; Garner et al., 2019; Teng et al., 2019). However, employers perceived an overwhelming performance expectation gap between workforce requirements and student proficiency (J. Cohen et al., 2017; Hendrix & Morrison, 2018; Pazil & Razak, 2019). Researchers recommend investigation into graduate perspectives of the most important skills entering the workforce and how they acquired them (Tharumaraj et al., 2018), where this study is situated. I explored how DI alumni perceived the 21st-century skills they learned through their DI experiences that informed their early career and workforce readiness, thereby contributing to filling this void of information. This gap is significant because by documenting ways to successfully build student skills to bridge the performance expectation gap between employers and graduates will enable educators to develop further learning opportunities. This study may be of interest to a variety of stakeholders.

Among them, educators, parents, and students interested in identifying methods of improving their 21st-century skills and workforce readiness. Results from my study may bridge the gap between the stated goals of DI and skills alumni learned through DI experiences and how these skills may have paid dividends as real-world skillsets as alumni entered the workplace by giving voice to alumni experiences.

In Chapter 3, I address the design and rationale of this study, provide the central and related questions, and discuss the role of the researcher. The methodology will be described in great detail, providing information on the selection of participants, instrumentation, data collection, and analysis. Further, in Chapter 3, I make transparent issues of trustworthiness including credibility, transferability, dependability, and confirmability, and address ethical considerations.

Chapter 3: Research Method

Introduction

The purpose of this qualitative study was to explore how DI alumni perceive that the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career and workforce readiness. These skills and competencies are essential to transition into the workforce. To fulfill this purpose, I explored DI alumni perceptions of how their DI experiences informed their early career and workforce readiness by collecting data from individual semistructured interviews.

In Chapter 3, I describe the methodology used in this study. I include the research design and rationale, the role of the researcher, and the methodology, including participant selection, instrumentation, data collection, and data analysis plans. Lastly, I address the four aspects of trustworthiness: credibility, transferability, dependability, and confirmability, and ethical considerations for this study.

Research Design and Rationale

In this section, I describe the research design for this basic qualitative study and the rationale for the methodology. The following central and related questions were aligned to the problem, purpose, conceptual framework, and methodology of this study.

Research Questions

CRQ: How do DI alumni perceive the 21st-century skills they learned through their DI experiences informed their early career readiness and workforce readiness?

SQ1: How do DI alumni perceive their DI experiences informed their work ethic?

SQ2: How do DI alumni perceive their DI experiences informed their ability to be innovative?

SQ3: How do DI alumni perceive their DI experiences informed their career navigation?

Rationale for Research Design

The research design for this study was a basic qualitative study, otherwise referred to as a generic qualitative inquiry (see Patton, 2015). This method is used to "answer straightforward questions without framing the inquiry within an explicit theoretical, philosophical, epistemological, or ontological tradition" (see Patton, 2015, p. 154). This method is particularly well suited to exploring "people's attitudes, opinions, beliefs, or experiences" (see Percy et al., 2015, p. 76).

I chose a basic qualitative design for this study because of my interest in understanding the experiences (see Merriam & Tisdell, 2015) of DI alumni as their careers began. The use of semistructured interviews is appropriate for collecting information-rich data of real-world experiences from representative sample populations (see Percy et al., 2015). An ideal strategy of identifying participants well-suited to basic qualitative inquiries is purposive sampling (see Ravitch & Carl, 2016), ensuring that participants with specific experiences are invited to participate. Thus, the design, data collection, and participant selection were aligned.

Considerations of Other Designs

I considered several alternative qualitative designs for this study, including phenomenology, ethnography, and grounded theory. Initially, I explored phenomenology

as a viable alternative approach because these participants shared the same lived experience of participating on a DI team (see Moustakas, 1994). However, in this study, I was not trying to explain the phenomenon of the DI experience, but rather seeking the participants' perspectives of how those experiences have helped them in the workforce after leaving the program. I also considered ethnographic research; however, this study was not investigating a culture-sharing group (see Atkinson et al., 2001). While participants in my study may have collaborated in similar ways and activities, it would be unlikely for participants to have known each other, and they were not members of the same team. Therefore, they would not share the same cultural norms, behaviors, and beliefs as required in an ethnographic study. Grounded theory was another method I considered. This method of qualitative inquiry was developed to generate theories grounded in the data (Glaser & Strauss, 2017). This approach was not an appropriate choice for this question because a theory was not being generated. Therefore, the basic qualitative inquiry provided the approach most suited to this study.

Additionally, I considered a quantitative methodology as an alternative to this basic qualitative design. Quantitative approaches seek correlation between variables (see Burkholder et al., 2016). A researcher might design a study to survey DI participants with a list of 21st-century skills to determine correlation between where participants learned these skills and how important they feel the skills are in their job. However, in this study, I was particularly interested in participant stories and gathering detailed descriptions of experiences (see Rubin & Rubin, 2012).

Role of the Researcher

For this qualitative study, I served as the primary investigator. As such, I was involved in all aspects of the study. My role included designing the study, choosing the conceptual framework, designing the research questions, developing the protocols and instruments, as well as recruiting participants, conducting the interviews, analyzing the data, and utilizing strategies to improve trustworthiness and ensure that every part of the study was in alignment.

My role as researcher did not conflict with my present position as codirector of a DI region. In this voluntary leadership position, I work only with adults. The regional board consists of 12 members who each carry out different organizational functions. I am involved in informing parents about the DI program, scheduling adult training, and organizing the local tournament. The participants in this study were completely unknown to me, coming from many states across the United States. To minimize bias, I offered transcripts to participants after each interview for member checking (see Burkholder et al., 2016), maintained a reflective journal to help uncover preconceived assumptions as recommended by Ravitch and Carl (2016), and acknowledged the limitations of this study, as described in Chapters 3 and 5.

Methodology

In this section, I describe details of the methodology for this study. Specifically, I include descriptions of participant selection, recruitment, and participation procedures, instrumentation, an interview guide, reflective journals, data collection, and a data

analysis plan. In addition, I discuss the trustworthiness and ethical considerations of this study.

Participant Selection Logic

I selected participants for this study using purposeful sampling following specific criteria. According to Ravitch and Carl (2016), purposeful sampling means that specific individuals are chosen for their experiences that may provide context-rich, detailed accounts of specific phenomena. Additionally, Patton (2015) made the case for using purposeful sampling in qualitative studies using small sample sizes to gain an in-depth understanding and provide rich information on a phenomenon. This sampling strategy is justified because purposeful sampling captures a small, homogenous sample providing increased confidence over a random sample of the same size (see Maxwell, 2009).

Participants volunteered for the study according to specific inclusion criteria. Participants (a) were 18 or older, (b) must have participated as a team member on a DI team for 3 or more years, and (c) must be have been employed full-time or part-time in a paid job for between 6 months and 4 years. I conducted 45-60-minute semistructured interviews with participants. Data collection continued until saturation was reached, at 11 participants. According to Ravitch and Carl (2016), saturation is the point at which no new themes emerge. Guest et al. (2006) recommend that saturation was likely to occur between eight and 12 interviews.

Procedures for Recruitment, Participation, and Data Collection

This study was focused on a specific extracurricular program, DI. This program is so specific and unique that it would easily be identified by the description of activities

involved. Therefore, I sought and was granted permission to waive masking the partner organization, DI, by the university and the executive director of DI International. The participant pool was so vast, potentially tens of thousands of eligible alumni across all United States and 30 countries, that identification of participants would be impossible.

I quickly reached the desired number of participants and therefore I accessed potential participants in one phase. A gatekeeper from DI provided a list of DI alumni email addresses. The alumni in this list already met the criteria of being over 18 and having been on a DI team. I obtained a signed letter of cooperation from the director of DI headquarters, indicating that DI was willing to be a research partner and provide DI alumni database list of names and email contact information once Institutional Review Board (IRB) approval was granted. Enough participants committed to joining this study via the first database; therefore, I did not have to access additional sources.

Entry to participation in the study occurred in three cascading stages: an initial invitation, the informed consent, and a demographic questionnaire. The initial invitation was randomized and emailed to 100 potential participants at a time, informing alumni about the study, listing the inclusion criteria, and inviting them to follow a link to the informed consent page. It also offered a $10 Amazon gift card to be sent to participants after the interview, thanking them for their time. The informed consent page included all aspects of the study, such as the voluntary nature of the study, the number of participants, the intended length of the Zoom audio-recorded interviews, how to exit the study, the transcript checking process, and assured confidentiality. Potential participants demonstrated their implied informed consent by clicking on a link at the bottom of the

consent form that took them to a demographic questionnaire. In this Google form, I asked questions to confirm that potential participants met the three inclusion criteria. If they did not meet the criteria, they reached a page thanking them for their willingness to participate but letting them know they do not currently meet the study criteria. For those who met the study criteria, eligible alumni were asked to provide their first name and email or phone number as record of their interest to participate and method of contact. The survey continued with willing participants providing answers to two short questions related to their DI and work experience. I replied to the first 11 qualified participants via email and then closed the Google Form.

Upon receipt of contact information via the demographic Google questionnaire, I emailed participants asking them to suggest a convenient time to meet and gave my contact details. I scheduled one 45-60-minute audio-recorded Zoom meeting to conduct semistructured interviews with each participant. Zoom is HIPPA compliant (see Zoom, 2020) assuring confidentiality. I downloaded the audio file onto my password-protected computer, and I stored a backup copy on a flash drive in a locked file cabinet. My committee members had access to the de-identified raw data at all times via the data management software Dedoose. I uploaded the audio recordings to Kaltura software, producing closed captions for transcription. I edited each transcription, adding notes of inflection as memos, and ensuring the transcript was accurate. I took handwritten memos during the interviews to ensure that they did not disrupt the flow of the conversation. I kept a reflective journal to record immediate impressions following the interviews. Transcription was completed as soon as was practical after each interview so that notes

and reflections could be corrected if necessary (see Halcomb & Davidson, 2006). Summaries of the transcripts were emailed to participants for member checking as suggested by Carlson (2010).

Instrumentation

For this basic qualitative study, I designed one instrument, an interview guide. Several colleagues with advanced degrees in education field-tested these interview questions to review the alignment and I incorporated their feedback. These questions directly aligned with the central and related research questions and the three constructs in the CTWE framework (see Rojewski & Hill, 2017).

Interview Guides

I based the interview guide on refinement procedures recommended by Castillo-Montoya (2016) and Jacob and Furgerson (2012) to achieve effective qualitative research interviews. The protocol included an introduction, opening, and key questions, and closing statements. Table 4 shows the six interview questions aligned to the central and related research questions.

Table 3

Alignment of Alumni Interview Questions with Research Questions

Interview questions	SQ1	SQ2	SQ3	CRQ
IQ 1: Tell me about a time, if any, when you might have used a skill in your job that you developed in DI?				X
IQ 2: Describe ways, if any, that you feel your DI experience helped you learn work ethics skills that you now use in your job?	X			X
IQ 3: Describe ways, if any, that you feel your DI experience helped you learn innovation skills that you now use in your job?		X		X
IQ 4: Describe ways, if any, that you feel your DI experience helped you learn career navigation skills that you now use in your job?			X	X
IQ 5: How do you feel your experiences in DI influenced your choice of career?			X	X
IQ 6: What additional skills do you wish you could have learned in DI, if any, to better help you in your job?				X

Data Analysis Plan

For this basic qualitative inquiry, at the first level, I used three different sets of coding, attribute, magnitude, and descriptive coding. Firstly, I described the participants by attribute coding (see Saldaña, 2016). Using the software program Dedoose I recorded a variety of descriptor factors to report the participant's DI and job experience, making it easier to identify connections between data and experiences. Secondly, I used magnitude coding to identify 21st-century skills that align with the framework and also any discrepant skills or data that did not fit. Moreover, this method indicated the frequency with which participants identified specific skills. This strategy was appropriate for qualitative research to enhance description (see Saldaña, 2016). Thirdly, I used descriptive coding, as appropriate for interviews, summarizing the main idea of a passage

with a noun to describe what the topic is about (see Saldaña, 2016). The goal of this strategy was to identify examples of how a participant may have used specific 21st-century skills in their workplace. Passages provided rich descriptions of experiences that I used as evidence to support or deny the main research question. Saldaña (2016) recommended keeping an open mind to alternative coding methods however these methods proved satisfactory.

At the second level, I used pattern coding to condense and categorize the descriptive codes into larger themes (see Saldaña, 2016). These themes emerge from the previous codes and were guided by the framework. I planned to use Microsoft Excel and the qualitative data management program, Dedoose, to organize, manage, and help make sense of the data. In addition, I used the more traditional method of sticky notes on chart paper to provide visual organization for codes.

Discrepant data, negative cases, outliers, or disconfirming evidence, challenge predominant theories (see Ravitch & Carl, 2016). It was important to identify discrepant data because analysis of negative cases provides strength to the credibility and dependability of the findings (see Burkholder et al., 2016). Exceptions to established patterns were easily recognized and discussed in Chapter 4 to provide transparency and increase trustworthiness (see Bashir et al., 2008). I actively sought to identify outliers and themes that did not align with the framework and have reported them in Chapter 4.

Demographic information, audio recordings, transcriptions, member checked files and coding files were organized in a table. This data has been stored on my computer in a password-protected file. Files were also backed up onto a labeled thumb drive and stored

in a locked file cabinet for the next 5 years. After 5 years, all files will be deleted, and the external hard drive will be reformatted. Any paper files will be shredded.

Evidence of Trustworthiness

Trustworthiness is a key factor in qualitative research. By incorporating certain procedures and approaches, used to ensure rigor (see Ravitch & Carl, 2016), the reader develops confidence that the data accurately portrays the phenomenon. These processes are used to minimize bias and increase the accuracy of the findings (see Patton, 2015). Some strategies that I used in this study to increase trustworthiness were: field-testing the interview questions, member checking, peer debriefing, recording thick, rich descriptions, and keeping a reflective journal (see Burkholder et al., 2016). Here I describe in more detail how I was able to increase trustworthiness through credibility, transferability, dependability, and confirmability (see Merriam & Tisdell, 2015) in this study.

Credibility

Credibility addresses issues of internal validity, or how well a study measures what it is intending to (Shenton, 2004) and is directly related to the methods and instruments used (Ravitch & Carl, 2016). I used six verified procedures to help ensure credibility in this study. Prior to data collection, the interview questions were field-tested by academics to ensure validity as suggested by Castillo-Montoya (2016). During the data collection phase, I established trust with gatekeepers and participants and encourage honest, frank participation as Rubin and Rubin (2012) recommend. I used iterative questioning in the instrument and ask participants about negative cases as described by Shenton (2004). Following data collection, I emailed summaries of the transcripts to

participants for member checking to ensure that they accurately reflected the participants' intended response as recommended by Carlson (2010). I used Saldaña's (2016) coding method to analyze the data, providing an appropriate method of analysis for this interview-based, basic qualitative study. Finally, I related the findings of this study to prior research as a further method of increasing credibility according to Shenton (2004).

Transferability

Transferability or external validity describes how well findings can be applied to other studies (see Merriam & Tisdell, 2015). In my study, I incorporated three strategies recommended to improve transferability. Firstly, a full description of all background factors defining the study assist the reader in deciding if the conditions might be applied to other situations or if the situation is typical of other environments (see Merriam & Tisdell, 2015). Descriptions of the partner organization, the number and demographic descriptions of participants, the data collection methods, and time frame help determine transferability, as described in Chapter 4. Also disclosing pertinent information and gaining various approvals build trust in the methods. Secondly, I provided rich thick descriptions of the participant's experience to allow readers to understand and generalize the phenomena for themselves. Thirdly, I used purposive sampling, limited by the specific inclusion criteria. This study was open to participants from across the United States and other countries thereby maximizing the variety of participants (see Merriam & Tisdell, 2015). The database of 1,600 alumni was randomized and I invited 400 alumni to participate before the quota of 11 was full. Participants from ten states responded to the call to be interviewed, two male and nine female. They represented a variety of fields

including education, and STEM careers. Additionally, participants represented a variety of DI experience from 3 to 10 years on teams. The diversification of participants strengthens transferability by increasing the potential application to other situations (Burkholder et al., 2016).

Dependability

Dependability describes how replicable the study is over time (Merriam & Tisdell, 2015). This can be achieved through detailed descriptions of the methods, providing evidence of consistent data collection, analysis, and reporting (Burkholder et al., 2016). I worked to align of all aspects of the study, assuring dependability by ensuring that the data and analysis answered the research question (see Ravitch & Carl, 2016). Triangulation helps confirm data and helps ensure saturation, as detailed by Houghton et al (2013). In this study, I used interviews to capture rich thick descriptions of participant experiences that were detailed in Chapter 4. These descriptions were compared and analyzed by emergent codes to identify several overarching themes which are described in more detail in Chapter 4. Additionally, participants from across the United States and internationally were invited to participate, thus bringing a wide variety of perspectives to the study, further increasing dependability. A code-recode analysis strategy was also employed to support the dependability of the findings as Anney (2015) described. This involves the researcher recoding the same data twice after a break of at least 1 week to allow a fresh perspective. Additionally, excerpts and themes were sent to participants via email for member checking to ensure I understood their words correctly and could describe the phenomena as they intended.

Confirmability

Confirmability relates to the objectivity of a study, ensuring that the results are the product of the participant, not the researcher (Shenton, 2004). Two ways to make the study transparent are by providing detailed descriptions of the method and carefully listing the limitations of the study. Therefore, Chapter 4 details each step taken in this basic qualitative design, while Chapter 5 contains a description of the limitations. Reflexivity is vital to establishing trust in the findings. Open reflection of the data collection and analysis help demonstrate self-awareness and eliminate bias (Ravitch & Carl, 2016). I used two reflective methods to ensure objectivity. Firstly, I kept an audit trail or reflective journal describing the choices made throughout the project as described by Cutcliffe and McKenna (2004) and Orange (2016). Secondly, I used peer debriefing to gain an independent perspective and scrutinize my analysis of the data (see Spall, 1998).

Ethical Procedures

The trustworthiness of qualitative research depends on how researchers follow ethical procedures. Ethical considerations go far beyond consent forms and confidentiality (Rubin & Rubin, 2012). In a basic qualitative study, the researcher acts as both the instrument of data collection and data analysis. In this role, the researcher must provide every consideration to ensure they do no harm to participants as well as to improve the validity and reliability of the study. The researcher-participant partnership involves building trust and open communication (Rubin & Rubin, 2012) and the responsibilities of maintaining ethical standards fall on the researcher.

For this study, I carefully followed all ethical procedures as detailed in my application to the IRB at Walden University. Walden University's approval number for this study was 06-10-20-0796102. The partner organization, DI, has not been masked in this study, with permission from the organization and the university. This is an ethical choice because the unique attributes of the program would make it easily identifiable. The interview process will not expose participants to risk exceeding that encountered in daily life (see Burkholder et al., 2016). I have been transparent about my role in DI and none of the participants in this study were known to me, and indeed they came from different states across the country. It was my goal to portray participants' stories transparently by reporting the meaning without judgment, coercion, or inaccuracy, as described by Rubin and Rubin (2012).

Recruitment was satisfied in one phase and while participants were somewhat homogenous, having both DI and work experiences, participants were ultimately self-selected, as in most interview-based data collection studies. Anonymity cannot be offered in interview situations (Patton, 2015), however, all data was kept confidential, referencing participants by pseudonyms. The only identifying data that I collected was the participant's first name and contact email address. Even by asking detailed information regarding their participation in DI in the demographic questionnaire, it would not be possible to identify participants due to the variety of DI challenges, age level categories, and sheer numbers of participants involved in DI across the world.

The informed consent document included a description of the purpose of the study, the inclusion criteria, and potential risks so that participants could make informed

decisions regarding participation. The informed consent stated that participation in the study was voluntary and could be stopped at any time without any negative effects on participants, also that the interview would be audio recorded. Participants were informed that data will be stored electronically for the next 5 years under password protection and backed up. Participants were asked to member check the transcripts. A $10 Amazon gift card incentive was offered to participants who scheduled interviews to thank them for their time, but this in no way implied coercion. Every consenting participant received the gift card when they exited the study.

Summary

Chapter 3 included a methodological description of this study. This included a rationale for the research design of this basic qualitative study, a description of my role as the researcher, an explanation of the participant recruitment and selection procedures, the instrumentation for the study, and a data analysis plan. It also included a description of the four aspects of trustworthiness and ethical considerations as they relate to this study. Chapter 4 details the results of the study presented by research question.

Chapter 4: Results

Introduction

The purpose of this basic qualitative study was to explore how DI alumni perceived the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career and workforce readiness. To fulfill this purpose, I developed one CRQ and three SQs aligned with this design.

CRQ: How do DI alumni perceive the 21st-century skills they learned through their DI experiences informed their early career and workforce readiness?

SQ1: How do DI alumni perceive their DI experiences informed their work ethic?

SQ2: How do DI alumni perceive their DI experiences informed their ability to be innovative?

SQ3: How do DI alumni perceive their DI experiences informed their career navigation?

In this chapter, I report the results of this basic qualitative study. The chapter includes the setting, demographics, data collection, data analysis for level 1 and level 2 coding, evidence of trustworthiness, results, and a summary.

Setting

The setting for this basic qualitative study was completely online. Participants were contacted via email from a list of DI alumni provided to me by the DI Headquarters alumni group. Alumni on this list are physically located across all United States and 15 additional countries, so in-person interviews would have been impractical. Interviews were conducted via Zoom at a time and location convenient to the participant. Therefore,

there was no single setting for this study. However, the DI program experience is somewhat standardized in the season length and choice of challenges.

Despite this normalization, several conditions may have influenced individual participant's experiences and therefore the results of this study. These variables may include the length of time each participant was involved in DI, how long ago they occurred, the training their team manager received, the continuity of their team membership, and their participation at state and Global Finals competitions. Consequentially, participants may have had different experiences.

Demographics

The participants in this study included nine female and two male DI alumni. Their participation as DI team members ranged from three to 10 years, with four participants on teams for 10 years. Six participated in elementary, middle, and high school, three in elementary and middle, two in middle and secondary, and one in the secondary level. Nine of the 11 participated in all three levels of tournament and two at the regional and state-level competitions. Their DI experiences were in 10 different locations across the United States, and eight of the 11 participants have subsequently chosen careers in STEM fields. Table 5 provides a list of this demographic data including participant gender, the number of years they participated in DI teams, the age levels, and competition levels, and their current field of work.

Table 4

Participant Demographics Including Gender, Years in DI, Grade Level, and Competition Level, and Work

Participant pseudonym	Gender	Years in DI	Grade level	Competition level	Work
P1	Female	10	EL, ML, SL	Regional, State, Global	College Student Supervisor
P2	Male	10	EL, ML, SL	Regional, State	Education - Research Assistant
P3	Female	8	EL, ML	Regional, State, Global	Quality Engineer
P4	Female	8	EL, ML, SL	Regional, State, Global	Quality Engineer
P5	Female	6	EL, ML, SL	Regional, State, Global	University Lecturer Mechanical Engineering
P6	Female	3	EL, ML	Regional, State	Math Teacher 7th Grade
P7	Female	10	EL, ML, SL	Regional, State, Global	Speech Pathology - Graduate Assist
P8	Female	7	ML, SL	Regional, State, Global	Dentist
P9	Female	5	EL, ML	Regional, State, Global	Data Domain Lead & Pharmacist
P10	Female	3	SL	Regional, State, Global	Library Circulation Assistant
P11	Male	10	EL, ML, SL	Regional, State, Global	Mechanical Engineering – Intern

Note. EL = Elementary Level, ML = Middle Level, SL = Secondary Level

I sent out invitations to prospective participants and P1 confirmed her Zoom interview within an hour of receiving the invitation. She worked at a university helpdesk supervising 10 other student assistants. She participated in DI for 10 years across all grades and competition levels located in the Midwestern region of the United States.

P2, one of two males in the study, was completing the data collection phase of his Ph.D. in Education while working as a graduate research assistant. He also participated in DI for 10 years across all grade levels and competed at regionals and state-level competitions. He participated in DI as a student in the Southeast United States.

P3 was a quality engineer. She participated in DI for 8 years in elementary and middle school in the Midwestern United States. She competed in all three competition levels. The profile of P4 mirrored that of P3 in all aspects, other than P4 experienced DI in high school as well.

P5 was a lecturer in mechanical engineering at a prestigious university. She participated in DI teams for 6 years in the Northeastern United States. She competed on teams across all three grade levels and experienced regional, state, and global tournaments.

P6 had been teaching seventh-grade math for 2 years at the time of the interview. She participated in DI teams in elementary and middle school in the Western United States. She competed in regional and state-level tournaments as a participant and remained involved in DI as an adult volunteer.

P7 graduated as a speech pathologist and at the time of the interview was a graduate student researcher working towards her masters in speech pathology. She participated in DI for 10 years, in all grade levels and competition levels in South-Central United States. On the day of the interview, she emailed to say that there had been a family emergency and that she was comfortable conducting the Zoom call from an airport corridor. Therefore, the call was slightly shorter than for other participants.

P8 was a practicing dentist. She was on DI teams for 7 years in middle and high school in the southeastern United States. She competed across regional, state, and Global Final tournaments.

P9 was trained as a pharmacist and chose to combine it with data analytics. Now she works in the pharmaceutical field as a data analyst. She participated in DI teams for 5 years in elementary and middle school in the Midwestern United States. She competed across all three competition levels.

P10 worked as a library circulation assistant while studying for a double major in geography, gender studies, and prelaw at university. She participated in DI in high school for 3 years in the Northeastern United States. The team competed at all three levels.

The final participant, P11, was involved in DI teams for 10 years across all grade levels. He participated across all three competition levels in the Northeastern United States. He is now an undergraduate student studying mechanical engineering and working as an intern designing cancer radiation machines for hospitals.

Data Collection

For this basic qualitative study, I collected data through interviews only. I received IRB approval on June 10, 2020, and I began recruitment soon afterward. I electronically randomized a list of 1,600 alumni using the RAND function in Excel. Then I invited the first 400 names to participate in the study in batches of 50 over 5 days. A total of 11 participants responded to the initial emails and subsequently booked virtual interviews in Zoom at times convenient to the participant. I used the interview protocol described in Chapter 3 and conducted the Zoom interviews from my home office. I audio recorded the interviews in two ways, with the embedded record feature within Zoom and using QuickTime as a backup recording. Interviews ranged between 23 and 59 minutes in duration. There were no interruptions to technology or our conversations or other anomalies, other than the interview with P7. This participant had a family emergency and called into Zoom from the airport. She stated that she was undaunted by taking the conference call from a terminal hallway, and I do not believe that the situation affected her responses.

The first interview with P1 was recorded on June 12th at 11 a.m. and lasted 38 minutes. The 11 interviews were conducted almost daily for 2 weeks, with the final interview with P11 being held on June 30th. The shortest recording lasted 23 minutes and the longest 59 minutes, with an average of 42 minutes. For transparency and clarity of reporting, Table 6 lists the 11 participant pseudonyms, the date of each interview, the time each occurred, and the duration of each recording.

Table 5

Interview Dates, Times, and Durations

Participant pseudonym	Date 2020	Time (PST)	Interview duration
P1	12 Jun	11 a.m.	37:44
P2	14 Jun	1 p.m.	23:13
P3	14 Jun	4 p.m.	36:04
P4	15 Jun	4 p.m.	38:46
P5	16 Jun	8 a.m.	47:37
P6	17 Jun	9 a.m.	51:05
P7	18 Jun	11 a.m.	27:39
P8	19 Jun	3 p.m.	53:15
P9	21 Jun	9 a.m.	59:37
P10	24 Jun	1 p.m.	38:03
P11	30 Jun	1 p.m.	53:15

To prepare interview data for the analysis phase, I uploaded the Zoom audio recordings onto Blackboard's Kaltura and requested computer-generated captions. When completed, I used the Kaltura editor functionality to review the transcriptions while listening to the audio. I edited the transcript for accuracy before copying and pasting the text from the editor into a Word document. I replaced all references to specific locations or names with generalized phrases to de-identify the written transcripts, thus protecting participant confidentiality. While I was preparing the transcripts, I began preliminary data

analysis, identifying key phrases in each transcript by bolding the text font. Next, I uploaded the Word file transcriptions to the online data analysis software program Dedoose in preparation for coding. Reading through each transcript, I identified key excerpts and labeled them with emergent codes in Dedoose that aligned with the three constructs in the Rojewski and Hill's (2017) CTWE framework, adding new codes as needed. Next, I took each transcript and identified key excerpts and copied them into individual documents, labeling each excerpt with its associated code to return to individual participants for member checking. I emailed those documents back to participants between June 30 and July 6, 2020. Six participants replied to this communication, and three of them contributed additional information, which I copied into Word documents and uploaded into Dedoose for coding.

Data Analysis

This basic qualitative study was conducted in two stages. Firstly, I tagged participant excerpts and coded them as recommended by Saldaña (2016). The second stage focused on combining codes into themes. Appendix B provides the codebook listing all codes, a definition of each, and exemplar quotes from the data that best highlight each code.

Level 1 Data Analysis

Initially, several codes were apparent in the transcripts. As I engaged in several rounds of iterative data coding, new codes were added and I experimented with the code hierarchy, developing the codebook in tandem. At this point, I created member-checking documents to send to each participant. I took each transcript and created a new Word

document and selected a few sample quotes for the codes that emerged for each participant. This allowed me an opportunity to look at the data again and re-code it, as Anney (2015) suggested, to ensure internal agreement that excerpts had been coded the same way twice.

Then I reread each transcript in Dedoose to ensure I had tagged all the relevant data. Then reread the excerpts in groups of codes, to ensure alignment, checking that there were no miscoded excerpts, and possibly to add new codes that I had not previously considered. I added codes even if they seemed to be isolated instances and refined these in the level two analysis. I felt that all research questions were answerable in this phase. At the end of level 1 coding, I had 34 emergent codes.

Level 2 Data Analysis

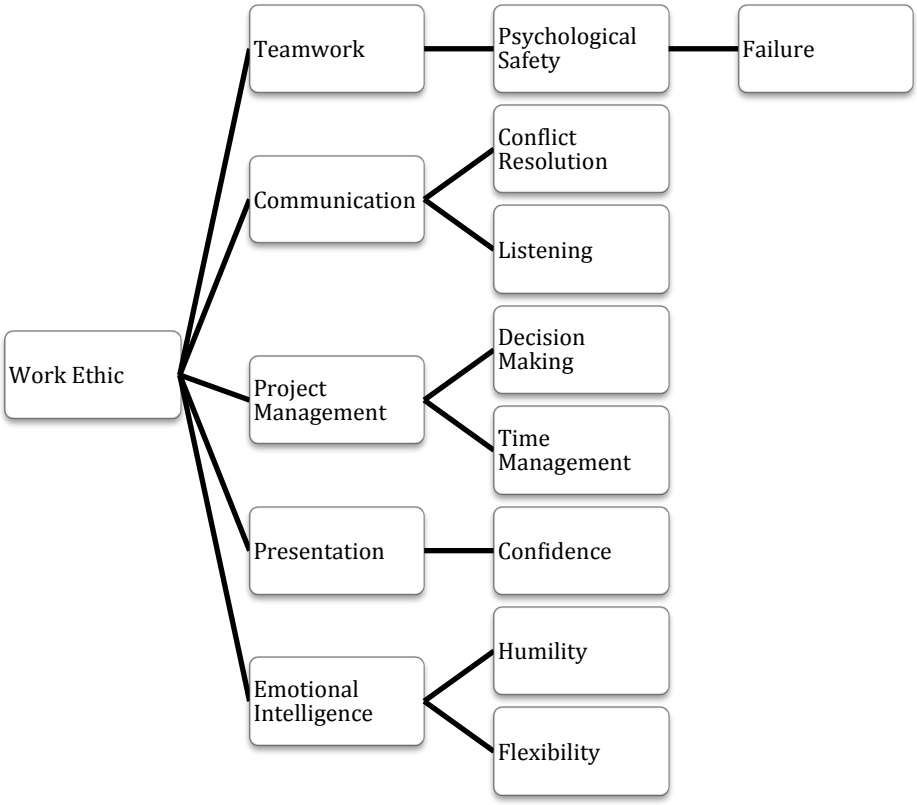
In the second level of data analysis, I continued to fine-tune the 34 emergent codes to reflect alignment with the three constructs of the CTWE framework. These are work ethic, innovation, and career navigation. I frequently revisited the codes and their definitions, reorganizing the structure, including or excluding excerpts based on how well they fit the evolving code tree and themes.

The first theme, work ethic is sub-divided into five main codes and then further into nine additional codes (see Figure 2). This theme applies to data matching the CTWE framework construct of work ethic. It includes personal and interpersonal traits, teamwork, and communication skills identified by participants as being learned through their DI experiences and that they use in their current work practices. The emergent codes conflict resolution and listening were put into the communication category. The codes of

flexibility and humility were categorized as emotional intelligence. The presentation category included the code of confidence, and teamwork was made up of the emergent codes of psychological safety, and another level of the emergent code of failure.

Figure 2

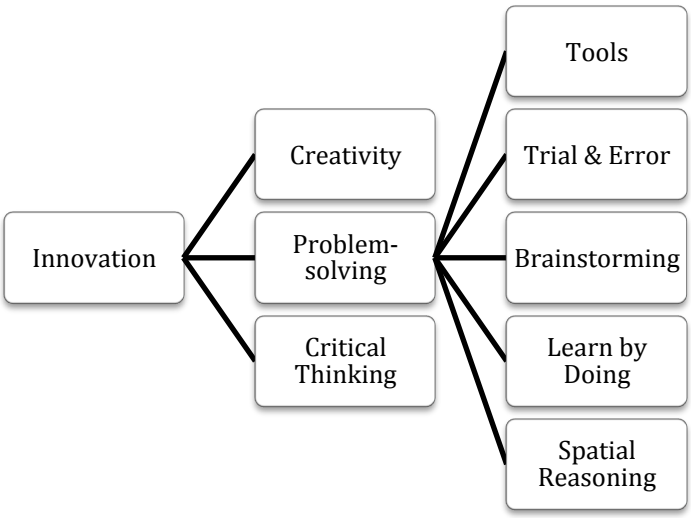
Code Tree for the Work Ethic Construct



The second theme, innovation, applies to data matching Rojewski and Hill's (2017) innovation construct which was divided into three main codes, creativity, critical thinking, and problem-solving (see Figure 3). I further identified five emergent codes under problem-solving, including, brainstorming, learn by doing, spatial reasoning, trial and error, and tools.

Figure 3

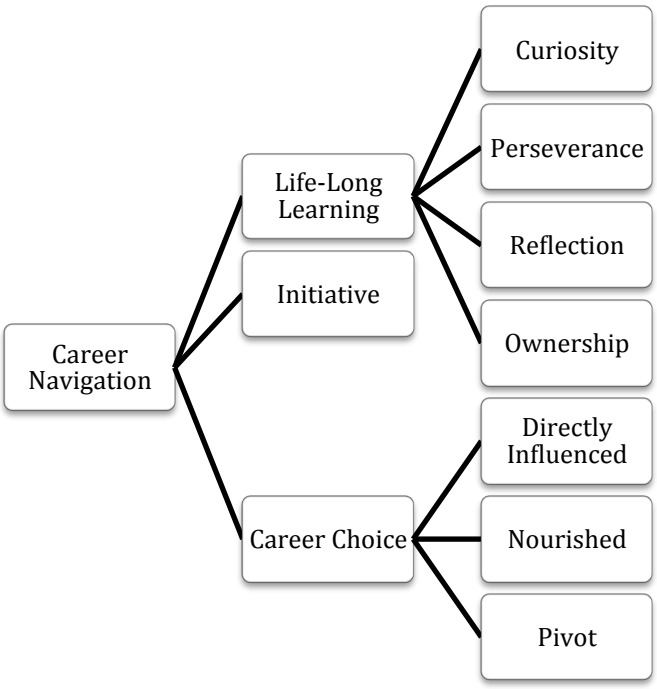
Code Tree for the Innovation Construct



The third theme, career navigation aligns data matching Rojewski and Hill's (2017) career navigation construct. This included the codes of life-long learning, initiative, and career choice (see Figure 4). I further divided life-long learning into four subcodes: curiosity, ownership, perseverance, and reflection. Additionally, participants described how their DI experiences influenced their career choice. While this theme was not a research question, it supports the theme of career navigation. Career choice was broken down into three codes: direct influence, nourished, and pivot using participants' expressions.

Figure 4

Code Tree for the Career Navigation Construct



Additionally, I actively sought areas of discrepant data that did not align with existing codes or themes. While this data did not present disconfirming cases, as Burkholder et al. (2016) suggested, it did present additional insights. In total, I linked 298 participant excerpts to these 34 codes. Table 7 shows the frequency of codes per participant and construct.

Table 6

Code Frequencies per Participant and Construct

Participant	Work ethic	Innovation	Career navigation	Discrepant data	Central question	Total
P1	16	12	8	1	3	40
P2	10	3	3			16
P3	9	8	5		1	23
P4	3	8	8	1	1	21
P5	12	10	8	4	3	37
P6	10	5	15	1	4	35
P7	6	7	3	1		17
P8	22	2	4	3		31
P9	18	4	3			25
P10	15	6	8			29
P11	17	16	3	1	1	38
Totals	138 (44%)	81 (26%)	68 (22%)	12 (4%)	13 (4%)	312 (100%)

Evidence of Trustworthiness

Trustworthiness is vital in qualitative research as it ensures rigor, decreases bias (Ravitch & Carl, 2016) increases accuracy, and reader confidence in the findings (Patton, 2015). I upheld issues of trustworthiness in several ways. In this section, I describe how I ensured credibility, transferability, dependability, and confirmability as evidence of trustworthiness.

Credibility

In this study, I ensured credibility or internal validity in several ways. Firstly, prior to data collection, the interview questions were field-tested by several professors to eliminate misunderstanding when presented to participants in interviews, as suggested by Castillo-Montoya (2016). I modified the questions several times before settling on these specific questions. I believe these modifications made the questions easier for the participants to understand, whilst leaving them open-ended and not directing their

responses in any way. Secondly, I conducted interviews in a friendly, inviting manner, listening carefully to participants to encourage honest responses and to establish trust, as Rubin and Rubin (2012) recommend to promote deeper conversation. Also, asking about negative cases as suggested by Shenton (2004) to uncover discrepant data and unanticipated points of view, also decreasing researcher bias. Thirdly, I sent the codes and quotes back to participants for member checking as recommended by Carlson (2010) and Houghton et al (2013) to ensure an accurate interpretation of their words. I received replies from six participants in total, confirming my understandings were correct. This included additional comments from three participants, which I included in the data analysis process. Next, I chose an analysis process that aligned with a basic qualitative methodology according to Saldaña (2016), thus increasing the reader's trust in both the process and results. Finally, Shenton (2004) suggested increasing credibility by relating findings with prior research in the field, which I have done extensively in Chapter 5.

Transferability

I used three methods to ensure external validity for this qualitative study. Firstly, I described in detail all the factors defining this study so that the reader may decide whether to trust them for themselves, described as best practice by Merriam and Tisdell (2015). Secondly, also as recommended by Merriam and Tisdell, in the results section, I included many quotes, using the participant's exact words to provide rich, thick descriptions of their experiences in their own words, thus allowing the reader to comprehend the phenomena from the participant's point of view. Finally, through purposive sampling I invited 400 individuals from across the United States and other

countries to participate in the study, thereby diversifying the participant pool as Burkholder et al. (2016) suggested. Eleven participants from 10 states joined the study, two male and nine female, representing a variety of careers, thus providing triangulation of the data as described by Houghton et al (2013).

Dependability

I have improved the dependability of this study in several ways. Firstly, I ensured the consistent application of all procedures across participants throughout the data collection process, described in the methods section, and suggested by Ravitch and Carl (2016). Secondly, I ensured that the research questions aligned with the CTWE framework and methodology of this study, in addition to the findings being consistent with the data, as outlined by Merriam & Tisdell (2015). Thirdly, to combat the potential risks of being a single researcher and not having a second opinion to confirm my codes, I employed a code–recode analysis strategy after a weeklong hiatus from the data, to ensure internal agreement that the data had been coded the same way twice as Anney (2015) suggested.

Confirmability

I have increased confirmability throughout this study in three ways. Firstly, by using a reflection journal throughout the data collection process to minimize bias, as described by Cutcliffe and McKenna (2004). I recorded my expectations, surprises, and thoughts on procedural issues after each interview, stored electronically and shared with my Chair, also recording code changes during the various stages of analysis. Secondly, my research Chair scrutinized the data analysis, providing an independent perspective on

the findings as recommended by Spall (1998) as a way of increasing confirmability. Thirdly, I actively sought to identify outliers and codes that did not align with the framework. This identification of discrepant data helped provide transparency, thereby increasing trustworthiness as described by Bashir et al. (2008).

Results

In this section, I have organized the results by research question, beginning with the three SQs and ending with the CRQ and discrepant data. For each question, I have included a frequency table listing the codes and visually representing the data (see Table 7). The summary is at the end of all results.

Work Ethic

Research SQ1 was, how do DI alumni perceive their DI experiences informed their work ethic? Data that helped answer that question included excerpts from participant transcripts that aligned with 21st-century skills described in the CTWE framework construct work ethic. I determined that the theme, work ethic, consisted of a total of 14 codes, five main codes with nine codes subsumed under them. The code of teamwork subsumed psychological safety and I coded failure under that. Conflict resolution and listening were included in the code communication. I further subdivided the code of project management into decision-making and time management. I coded confidence under presentation, and emotional intelligence included humility and flexibility. For SQ1, work ethic, I found 138 out of 312 excerpts, or 44% of the total number of excerpts, to support these codes (see Table 7). The codes associated with SQ1 and their frequencies are listed in Table 8.

Table 7

Frequency of Codes Aligned with Work Ethic

Code	Emergent code	Emergent code	Frequency	Total
Teamwork			30	56
	Psychological safety		21	
		Failure	5	
Communication			13	32
	Conflict resolution		13	
	Listening		6	
Project management			7	20
	Decision-making		7	
	Time management		6	
Presentation			7	19
	Confidence		12	
Emotional intelligence			3	11
	Humility		5	
	Flexibility		3	
				138

Teamwork

Teamwork was the concept most commonly referred to in the study. The data showed that 10 participants discussed teamwork and I identified 30 excerpts. I have considered collaboration as a synonym for this code, while only four participants used the term collaboration six times. P6 struggled to define teamwork in DI, finally, she settled on this explanation. “It’s more than teamwork, it’s real collaboration, it’s not just working together, or working toward a goal ... it’s a community, goal-oriented, support system.” P5 expressed teamwork simply as “valuing everybody’s contribution.” P1

described the essence of dividing up work as an integral part of being a team member when she said, “Everybody has a different skill set that they’re best at ... I can’t do everything by myself.”

P10 reported experiencing teamwork as sharing tasks to get the job done. For example, she described her work, but referred to her DI experiences as she explained, “You’re working in different team configurations. That came up a lot in my DI improv group. You keep switching roles ... put on different hats at different times, we’re all one team ... I feel sometimes like I’m in an instant challenge [at work].” P9 commented further on this idea of reciprocal support saying,

> If you’re working on a project at work or college, and you feel like your back’s up against the wall, and you have a mountain of stuff that needs to get done before the deadline, not being afraid to pull someone else in and ask for help, and even in reverse, if you see someone else struggling, you’re willing to jump in and help them out.

P3 also spoke of helping each other and sharing tasks as something she learned in DI and used at work. She described her DI team breaking into task groups,

> engineers making sets, theater people making costumes, all coming together for a common goal. At my new job now, I’m working with designers, sales division, suppliers, and the factory. ... [Everyone] works with other divisions they can meet their deadlines. ... Everything needs to come together so that you have the completed project. Having that experience of working with a wide of variety people [in DI] has helped me today in my job.

P5 described how she valued the teamwork she learned in DI and how she uses it in her classroom and she connected it to her field of engineering. She said,

> In my current role, I teach students to do some of the skills that I learned in DI, so [I use] a lot of teamwork. We learn about how your role in a team affects others, and how can you improve next time. The teamwork component especially in engineering is so crucial in the real world as an engineer. You're never building anything by yourself.

P4 explained her personal growth concerning teamwork:

> I was a bossy kid. DI has definitely helped with collaboration and teamwork skills. I've learned to listen. ... I had to learn not to be that leader but a team player, not tell you what to do, but to take your ideas and think and grow.

P8 observed the importance of teamwork from the employer's point of view:

> The biggest thing a manager wants ... is [for you to] be able to communicate well. They want someone that works well on a team, can step up when they need to, and let other people play to their strengths, and DI helped us develop that.

P2 compared learning teamwork in school to DI saying,

> In school, we do a lot of group projects but they were very much, you do your little piece and then we all get together at the end and present it. In DI, you constantly have to work together come up with ideas, collaborate, and listen to everyone. I definitely was able to relate that to my work, and I think that it's made my research and collaboration stronger.

P1 compared learning teamwork in other ECAs to DI, highlighting the quick-thinking, the length of the season, and teamwork:

> I feel that teamwork is the main thing that you get [from DI] that you don't get from other extracurriculars, including sports. You don't get the quick-thinking skills that instant challenges give you, especially since DI lasts for so much of the year, and you learn to work with a group of people.

Participants reported on many aspects of teamwork such as delegation, valuing and supporting others, working towards a goal, and made several comparisons between learning teamwork in DI and school, other ECAs, and participant perceptions of employer needs.

Psychological Safety. The concept of psychological safety is fundamental to strong teamwork. I used this code to subsume several concepts including, accepting criticism, belonging to a community, and risk-taking. I tagged 21 excerpts from seven participants with this code.

Two participants expressed ideas regarding accepting criticism. P11 observed, "You can always improve [the way you] take criticism, run with it, and don't get offended by it." Supporting team growth in this area P8 stated that a norm in her DI team was not to "criticize or judge without [having] an alternative solution" to suggest. P8 referenced her work being "able to receive criticism without taking it personally has been helpful in my workplace."

P10 described a fundamental brainstorming rule designed to build belonging and community and connected it to working with her library customers. She stated the rule,

"The 'never say no rule,' from instant challenge." Then explained, "If someone asks, 'Can you help me with this?', you can't say no, you can only say, 'Oh, we can't help you here, but let us direct you to the next place.'" P6 agreed that, "Relying on other people to be supportive comes from DI." P11 concurred adding, "Everyone has an important role." He added his perspective that DI is "a competition, but you compete with yourself. [At tournaments] everyone is happy to show you everything they've made and talk about how they did it. DI is so open and super friendly." He explained that teams even borrow tools from each other at tournament. He compared this favorably to experiences volunteering at his school's fierce robotics competitions. P10 extended this idea of community as she described how "DI builds [its] own community. We're always wondering what's happening and how they are doing at the high school teams." P9 described learning the importance of community, saying,

> DI taught me the more important life value of not being so self-centered. You start to realize that your solutions are going to be better baked, or more creative if you solicit that group-think mentality rather than just going off [by yourself].

Another aspect of psychological safety is risk-taking. P10 described learning to take risks in DI and applying that to her work life. Another participant described how performing in a DI play can be challenging and stressful because you risk looking foolish or making mistakes. Applying for a job is similarly stressful causing you to lose the job opportunity. "One of the biggest risks that I took when I first started DI [was being in] the play. Now if I apply for a job and I don't get it, it's a little bit less harrowing, because that is just how life goes sometimes." P10 had already experienced taking these risks

when the stakes were not as high and had become comfortable with the stress and challenge. P6 described valuing the ability to take risks and that she "talks a lot [to her students] about risk-taking and just trying things" in her math class. Participants described several aspects of psychological safety including drawing connections from their DI experiences to accept criticism, belonging to a community, and risk-taking. A successful team requires its members to feel safe from ridicule, safe to take risks, and feel a sense of belonging.

Failure. I tagged 5 excerpts from five participants who expressed their thoughts on failure. P3 explained her experience from DI. "You're going to fail sometimes, but you're going to get back up and do it next year, you have to keep going and keep innovating because there's always going to be a new challenge for you." P10 echoed this thinking stating, "It doesn't matter if you fail because it's all part of the process ... a learning opportunity." P5 explained how she used this philosophy in her work teaching:

> [My students] get really scared when things so wrong, so I make my class a space that is ok for things to go wrong ... [so they are] not afraid to try something, see what happens, and if it fails, it fails. You learn and you move on.

P6 recounted her learning in DI the year her team did not advance to the state tournament:

> I didn't experience a lot of failure in school, so this was really valuable, but we were still really proud, and we still accomplished things, and just because we weren't in the top three didn't mean that what we did didn't matter, and that was huge learning from DI.

In these excerpts, participants described learning through DI, that failure is part of a continual growth process.

Communication

The second most frequent code was communication, with 13 excerpts being tagged from seven participants including examples of both written and spoken communication. Regarding written communication, P2 reported that DI "helped with my writing ... explaining [things] to different audiences." Also, P1 claimed that DI taught her to be "more concise ... filling out paperwork and writing things that make sense, which I do at work writing up procedures and announcements."

Regarding spoken communication, P11 stated, "DI has taught me so much about general people skills" specifically talking to different people. P1 described the need for clear communication, "being consistent so that everybody knows what's going on." P8 also described how to pitch your message at the right audience, saying in DI, "We had to know our audience." Additionally, P8 mentioned communicating in a different language as helping to "connect with them [people], something that shows that you took the extra step to build a relationship." Participants described how DI helped strengthen both written and spoken communication that they now value in their work.

Conflict Resolution. I coded conflict resolution as part of communication and tagged 13 excerpts from five participants. P8 explains that DI has been "really helpful in [learning to] criticize in a constructive manner. That experience has really helped me communicate with my team [at work]." P9 agreed saying, "I attribute the seeds of that confidence to DI ... The ability to have a very difficult conversation and still hold a

respectful constructive conversation with people even if you don't agree with their ideas." P11 adds the challenge of "dealing with that sort of person who you don't really click with, but you still have to work peacefully with." Similarly, P6 describes,

> how to disagree with people without making them feel like their ideas aren't important ... is something that goes back to the DI and something I use all the time. ... It was really valuable to find a way to make somebody that's already upset, emotionally triggered, feel comfortable, confident and heard: [this] is a huge challenge.

Conflict is often uncomfortable and is therefore avoided. These excerpts describe how participants learned from DI experiences gaining conflict resolution skills they now use at work.

Listening. The code of listening appeared in six excerpts from five participants. P8 stated that she learned to listen to others through DI. "DI definitely teaches you how to work, when you need to listen when you need to speak, and how to how to accomplish your goals." P9 describes the importance of listening to others at work. She said, "The willingness to just step back, stop talking and listen to what other people have to say, and valuing their opinions." P2 echoes that it is important to "come up with those ideas ... but still listening to others." Listening is a vital aspect of communication, separate to written and spoken forms, and recognized by participants as a valuable skill.

Project Management

Project management was a concept of work ethic that four participants discussed. I identified seven excerpts from their interviews. P6 reported how she learned the process

of project management in DI and described it as taking "something really big and breaking it into small chunks ... and delegating those different pieces out to different people." Similarly, P5 explained project management as the "taking little bites approach, breaking it down into achievable goals at each stage." She compared her job to DI:

> When I started this job ... it had a lot of moving pieces ... it was overwhelming. [Back in DI] I remember reading the central challenge rules [and thinking], 'Oh my goodness, there's no way!' ... then breaking it down into something more manageable. DI definitely helped with that.

P8 compared planning a procedure at work to preparing for an improv challenge in DI. Running through the steps "to accomplish the goal and managing the patient," and changing plans "on the spot," experiencing time pressures in both situations. Here participants explained the value of learning to break apart a large task and delegating tasks.

Decision-Making. For this code, I found seven excerpts from four participants that explained ideas related to decision-making that included, optimization, prioritization, and research. P11 explained that learning "how to optimize the solutions is something super consequential that I learned from DI. ... Looking at the problem, writing everything down, weighing each step ... [then] going for the big stuff [important aspects] and then filling in the gaps with the small stuff." This idea of prioritization was echoed by P8 who explained "how people interpret the problem" differently depends on "what they think is important and what their goals are." Both P3 and P8 described their need for research as part of their decision-making process, both in DI and in their current jobs. P8 said that in

DI they "had to research different things." P3 added, reporting, "I do a lot of research in my job now."

Time Management. Five participants offered comments on managing time and I identified six excerpts. P10 described how the time pressure of joining a DI team affected her.

> DI taught me the power of being busy, the power of having a time pressure. When I started DI, I thought the extra pressure would be worse for my academics, [however] it actually improved my academics. Having this extra thing that took up all of my time somehow improved my grades and improved my mental health as well.

P3 described how instant challenges helped her learn time management. "Instant challenges were really helpful because you don't have a lot of time to think about [the problem]" similar to "projects at work where you don't have all the time in the world ... working on a strict deadline." Project management, including time management and decision-making skills that participants used at work were improved through DI participation, including breaking down a problem, optimization, prioritization, research, and working to a deadline.

Presentation

I tagged seven excerpts from 4 participants with the code of presentation. I included the idea of performing as well as presenting, in this code. P7 expressed her experience succinctly stating, "My presentation skills have got exponentially better" because of DI. P2 agreed explaining, "Being in DI and performing helped because ... I

got experience being up in front of crowds, ... so now when I go to conferences and presentations ... I'm talking in front of a large group of people." P7 offered another example from when she was a reporter at a DI event. "[That] taught me a lot of good personal skills: ... how to conduct myself ... in a professional manner with adults." She went on to connect this experience with getting a job. "You get used to talking to adults and showing off your best stuff. That's an important skill going into the real adult world, how to talk, and showcase yourself to get that job." P10 associated performing in DI and to her daily work. "It's similar because we are being watched all the time" in the library by staff and patrons.

Confidence. I coded 12 excerpts related to confidence from six participants. P10 simply claimed that, "Joining DI ... improved my confidence." P2 extended this idea explaining "Coming up with ideas and having to stand up for yourself and say this is my idea" built his confidence. P9 went on to describe a shy image of her younger self before joining a DI team. "I can't say enough good things about the program. I feel like it was super instrumental in bringing me out of my shell when I was a kid, I was always on the shyer side." P7 echoed a similar growth experience.

> I'd be a very different person if I hadn't gone into DI, probably more closed off. ... It gave me a lot of confidence. It took a lot of guts [to speak in front of people]. DI has made me comfortable in a lot of different weird settings.

P8 agreed, explaining her view of the effect that DI has had and how that influenced her in the workplace:

> DI gives you a lot of confidence and it does empower you, and I recommend it to all kids, ... just believing in yourself. ... I think DI has that effect on young kids. When something is going right, kids feel better about themselves. That's how it is in the workplace, whenever your team is running smoothly, and everything's going well, your team is able to take on more challenges and not be set back by obstacles. ... That's the empowerment that I get from DI.

Additionally, P1 explained the confidence she developed as a kid doing the DI structure challenge and how it transferred to her work. She started by explaining that she is a "very short woman," and then went on to say,

> During the structure challenge, people were shocked and underestimated me. It's the same thing when I'm the supervisor at the desk, I'm the youngest person there, and I don't look super intimidating, but being able to pull from my experience, [thinking] I can do this, has transferred over really well [from DI].

Participants clearly described improvement in performance skills and gaining confidence through participation in DI and transferring those skills to their work.

Emotional Intelligence

The construct of work ethic includes emotional intelligence skills. That is being aware of and controlling your emotions and handling interpersonal relationships empathetically. I tagged three excerpts from three participants with this code. P5 stated, "Dealing with interpersonal skills is a big goal of DI," and P8 reflected, "DI helped me be compassionate." Social-emotional issues can be challenging in team situations and P2 reported,

> with different personalities, something that comes up in DI are disagreements about how things are going to work. As we got older, the stakes got higher ... trying to control emotions and still remain friends. ... I've been able to apply that to my social circles and navigate that a little bit better.

These three excerpts reflect the importance participants perceive of developing social-emotional and interpersonal skills in DI.

Humility. Four participants offered comments relating to humility and I tagged 5 excerpts. P3 simply noted, "Sharing the credit is a big thing." P10 commented, "Acknowledging that other people know more than you about things and that they have things to teach you, ... being open to sharing their experiences and thoughts." P11 described a situation in DI when he had a great idea for a prop and could not let it go. Finally, he listened to a team member who convinced him that her ideas would improve the prop. He recounted his acceptance saying, "You have to learn in DI and the real world, the ability to distance yourself from yourself ... to level headedly admit, 'You're right! That's the best solution.'" P8 explained the need for humility in her job that she credits learning in DI. "A lot of humility is needed. I cannot do an assistant's job. I would never think that I was better than an assistant because they have a lower job than I. We just have different jobs. Knowing and respecting each other's roles is really important, in DI as well."

Flexibility. I identified three excerpts from two participants regarding flexibility and adaptability. P2 explained applying his learning from DI to work. "The biggest one is being flexible. Things constantly change and you have to adapt on the spot. I definitely

see that in my work, ... especially with the pandemic right now ... I had to completely change how I was [working], ... coming up with alternative ways to complete what I needed to do." P8 echoed the importance of flexibility as she stated, "Being adaptable is the biggest thing that DI has taught me, ... to re-evaluate what went well and what didn't and then try to apply it to the next scenario. [Then] adapt your personality to the situation, a lot of dentistry is patient management and reading your audience," making changes on the spot. Humility and flexibility are two emotional intelligence skills that participants recognized they learned in DI and use at work.

Innovation

Research SQ2 was, how do DI alumni perceive their DI experiences informed their ability to be innovative? To answer this question, I looked for the skills suggested in the CTWE framework. The framework and the literature helped illuminate codes that emerged as I identified excerpts in the transcripts. This section includes 81 out of 312 coded excerpts or 26% of the total number of excerpts (see Table 7). The 81 excerpts were placed into three codes; creativity, critical thinking, and problem-solving. Problem-solving was further subdivided into five codes; tools, trial and error, brainstorming, learn-by-doing, and spatial reasoning (see Table 9).

Table 8

Frequency of Codes Aligned with Innovation

Code	Emergent code	Frequency	Total
Creativity		16	16
Problem-solving		16	57
	Tools	16	
	Trial & error	9	
	Brainstorming	7	
	Learn-by-doing	5	
	Spatial reasoning	4	
Critical thinking		8	8
			81

Creativity

Creativity was the most frequent code in SQ2, mentioned by all participants, and tagged in 16 excerpts. Several participants identified creativity in their workplace. P7 explained that in her profession, "You have to be constantly thinking on your feet" to tailor her services to her client's specific needs. P11 explained how "it is super important, as an engineer, to be able to think creatively." He described making a machine part by hand to solve a specific problem, thinking "outside the box," while having to "deal with constraints" of materials, time, and cost. He stated, "DI foster[ed] that, outside the box, creative thinking." P5 echoed his words exactly, as she described the importance of uniqueness or novelty, relating theory to practice. "A lot of engineering is being creative. You could take a solution that you find in the literature, but it's never going to be plug and play, so you do have to change." P6 connected this need for novelty to a DI experience as she explained, "The biggest lessons I got from DI." In her first year of DI, the team bought clothes from Good Will to make into costumes. "We realized that if we

had built them ourselves we would have gotten more points, ... emphasizing that it's more valuable if you can make something your own." These statements highlight an important aspect of creativity that is uniqueness.

Another aspect of creativity is diversity. P4 described diverse perspectives that creativity brings, as she explained, "You can hand a page of text to 100 different people and they're going to understand it in different ways ... and model it in 1000 different ways." She then put it into context by highlighting DI presentations. "DI helps you see things differently, ... look at how we all take [the same] challenge, and you never see the same skit [performed]." As a further example, P1 suggested, "You can do so many things with a pipe cleaner, you just get used to looking at everything from every point of view." Seeing things from different points of view, thinking on your feet, and "out of the box," to create something unique and novel, are aspects of creativity valued by these participants, learned in DI, and used in their workplace.

Problem-Solving

Problem-solving was the most frequently tagged code under innovation. I tagged in 16 excerpts from eight of the 11 participants. P11 said, "Creative problem-solving is pretty much what DI is." P2 agreed, remarking, "I definitely see instant challenges showing up in my daily life. I'll be in a situation [at work] that could have been something I did in an instant challenge." P3 described problem-solving in her work as a quality engineer and compared it to DI. "Ok, here's how [the part is] failing ... now what creative ways will fix it?" In this excerpt, P3 described the design thinking process they use at work, called their "failure tree analysis" and compared it to how they solved

problems in DI. “That’s what we did in DI. We’d start with the overall problem, then work our way down to make sure that each part of our process feeds back into the common goal to ensure this issue doesn’t happen again.”

P11 described learning to accept many possible solutions as part of solving problems:

> You learn there’s not [only] one solution. There’s not one that looks better, there may be an easier one, a cheaper one, a more cost-effective one, there’s all these different solutions and you must pick out which one is the best.

P8 expressed this same opinion differently. “DI taught me that there is not only many ways to skin a cat, but it’s *okay* [emphasis added] to skin a cat in different ways.”

P9 had a different way to describe problem-solving, she called it, “scrappy thinking.” She explained, “DI has definitely helped me become a scrappy thinker. You work with whatever they gave you, you have to solve the problem.” She described working in DI, “to build a tower as tall as you can. You would want to have Lego blocks, but they gave you straws, marshmallows, and pipe cleaners.” Then she drew the comparison to scrappy thinking in her job. “You realize no data set is perfect, so you start thinking creatively, scrappily, about what other datasets you could use, things you would not normally put together. You start thinking about what you could combine to create a solution.” This example describes problem-solving at its core and P9 provides a direct correlation between DI and her work.

Tools. The code, tools, emerged from the data as eight participants described the many different tools they learned to use in DI and their thoughts on how they have

influenced them. P1 compared building props to large scale projects in life, “Prop building and design helps with my planning skills because there are so many factors that go into it, budget, materials, time, research, and making mistakes, which is like any large project out in the world.”

P4 best described how the woodworking skills she learned in DI directly impacted her work building snowboards. “I had to take all my knowledge of how to work with 2x4s, and how to drill wood without splitting it. If I hadn’t learned that at DI, I probably would have split a lot of boards.” P11 commented on a specific technology skill, “Knowing how to use spreadsheets is the world’s most helpful thing. Everyone needs to know Excel. ... You can be 10 times more productive.” P10 commented on how these skills translate into personal life, “[Back in DI] I was working with one of my friends painting a backdrop, it’s a fun memory. Then it leads to doing more creative projects in the future, even if it’s not for DI,” and perhaps not even for work, but personal fulfillment.

Participants 1, 3, 10, and 11, described learning to use specific tools over the years in their DI projects, which contributed to their ability to be innovative. While they may not be physical skills required in their career, they are life skills. These tools included: hot glue guns, staple guns, razor blades, sewing machines, hammers, power saws, screws, drills, clamps, resistors, voltmeters, spreadsheets, and 3D printers. P11 learned the computer programing language Python to create a backdrop of the night sky lit with LEDs for stars, and sign language that the team used to perform their play; a life skill and communication tool. P9 built wooden bridges and towers in the structure

challenge each of the 5 years she participated in DI so that in her region they "[became] known as the structure queens."

Trial and Error. I tagged nine codes from seven participants describing trial and error, reworking a project over again until it is perfect. P6 spoke of the iterative nature of this process, "It's not just about creating it. It's about creating it and then perfecting it." P7 included the need for modification in each round of change, "You have to be smart and willing to learn more, and then you have to recognize, analyze, and comprehend. [Thinking] Ok, we have done something like this before, how can we modify it?" P3 brought the ideas of iteration and modification together as she compared her work and DI experiences:

> That's kind of how it is with your job. When I'm doing a project, I'll give it to my boss and he'll red pen it and be like, 'You started out fine, I need you to fix these, and then send it back to me.' Your report you spent 2 months working on has all these red marks on it. You [think], 'Well I have to basically restart,' but then you [think], 'No, I'm going to take what I have and make it better for version two,' ... understanding that nothing is going to be perfect the first time you put it out. It's going to take time. I remember in DI, the first script that we would write would never be the one that we presented at Globals. So it's taking time to realize you're going to have to keep revising stuff until it gets perfect.

These participants expressed the willingness to redo work to perfection both in DI and in their work.

Brainstorming. Brainstorming is a process of rapid idea generation. Five participants referenced brainstorming drawing connections to DI instant challenges and their work. P1 explained brainstorming as "looking at something and thinking of all the possible ways to handle it ... and do it quickly." P8 likened her dentistry work to an instant challenge when she said, "You walk in that room and you have no idea what's going to go on. ... You have to do what you've got to do. That's what instant challenge is."

P7 explained brainstorming and compared her ability to others she works with, saying,

> Rapid-fire brainstorming, I realized was never taught in school. ... You offer an idea, talk back and forth, then move on to the next idea, really quick. I realized I had that skill but other people [at work] had not practiced rapid-fire brainstorming.

She went on to identify an example of quick thinking in her work. "The other day we were doing a lab, ... learning about different breathing techniques, called a peak cough flow. You cough into it [a machine] and it counts the muscles you use, and a camera goes through the nose." She explained that she had 30 minutes to organize a rotation managing how groups of people would need to physically move through several stages of this process, in groups of seven, with COVID pandemic restrictions, and decide how the procedure could be filmed and edited before the subjects arrived. "Being able to brainstorm what's going on, and how are we going to do this, really help me to solve that

problem quickly." These examples explain how DI experiences influenced the participant's work daily, using skills that they can identify they learned in DI.

Learn-by-Doing. This code subsumed in innovation incorporates the power of making mistakes and learning from them. Five participants described this idea. P5 incorporates this learn-by-doing philosophy in her engineering classroom.

> We put students into teams, teach them the design process, and get them to build a robot. They have to build everything completely from scratch; ... students make all the parts in the machine shop, actually build things with their hands; ... we would actually just let them build it and see for themselves.

P1 makes the connection between learning on the job and her DI experiences:

> We have had some large events [at my job] that I had almost no time to plan for. So like DI, I did some of the planning and execution at the same time. It's a lot of learning while doing at my job, and that is much like how DI works.

P7 explained the nature of DI that does not explicitly state the skills students learn but set up challenges so that students learn-by-doing. She says, "[In] DI, they don't outright say, these are the skills you're learning, they just teach it to you and then you learn it without being told, 'Here's the exact definition of what you're doing.'"

Spatial Reasoning. I tagged this code four times from three participants who referenced the spatial skills they learned in DI. P11 described how hours of DI planning helped his spatial reasoning:

> To make anything you have to have a picture in your head. ... That has made my life in engineering so much easier. I spent so long interpreting and drawing [in DI] so now I can very easily visualize parts in my head.

P10 described skills she uses daily in the library. “One of the biggest skills that DI taught me is spatial reasoning, ... figuring out, ... if I stack these things [books], how will that work, and how many might fit in that space?” Spatial reasoning is a competency not often referred to in the literature however these participants recognize it in their work environment.

Critical Thinking

Four of the 11 participants compared their DI experiences to how they use critical thinking at work, being tagged eight times. P1 said, “Reading the rules [for a DI challenge] is like reading the manual at work, where you have to be aware of everything to get the job done correctly.” P7 expressed her connections related to critical thinking and her daily work.

> Without doing DI I think I would have had a harder time learning those critical thinking and analyzing skills. [At work] we’re constantly having to do a critical critique and analysis of what we’re doing, just the same as in an instant challenge, ... you have to think and analyze in that moment, and those same skills have to translate over to [my work]. Ok, this isn’t working right now in this session, how can I change it, right now? That’s something that’s carried over from DI for me.

P5 explained her philosophy related to teaching her engineering students. “I don’t care if you don’t remember the equation, that’s not the point, it’s really the critical

thinking and how to break down a problem. At the beginning of the year, I hand them [the students] essentially a [DI] central challenge." To be more explicit, she uses the structure of her DI experiences to teach her engineering students critical thinking.

Career Navigation

Research SQ3 was, how do DI alumni perceive their DI experiences informed their career navigation? According to CTWE framework, career navigation involves 21st-century skills that help someone keep a job, such as, initiative, life-long learning, and coping behaviors. To answer this question fully, I pursued two avenues of inquiry. Firstly, I asked participants their perceptions of learning career navigation skills. Secondly, I asked if they perceived that DI had influenced their choice of career in any way. In total, I determined that the theme, career navigation, aligned with ten emergent codes to answer this question. The total number of excerpts coded for career navigation was 68 out of 298 or 23% of all excerpts (see Table 7). Those 68 excerpts fell into three codes, life-long learning, initiative, and career choice. Life-long learning was further subdivided into four codes. Similarly, career choice was divided into three codes. The emergent codes associated with SQ3 and their frequencies are listed in Table 10.

Table 9

Frequency of Codes Aligned with Career Navigation

Code	Emergent code	Frequency	Total
Life-long learning		10	35
	Curiosity	8	
	Perseverance	8	
	Reflection	5	
	Ownership	4	
Career choice			27
	Directly influenced	12	
	Nourished	11	
	Pivot	4	
Initiative		6	6
		68	68

Life-Long Learning

Life-long learning was the most frequent code, discussed by ten of the 11 participants. The data showed that participants perceived that life-long learning is a skill vital to keeping their job and that their DI experiences helped develop sustained interest in learning. P11 said, “That’s my life, I have to continuously work to always be the best version of myself.” P9 echoed this feeling by stating, “Always being willing to search for and drive towards continuous improvement ... definitely came from DI.” These excerpts reflect a clear desire for continual development.

P6 expressed a similar desire for continued learning in her work, without fearing the unknown when she said:

> I don’t get hesitant about signing up for something I don’t know how to do, because I know that means that I’ll learn how to do it. I’ll find the right people to

> ask the questions. I'll learn a new skill, it'll be really cool. ... When I want to learn something new, I sign myself up for it, and that comes from DI.

P10 described a situation exemplifying her attitude to life-long learning when her high school DI team decided to build a human-sized, functioning, Jacob's Ladder as a technical component in their team solution. A Jacob's Ladder is a traditional, wooden toy, made of six blocks connected by ribbons that flip over and appear to cascade downwards. The problem was that the ribbon continually broke where it bent. She studied the toy and suggested a successful solution to this problem. She told me,

> If I had not taken the time to learn how a Jacob's Ladder worked and where the pressure was, I would not have been able to make that suggestion. ... I wanted to be able to learn anything I didn't already know, ... then maybe I'd have a different perspective on it and then could improve it. ... I wanted to understand how everything we were doing worked, every year.

These excerpts reveal the participants' desire to not only solve the problem at hand but to continue to learn in all areas of their lives. I was able to further sort excerpts in the life-long learning code, into four additional skills of curiosity, perseverance, ownership, and reflection.

Curiosity. Curiosity is a particular aspect of life-long learning. Eight different participants described curiosity in their interviews. For example, P5 expressed keen interest in what was going on in the world as she spoke of attending well-known people speak and wondering what other people are thinking and creating, "DI really did instill being curious." P8 echoed this by saying, "[I'm] interested in how other people go about

their problems." In a third example, P11 expressed curiosity simply for the joy of learning, saying, "There's just so much to know, and I love to just learn ... I've taken some [extra] classes ... just because I think it's fun." Further, P7 linked practices encouraged in DI with her current career, saying,

> A craving for learning is what DI has given me. And that's a very important thing in my field of work right now. Things are always evolving, ... so we always have to ... constantly learn new things. Having that want and desire to keep on learning, that DI has given me, will help me in my field.

Additionally, P10 added her connections between curiosity developed in DI and her current work, saying:

> I definitely use that [curiosity] in my job. I think my supervisors would probably tell you that I ask a lot of questions. I want to fully understand everything so that if someone asked me a question I can fully understand the answer, rather than just trying to remember what someone said and spitting it back, ... I think DI taught me how useful that can be.

These excerpts demonstrate the participants' curiosity through asking questions, taking on new challenges, and wondering about how others solve problems and that they perceive that DI fostered this skill.

Perseverance. I tagged eight excerpts from four participants with the code perseverance. I considered this concept to fall under the code of life-long learning, as distinct from failure, that I coded as psychological safety, under the code teamwork. These excerpts subsume several sub-concepts. The first is the aspect of perseverance that

requires a long-term commitment to a particular endeavor. P6 compared participation in DI to involvement in other clubs. She noted that the DI season to Global Finals is a sustained 9 months long saying, “There’s nothing else in school that looks like that ... the length of DI really helps you stick with something for a long time.”

Perseverance also involves the notion of not giving up when things get difficult. P5 said, “I think that DI really helped with that persistence, too, when things do go wrong, what do you do?” Her words imply that continuing to work hard and improve is the only option when things go wrong. Following this line of thought, P6 described how in sixth grade she moved to a new school, leaving her old DI team. Still wanting to participate, she had to convince not only new friends to begin a team, but also her mother to be the Team Manager. “I realized that sometimes if you really want something to happen you have to campaign really hard for it. ... It’s not just going to happen because I think it’s a good idea.” Further, two participants expressed the hard work aspect of perseverance, describing how they had learned to work hard to enjoy the potential success. P4 said, “To work your butt off, that long and that hard ... and to make it to Globals, ... that is why we put in all the extra hours.” Also, P1 described striving toward their goal, “That’s how my team was successful, we really pushed ourselves.” In these excerpts participants described long-term commitments, campaigning hard for something, not giving up, and striving toward a goal, demonstrating the participants’ recognition of perseverance as a desirable skill learned in DI and valued in their career.

Reflection. Four out of the 11 participants expressed that DI helped develop their ability to be reflective. P10 said, DI “definitely has helped me with self-reflection. P8

described herself professionally as being able to "explore how to do things differently, and how to make what you're doing better, rather than just getting to the next step." through taking time to be reflective of her practice and in her life. P9 described how she is "very introspective in terms of reflecting on how certain experiences have affected me, and maybe that's attributable to DI, too." These perspectives are significant because three different participants offered reflection as a skill they learned in DI, and also considered reflection as important in their working life.

Ownership. I tagged four excerpts from two participants who discussed ownership of their learning that they developed in DI, a somewhat abstract concept that these participant explanations capture effectively. P7 described their high school DI team's service-learning challenge, in which they invited ten schools to raise money for a local children's hospital. The teenage team developed skills liaising with professional hospital staff and school principals and created an advertisement to raised funds. They were recognized by the state House of Representatives for their work. She described many of the skills necessary for "teenagers to be taken seriously by adults" such as, developing communication, marketing tools, and follow-through. She described "follow-through" as explaining to adults, "what we were going to do, when we were going to do it by, how we were going to do it, and how it would impact them." This vignette serves to exemplify the concept of ownership.

P6 further explained this concept of ownership by drawing parallels between what she learned in DI, and how she now develops projects for her students similar to those

she experienced in DI so that they can experience the same sense of ownership she had when she participated.

> I saw all my [math] students rise to the occasion because they had ownership. It's their own [project], they've taken it over. It lets them showcase skills that people don't think that they have. They don't care about what you are asking them to do, but they care because it's theirs.

Her final words, "... they care because it's theirs," capture the essence of ownership.

Initiative

I coded six excerpts from five participants related to initiative. P1 sums up the idea of taking initiative best when she said:

> I know what I'm doing. This is my job and I'm getting paid to do it, so I can't just sit here and wait for other people to tell me things. I just have to go for it and do it.

Additionally, P3 drew the comparison between taking initiative in DI and relating it to her current job, by explaining that on a DI team "the parents are there to guide you, but can't do it for you." Comparing DI to her job, she said, "My boss, ... he's not going to finish it [the work] for me." Finally, P5 reflected that at work, "I always feel like I should be the person to step up because that's the role I played on a lot of my DI teams." Taking initiative was a skill that half the participants found important enough to discuss.

Career Choice

Eight of the 11 participants in this study pursued careers in STEM fields. Two were quality engineers, one was a professor in mechanical engineering, another became a

math teacher, and one was mechanical engineer student making medical devices. Three others chose careers as health professionals, one as a pharmacist and data analyst, one as a dentist, and the third as a speech pathologist. Seven of these eight were women. P4 addressed this issue, volunteering, "I definitely preach to all the little girls to go into STEM fields."

Participant responses to this question of career choice fell into three codes; the first, reflecting that participants could identify a clear direct influence between DI and their career choice, second, that DI had nourished their interests, and third that DI gave them a new way of looking at the world.

Direct Influence. Three participants directly associated their career choice with participating in DI. P5 said,

> The whole reason that I believe I'm an engineer is because of DI. ... In high school, I knew I wanted to do something in the sciences ... and then we did this DI project, ... We built an air-powered cannon out of trash that we found in his barn. ... We used a bicycle tire for the conveyor belt ... and that was what really inspired me to go into mechanical engineering. ... That kind of thinking and being creative helped me get my Ph.D. and get the position that I have now.

In another interview, P3 made it clear that she felt her DI experiences influenced her interest in engineering as early as eighth grade, incidentally her last year in DI. She said, "When I entered high school, I knew I wanted to do something engineering. I was on the scientific [DI challenge] that led me to being in engineering, especially my degree

in material science." P4 described the confidence that DI built, expressing similar connections between DI and her career:

> Up until my senior year, I had no idea what I wanted to go to school for, but I knew I wanted to build snowboards. I knew I had the technical mind for it because I'd been in technical [DI challenges]. ... I graduated from a university nearby as a manufacturing engineer. DI had a huge part in who I am today.

Additionally, P3 offered the experience of her DI teammate. After they graduated from high school, they both returned to DI to judge the tournament. She said, "DI is such an impactful thing. My friend is a social worker. She told me, in college when we appraised the first and second graders and she loved talking to them. So that led her to become a social worker." These three participants and the story of the teammate, exemplify the connection they feel between their DI experiences and the direction their careers have taken.

Other participants supported the connection between participating in DI and getting into college or being offered a job. For example, P10 said, "It also helped me get into college". She went on to explain that DI is still on her resume, describing skills that she thinks employers want to see. "[DI] applies to any job you're applying for. I worked in a team. I accomplished all these goals. I was under time pressure. It definitely helped me get my job." P3 echoed this sentiment stating that DI helps, "getting those [skills] that employers want to see [like teamwork], and you learn them before you go to college." These two conversations support their belief that DI helped their admission to college and the workforce.

Nourished. Six of the 11 participants indicated that their DI experiences had not directed their careers, but rather had in some way supported their path. For example, P11 used the word, "nourished" his natural inclination towards a career in engineering by saying, "I think I've always been an engineering focused person ... but I will say that DI really nourished that." P8 stated that DI did not influence her choice of career, however, she reflected on what it was about DI that redirected her career path after she was qualified:

> That's why I honestly decided to change my career specialization to pediatrics. ... I love seeing kids have an 'I can do it' attitude and that's DI in a nutshell. ... pushing the limits, exploring options ... You're not just influencing a kid's life, you're influencing a family's life, and DI does that.

A third participant shared similar connections. P1 explained:

> I wanted to go into education at first because I saw what DI did for kids. ... DI showed me that kids of all abilities, experiences, and skillsets can succeed, ... it really inspired me as to what I want to do with my life.

These excerpts demonstrate that participants believe that their DI experiences supported their choice of career.

Pivot. Two participants spoke of DI teaching them to become comfortable accepting the unknown. P10 spoke of "pivoting" her thinking. "DI taught me that you can sort of pivot, I can switch." Being comfortable accepting change without "[having] to stick to this identity I have decided for myself. ... I don't really know what my future career will be, because I don't even know what the world will be."

P6 expressed ideas on being comfortable changing her career this way:

> DI is where I figured out that I don't need to know what I want to do until I do it. ... My career will probably not be my career forever. You can be interested in whatever you want: it doesn't matter: it changes all the time anyway."

Two participants independently referenced adaptability and learning to become comfortable being uncomfortable, and explained that they learned this skill through participation in DI.

Central Research Question

The CRQ was, how do DI alumni perceive the 21st-century skills they learned through their DI experiences informed their early career and workforce readiness? Data that helped answer the CRQ came from all three SQs representing the three constructs aligned with the CTWE framework, work ethic, innovation, and career navigation. However, to answer the CRQ, I coded 13 excerpts a variety of generalized participant statements not included in the SQs.

These participants directly attributed learning work-related skills, to their participation in DI. P1 reflected, "Before this [interview], I didn't even think about how much DI impacted my work and how I do things. I don't think I'd be as good at my job as I am currently, without the skills that DI gave me." P5 echoed this thought as she attributed skills to DI. "I teach engineering so I'm seeing it from the other side now, but a lot of the skills are directly analogous to what I learned when I was a kid in DI." P3 went on to justify the need to learn specific skills in DI saying, "People say that the 21st century is all about coding. Regardless, teamwork, communication, learning to accept

failure [resilience], those are never going to go away: I think DI is really helpful with that." P11 adds self-improvement to the previous list. "The concept of being able to better yourself, I think, is really important for keeping a job." P6 recommends DI as a way of thinking. "DI taught me that the answer is there, you just have to go get it, or create it on your own, it's a way of thinking." P10 explains how DI supported her growth. "When I joined DI, it gave me a stronger sense of belonging and improved my confidence, ... DI gave me purpose, responsibility, and lifelong friends." Finally, P4 makes the case that DI improves STEM learning for girls. "I think that DI should be offered in every single school, to every single student. We would have a lot more women in STEM if that were the case."

Discrepant Data

After coding all the data, four outstanding codes that did not align with any specific research question remained. These codes were: funding, volunteering, grading, and pin trading. Each is discussed in separate paragraphs below.

Funding

Four of the 11 participants reported financial and resource disparities in DI. The other seven participants did not mention finance at all. P1 expressed frustration at "the cost increase of Global Finals." P8 echoed this frustration at the cost of attending Global Finals and also staffing inequities in the program, recognizing that this problem is consistent with other ECAs. She observed that,

> Depending on how the team is run ... you need very involved parents. Where I grew up parents cannot take time off work to be involved and teachers aren't

> appropriately reimbursed for all that they do. [Some areas have] more resources to put into their team to make them better.

P5 echoed her perception of these disparities also focusing on adult supervision:

> I was in a much poorer area and [other teams] had much more structure to their experience than we did ... and a lot more guidance from their adults. ... You might have two or three teams all working at the same time with one parent. ... It may be a function of who was involved if the parent supervising was actually an engineer ... or just somebody's Mom. ... The divide between our school district and others was very stark where I grew up.

While this code of funding inequity does not directly relate to skill acquisition addressed in this study, it relates to access to this program and other ECAs as P8 suggested.

Volunteering

Four participants mentioned that they volunteered to help DI in a variety of ways once they left the program as team members. P5 expressed it best saying, "I think volunteering for DI really instilled a sense of community. ... DI made it really fun, you got to see some of the creative solutions [at tournaments] and give back." The concept of giving back to the community is a competency not described in the literature on 21st-century skills.

Grading

Only one participant brought up this code related to grading. In the DI scoring system you "give points, not take points away." P5 described how she has transferred the philosophy of DI scoring to her classroom. "Honestly, I feel like I approach my grading

in [class] that way, where I want to give points rather than taking them away. It feels wrong to take points away rather than giving credit for what they [students] did do." This data offers another connection between a DI alumni experience and her current work-related practice.

Pin Trading

Only one participant mentioned this unique aspect of DI. Pin trading is a social activity that occurs most commonly during Global Finals, in which individuals from across the world swap locally created pins. It is not part of the competition yet an opportunity to encourage interpersonal communication. P7 explained the benefits of pin trading as she saw it:

> I think it is a unique component of DI. You can pin trade with children or adults. It teaches so many skills. You learn how to speak with adults, have fair trade, it teaches negotiation tactics, it teaches the importance of items because some pins are more important to you or more valuable than others. ... It teaches interpersonal skills: it teaches international conversation skills. I traded pins with so many teams that I don't know how to speak their language and they don't really know how to speak mine, but we still knew how to trade those pins. I think that's a very important aspect of DI.

This perspective adds a dimension, not frequently discussed as part of the DI program, which offers concrete learning opportunities supporting the development of 21st-century skills and workforce readiness.

Summary

The key findings for this study were centered on three SQs and themes that emerged from data analysis. Based on the data, I concluded that the key finding related to SQ1 was that DI alumni perceived that their DI experiences helped them develop specific work ethic skills, including teamwork, communication, presentation skills, project management, and emotional intelligence. Based on the participants' descriptions of specific skills and how they frequently applied them in various work situations, participants were repeatedly able to describe specific situations in DI that they recognized as developing these skills. Specifically, these skills included delegation, valuing others, goal setting, accepting criticism, risk-taking, belonging, bouncing back from failure, written, spoken communication, listening, conflict resolution, self-confidence, breaking down a problem, optimization, prioritization, research and working to a deadline, humility, and flexibility.

The key finding related to SQ2 was that DI alumni perceived that their DI experiences informed their ability to be innovative by teaching them how to solve problems creatively, to think critically and quickly, to use a variety of tools, and to learn by doing. Participants explained how through DI they developed spatial reasoning, and the willingness to rework products to perfection. They learned to view problems from different perspectives, to think "on their feet" and "out of the box" to order to create something unique and novel. They explained that they valued these skills and felt that the tools gave them an advantage over others in their workplace.

The key finding related to SQ3 was that alumni perceived that participation in DI helped them gain admission to college, secure jobs, and keep jobs. Participants described experiences that they felt, not only increased their awareness of different careers, developed their interest in STEM fields, influenced their career paths, but also enriched their personal lives. Further, DI alumni perceived that they developed a variety of skills that supported their career readiness and helped them keep their jobs, such as initiative, life-long learning, curiosity, perseverance, self-reflection, goal setting, and ownership.

I concluded that the key finding related to the CRQ was that DI alumni perceived that their DI experiences supported the development of skills desired by employers as necessary for successful entry into the workforce. Participants specifically described skills including teamwork, written and spoken communication, conflict resolution, listening skills, decision-making, time management, confidence, flexibility, humility, creativity, problem-solving, spatial reasoning, critical thinking, curiosity, perseverance, reflection, and ownership, resilience, and life-long learning. Chapter 5 will include interpretations of the findings, limitations of the study, recommendations, implications, and conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this basic qualitative study was to explore how DI alumni perceived that the 21st-century skills they learned as part of their academic extracurricular experiences informed their early career and workforce readiness. The CTWE framework provided three constructs, work ethic, innovation, and career navigation, which guided this study (Rojewski & Hill, 2017). To fulfill this purpose, I used purposeful sampling to recruit participants from a global database of DI alumni. I conducted 11 online, semistructured interviews to collect rich, thick descriptions of participant perceptions of the phenomena (see Rubin & Rubin, 2012). Inclusion in the study was limited to adults who had had at least 3 years participating in DI as a team member and who had been in the workforce for at least 6 months and not more than 4 years. The literature addressed these skills and competencies that are essential for successful transition into the workforce. The results of this study may contribute to positive social change by raising awareness of the potential outcomes of ECAs affecting the performance expectation gap between graduates and employers.

The key findings for this study align with the CRQ and SQs. I concluded that the key finding related to the CRQ was that DI alumni perceived that their DI experiences supported the development of a variety of skills desired by employers as necessary for successful entry into the workforce. Based on the three framework constructs, work ethic, innovation, and career navigation, I organized my study using three SQs. The key finding related to SQ1 was that DI alumni perceived their DI experiences helped them develop

specific work ethic skills, including teamwork, communication, presentation skills, project management, and emotional intelligence. The key finding related to SQ2 was that DI alumni perceived their DI experiences informed their ability to be innovative by teaching them how to solve problems creatively, think critically and quickly, to use a variety of tools, and to learn by doing. The key finding related to SQ3 was that alumni perceived that participation in DI helped alumni gain admission to college, secure jobs, and keep jobs.

Interpretation of the Findings

In this study, I explored DI alumni perceptions of 21st-century skills they learned as part of their academic extracurricular experiences viewed through the three constructs of the CTWE framework, work ethic, innovation, and career navigation. The results from the current study confirm, disconfirm, and extend the findings from the literature. I organized the interpretations of the findings by research question.

Work Ethic

A review of recent literature revealed that employers required their employees to be proficient in a variety of soft skills. The most highly ranked skills were teamwork, communication, various interpersonal skills (Dunbar et al., 2016; Pang et al., 2019), time management skills (Pinto & Pereira, 2019), and written communication (Kunz & de Jager, 2019). The data from this study showed that participants perceived that their DI experiences developed skills in all three of these areas. Additionally, participants in this study recognized that employers value these skills and recognize that DI participation developed these skills before attending college.

Secondly, participants in this study described how being busy, juggling participation in a DI team and their school studies, actually improved their time management skills. This result supports prior research into how increased workload positively affected task completion and increased motivation (Wilcox et al., 2016). Thirdly, this study confirmed previous research on personal and social competencies. Recently, Nair and Fahimirad (2019) found that emotional intelligence could be developed through ECAs. The data from this study supported this claim, as documented by participants who discussed their development of a variety of skills including humility and flexibility through participation in DI.

Some study data contradicts prior research. Previous studies discussed the difficulty of accounting for the origin of prior knowledge (Aristawati et al., 2018). However, each participant in this study described their DI experiences and related stories in which they directly identified the source of learning specific skills. These participants made clear connections between experiences and skill development. In other ways, study data extends what is understood, presenting involvement in ECA as a way of improving mental health. This connection was not discussed in previous research.

Innovation

Data from this study supported existing research. Participants in this study described DI as employing a learn-by-doing philosophy. This reflects a constructionist approach to learning as Papert (1993) described, providing an environment rich in opportunities for deep learning and creating conditions for invention. The data showed

participants' enjoyment of the hands-on experiences and willingness to engage in trial by error, reiterating practices to improve their products.

This study extends what is known in the following three ways. Firstly, Jang (2016) recommended that students should use critical thinking and collaboration to solve interdisciplinary complex problems. Participants in this study described several examples of complex problem-solving challenges that they used in DI and how they learned to break apart problems, work with tools, and collaborate to solve complex problems. Participants cited specific examples from their DI experiences and related them to their work situations, describing how they applied this learning, thereby extending Jang's recommendation. Secondly, creativity has been long studied. Noddings (2013) expressed his view that the standardized curriculum leads to loss of creativity. In this study, two teachers, a middle school math teacher and a college engineering professor, described a variety of ways in which they intentionally incorporate DI activities and philosophies into their learning curriculum. These teachers explained ways they applied creativity in making their classrooms creative and exciting places to learn. Research might be undertaken to document how such philosophies might be extended into more mainstream education. Thirdly, the data from this study highlighted something not yet explored empirically. Participants perceived a career advantage because they learned valuable skills in DI, which their work colleagues do not possess. Comparing ECA alumni skill perceptions compared to their non-ECA peers has yet to be examined.

Career Navigation

This study confirmed existing research in the following ways. In a review of literature on student perceptions of skill acquisition through ECAs, two studies found that students who invested more time, effort, and initiative experienced greater competency development (Guilmette et al., 2019; Haddad & Marx, 2018). These findings are consistent with the data in this study. Participants reflected on the 6-9 month length of the DI season and the variety of skills, including perseverance, which such an extended commitment builds. In addition to the length of time spent engaging in a project, participants spoke about their hard work and dedication to various projects. This evidence supports the prior research into intrinsic motivation that Hennessey (2017; 2010) presented, demonstrating that motivation is vital to developing deep, long-lasting learning and creativity in students.

This study supported prior research into the connection between ECAs and participant choice of STEM careers. Participants in this study choose to follow careers in STEM fields such as engineering, math, and medicine. Participants attributed their increased interest in STEM to various experiential DI opportunities. This finding supports previous claims that STEM ECAs foster interest in STEM careers (Miller et al., 2018; Ozis et al., 2018). Therefore, my study data may extend this finding, citing active participant support in encouraging other girls to follow STEM careers.

In one of the few prior studies on DI, Shin and Jang (2017) noted that DI promoted ownership of student learning. The data in this study supported this claim. Participants felt they were highly engaged, motivated, and independent because they had

ownership and agency of their projects. However, ownership is not a skill mentioned in 21st-century skills frameworks.

Central Research Question

The data confirmed prior research in the following ways. Firstly, in a study of the effect of ECAs on employment opportunities, Nuijten et al. (2017) found that students profit from participation in ECAs. The data in this study confirmed the many 21st-century skills participants developed by participating in DI. Participants in this study recognized that management across industries continues to seek employees with strong skillsets. Secondly, in recent studies of alumni views of ECAs, Clark et al. (2015) found that the effects of ECAs are unexpected and long-lasting. The data in this study supported this finding as reflected by the many skills and attitudes participants attributed to gaining through their participation in DI. Thirdly, in previous research, Clarke (2016) and Tharumaraj et al. (2018) suggested gathering alumni perspectives as opposed to current students, because they have had a longer timespan to reflect on the application of their learning. Further, Tiessen et al. (2018) recommended that gathering data from alumni would be important in designing effective learning experiences. This study provided evidence by DI alumni confirming, extending, and filling gaps in published empirical research.

Limitations of the Study

Limitations are factors or influences beyond my control that may affect the trustworthiness and transferability of this study. Several limitations existed concerning the research design, time, and participants. In any basic qualitative research methodology,

there exists the possibility for unintentional researcher bias. In Chapter 3, I acknowledged this bias and explained how I attempted to mitigate it by keeping a reflective journal, field testing the questions, member checking the transcripts, and being transparent in all methodological choices.

A second limitation of this study was related to time. Participants in this study may have participated in DI teams as long as 12 years ago and others only 3 years ago. The benefit of this time delay is that it allows for participant reflection, while the disadvantage is that time may alter their perceptions. A third limitation was related to the timing of the data collection phase. I collected data during the summer amid the COVID-19 pandemic, and that may have influenced who responded to recruitment for this study. A fourth limitation of this study is related to the somewhat self-selecting nature of the pool of participants. The list of possible participants was randomized from a database of 1,600 DI alumni to which they voluntarily submitted their names. This may suggest that they had favorable DI experiences. A further limitation involving participants in this study was that it only included two males, while data saturation was achieved after 11 interviews.

Recommendations

Recommendations for further research are based on study results and limitations of the study. The first recommendation is related to the CRQ and the key finding that DI alumni perceived their DI experiences supported the development of a variety of skills desired by employers and necessary for successful entry into the workforce. What remains unclear is whether employers of DI alumni perceive a gap between alumni skills

and their expectations. I recommend studies into how employers perceive the skillsets of DI alumni. This may provide deeper understanding of any performance-expectation gaps across a wide range of careers. Additionally, it may provide information to stakeholders to strengthen student support and improve market-responsive experiential learning.

The second recommendation is related to SQ3 and the key finding that alumni perceived participation in DI helped alumni gain admission to college, secure jobs, and keep jobs. These participants described an engaging, motivating environment that helped them navigate the challenges between school, college, and career. More research needs to be undertaken into documenting ways that these basic tenets of DI, as described by participants in this study, such as ownership, independence, psychological safety, might be extended into more mainstream education. Research into more DI-like practices of education may help support students gain admission to college, secure, and keep jobs.

The last recommendation is related to the limitations of this study. This study used a basic qualitative methodology, interviewing 11 DI alumni online. Therefore, this study should be extended in two ways. Firstly, by surveying hundreds of DI alumni to determine if results are similar to those found in this study, and to discover patterns related to how long students participated in the DI program, the 21st-century skills they felt they learned, and the careers they chose. Secondly, by conducting an ethnographical study capturing participants' stories in greater detail. Such a study might be extended to include team managers' and parents' experiences, on which there is currently a significant lack of data.

Implications

This study may contribute to positive social change in several ways. Firstly, prior studies reveal that employers, on the whole, perceived a significant performance expectation gap between their needs and graduate abilities, particularly concerning soft skills (Pang et al., 2019; Pazil & Razak, 2019). The results of this study may contribute to positive social change by raising awareness of the potential outcomes of academic ECAs, perceived to positively affect the performance expectation gap between graduates and employers. Secondly, at the individual level, this study addressed a gap in the literature regarding alumni reflections on their ECA experiences. Alumni were offered an opportunity to contribute their opinion regarding activities they deemed helpful in skill acquisition, describing how those experiences impacted their entry into the workforce. Participants reported viewing this opportunity as both personally satisfying and giving back to the DI community.

Thirdly, related to the specific ECA of DI, this wider study addressed a gap in the body of literature (which had previously been limited to creativity studies and program evaluations) by focusing on alumni outcomes. The results reveal a broad range of skills and competencies providing a deeper understanding of the processes involved in a DI team. Data from this study may help improve classroom practice if teachers implement similar philosophies in their classrooms. This data may be useful to DI as an organization, to schools, parents, and to promote the benefits of ECA participation. Finally, there is potential for change regarding educational benefits. This study contributes to positive social change regarding improvements in professional practice

concerning career and workforce preparation. The results may provide insights for administrators, educators, and parents, into the support provided by ECAs in developing student skills in preparation for the workforce. This may influence the development of ECAs experiences offered to students in the future.

Conclusion

The problem addressed in this study is the lack of understanding of how 21st-century skills that alumni learned through academic extracurricular experiences informed their early career and workforce readiness. I concluded that the key finding related to this basic qualitative study was that DI alumni perceived that their DI experiences supported the development of a variety of skills desired by employers as necessary for successful entry into the workforce. Workplace requirements are vastly different from the past, due to rapid changes in technology and globalization, and require well-developed 21st-century skills and innovation (Penprase, 2018). However, research shows not only that students are inadequately prepared to meet the needs of a changing business environment (Cohen et al., 2017) but also that employers are generally dissatisfied with 21st-century skill levels of incoming graduates (Baird & Parayitam, 2017; Stewart et al., 2016). Additionally, Hendrix and Morrison (2018) found that employers and graduates perceived differing levels of competence regarding these skills. Employers, academics, and graduates perceived that these skills can be strengthened by a variety of internships and activities (Alshare & Sewailem, 2018; K. Jackson et al., 2016). This study may contribute to positive social change by raising awareness of the perceived potential outcomes of academic ECAs affecting the performance expectation gap between

graduates and employers. Additionally, it may provide insights for administrators, teachers, and parents into how well ECAs may support student skills development in preparation for early career and workforce readiness.

References

Abbas, J., & Sagsan, M. (2019). Identification of key employability attributes and evaluation of university graduates' performance: Instrument development and validation. *Higher Education, Skills and Work-Based Learning, 10*(3). https://doi.org/10.1108/HESWBL-06-2019-0075

Alshare, K., & Sewailem, M. F. (2018). A gap analysis of business students skills in the 21st century: A case study of Qatar. *Academy of Educational Leadership Journal*, *22*(1). https://www.abacademies.org/journals.html

Altan, E. B., Üçüncüoglu, I., & Öztürk, N. (2019). Preparation of out-of-school learning environment based on science, technology, engineering, and mathematics education and investigating its effects. *Science Education International*, *30*(2), 138–148. https://doi.org/10.33828/sei.v30.i2.7

Anderson, S., & Mezuk, B. (2015). Positive youth development and participation in an urban debate league: Results from Chicago Public Schools, 1997-2007. *Journal of Negro Education*, *84*(3), 362–378. https://doi.org/10.7709/jnegroeducation.84.3.0362

Anney, V. N. (2015). Ensuring the quality of the findings of qualitative research: Looking at trustworthiness criteria. *Journal of Emerging Trends in Educational Research and Policy Studies*, *5*(2), 272–281.

Aristawati, F., Budiyanto, C., & Yuana, R. (2018). Adopting educational robotics to enhance undergraduate students' self-efficacy levels of computational thinking.

Journal of Turkish Science Education (TUSED), *15*, 42–50. https://doi.org/10.12973/tused.10255a

Armstrong, E. M. (2015). *The use of fantasy theme analysis to describe the group communication and creative problem-solving skills of university-level students as they prepare for Destination Imagination Global Finals competition* (Publication No. 3525032) [Doctoral dissertation, Andrews University]. ProQuest Dissertations Publishing

Atkinson, P., Coffey, A., Delamont, S., Lofland, J., & Lofland, L. (2001). *Handbook of ethnography*. Sage Publications.

Balakrishnan, B., & Low, F. S. (2016). Learning experience and socio-cultural influences on female engineering students' perspectives on engineering courses and careers. *Minerva: A Review of Science, Learning and Policy*, *54*(2), 219–239. https://doi.org/10.1007/s11024-016-9295-8

Baird, A. M., & Parayitam, S. (2017). Are employers dissatisfied with college graduates? An empirical examination. *International Journal of Arts & Sciences*, *10*(1), 151–168.

Bar-On, R. (2006). Bar-On model of emotional-social intelligence (ESI). *Psicothema*, *18*, 13–25. https://www.redalyc.org/articulo.oa?id=72709503

Baruch, Y., Altman, Y., & Tung, R. L. (2016). Career mobility in a global era: Advances in managing expatriation and repatriation. *Academy of Management Annals*, *10*(1), 841–889. https://doi.org/10.5465/19416520.2016.1162013

Bashir, M., Afzal, M. T., & Azeem, M. (2008). Reliability and validity of qualitative and operational research paradigm. *Pakistan Journal of Statistics and Operation Research*, 35–45. https://doi.org/10.18187/pjsor.v4i1.59

Batubara, J., & Maniam, S. (2019). Enhancing creativity through musical drama for children with special needs (Down Syndrome) in education of disabled children. *Musical Education*, *2*, 166–177. https://doi.org/10.17674/1997-0854.2019.2.166-177

Behnke, A. O., Bodenhamer, A., McDonald, T., & Robledo, M. (2019). Impact of the Juntos Program: A qualitative evaluation. *Hispanic Journal of Behavioral Sciences*, *41*(1), 63–84. https://doi.org/10.1177/0739986318820486

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17–66). Springer. https://doi.org/10.1007/978-94-007-2324-5_2

Brown, W. (2019). Guiding the path: Identified skills for educating the next generation of workers. *Journal of Education for Business*, *94*(6), 400–407. https://doi.org/10.1080/08832323.2018.1541854

Bruner, J. S., & Postman, L. (1949). Perception, cognition, and behavior. *Journal of Personality*, *18*(1), 14–31. https://doi.org/10.1111/j.1467-6494.1949.tb01229.x

Buckminster, F. (1982). *Critical path*. St Martins Press.

Burkholder, G., Cox, K., & Crawford, L. (2016). *The scholar—Practitioner's guide to research design*. Laureate Publishing.

Byrne, C. (2020). What determines perceived graduate employability? Exploring the effects of personal characteristics, academic achievements and graduate skills in a survey experiment. *Studies in Higher Education*, 1–18. https://doi.org/10.1080/03075079.2020.1735329

Calkin, J., & Karlsen, M. (2014). Destination Imagination: Creativity in a world of complacency. *Journal of Applied Research on Children, 5*(1), 15.

Callahan, C., Hertberg-Davis, D. H., & Missett, T. C. (2011). *Program evaluation report*. 22. https://www.destinationimagination.org/wp-content/uploads/2016/02/2011-Virginia-Curry-School-DI-Report.pdf

Carlington, C. (2011). *2011 Global Finals University of Texas at Dallas verses foiled again*. YouTube. https://www.youtube.com/watch?v=qUsHzSSka94

Carlson, J. A. (2010). Avoiding traps in member checking. *Qualitative Report*, *15*(5), 1102–1113.

Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., & Hornstein, M. (2010). Destination, Imagination and the fires within: Design thinking in a middle school classroom. *International Journal of Art & Design Education*, *29*(1), 37–53. https://doi.org/10.1111/j.1476-8070.2010.01632.x

Castillo-Montoya, M. (2016). Preparing for interview research: nterview protocol refinement framework. *Qualitative Report*, *21*(5), 811–831.

Chambers, E., Foulon, M., Handfield-Jones, H., Hankin, S., & Michaels III, E. (1998). The war for talent. *McKinsey Quarterly*, *3*.

Chan, Y.-K. (2016). Investigating the relationship among extracurricular activities, learning approach and academic outcomes: A case study. *Active Learning in Higher Education*, *17*(3), 223–233. https://doi.org/10.1177/1469787416654795

Cisco, Intel and Microsoft. (2010). *Assessment and teaching of 21st century skills*. https://www.cisco.com/c/dam/en_us/about/citizenship/socio-economic/docs/ATC21S_Exec_Summary.pdf

Clark, G., Marsden, R., Whyatt, J. D., Thompson, L., & Walker, M. (2015). 'It's everything else you do…': Alumni views on extracurricular activities and employability. *Active Learning in Higher Education*, *16*(2), 133–147. https://doi.org/10.1177/1469787415574050

Clarke, M. (2016). Addressing the soft skills crisis. *Strategic HR Review*, *15*(3), 137–139. https://doi.org/10.1108/SHR-03-2016-0026

Cohen, J. D., Huprich, J., Jones, W. M., & Smith, S. (2017). Educators' perceptions of a maker-based learning experience. *International Journal of Information and Learning Technology*, *34*(5), 428–438. https://doi.org/10.1108/IJILT-06-2017-0050

Cohen, J., Renken, M., & Calandra, B. (2017). Urban middle school students, twenty-first century skills, and STEM-ICT careers: Selected findings from a front-end analysis. *TechTrends: Linking Research & Practice to Improve Learning*, *61*(4), 380–385. https://doi.org/10.1007/s11528-017-0170-8

Conley, D. T., & French, E. M. (2014). Student ownership of learning as a key component of college readiness. *American Behavioral Scientist*, *58*(8), 1018–1034. https://doi.org/10.1177/0002764213515232

Cre8Iowa. (2019). *Tall tower*. Students for a Creative Iowa. http://www.cre8iowa.org/wp-content/uploads/2010/07/Tall-Tower1.pdf

Cushing, D. F., Pennings, M., Willox, D., Gomez, R., Dyson, C., & Coombs, C. (2019). Measuring intangible outcomes can be problematic: The challenge of assessing learning during international short-term study experiences. *Active Learning in Higher Education*, *20*(3), 203–217. https://doi.org/10.1177/1469787417732259

Cutcliffe, J. R., & McKenna, H. P. (2004). Expert qualitative researchers and the use of audit trails. *Journal of Advanced Nursing*, *45*(2), 126–133. https://doi.org/10.1046/j.1365-2648.2003.02874.x

Cutumisu, M., Schwartz, D. L., & Lou, N. M. (2020). The relation between academic achievement and the spontaneous use of design-thinking strategies. *Computers & Education*, *149*, 103806. https://doi.org/10.1016/j.compedu.2020.103806

Deng, L., Ma, W., & Fong, C. (2018). *New media for educational change: Selected papers from HKAECT 2018 international conference*. Springer. https://doi.org/10.1007/978-981-10-8896-4_1

Destination Imagination. (2012). *DI student survey 2012*. https://www.destinationimagination.org/wp-content/uploads/2016/02/2012-UT-DI-Student-Survey.pdf

Destination Imagination, (2019a). *About.* https://www.destinationimagination.org/about/

Destination Imagination, (2019b). *Annual Report*. https://diannualreport2018.squarespace.com/2018-annual-report

Destination Imagination, (2019c). *Challenge Program*. https://www.destinationimagination.org/challenge-program/

Destination Imagination, (2019d). Challenge Synopses. http://didisc.org/r-challengehistory2011

Destination Imagination, (2019e). *Early Learning*. https://www.destinationimagination.org/early-learning/

Destination Imagination, (2019f). *Educator Flyer*. https://www.destinationimagination.org/wp-content/uploads/17-18-Educator-Flyer.pdf

Destination Imagination, (2019g). *Global Finals*. https://www.destinationimagination.org/challenge-program/global-finals/

Destination Imagination, (2019h). *Global Finals Archived Results 2011*. https://www.destinationimagination.org/files/archived%20global%20finals%20results/2011_GF_Results_Combined.pdf

Destination Imagination, (2019i). *Global Finals Nexpo19*. https://www.globalfinals.org/nexpo19-activities/

Destination Imagination, (2019j). *Instant Challenges.* https://www.destinationimagination.org/challenge-program/resource-library/

Destination Imagination, (2019k). *Interference.* https://www.destinationimagination.org/blog/what-is-interference/

Destination Imagination, (2019l). *Mission Statement*. https://www.destinationimagination.org/vision-mission/

Destination Imagination, (2019m). *Parent Information*. https://www.destinationimagination.org/parents-start-here/

Destination Imagination, (2019n). *Proven Results*. https://www.destinationimagination.org/proven-results/

Destination Imagination, (2019o). *Resources.* https://www.destinationimagination.org/challenge-program/team-resources/

Destination Imagination, (2019p). *Start a Team.* https://www.destinationimagination.org/challenge-program/start-a-team/

Destination Imagination, (2019q). *Statistics*. https://www.destinationimagination.org/our-stats/

Destination Imagination, (2019r). *Supporters*. https://www.destinationimagination.org/our-supporters/

Destination Imagination, (2019s). *What We Do*. https://www.destinationimagination.org/what-we-do/

Donald, W. E., Ashleigh, M. J., & Baruch, Y. (2018). Students' perceptions of education and employability: Facilitating career transition from higher education into the labor market. *Career Development International*, *23*(5), 513–540. https://doi.org/10.1108/CDI-09-2017-0171

Dunbar, K., Laing, G., & Wynder, M. (2016). A content analysis of accounting job advertisements: Skill requirements for graduates. *E-Journal of Business*

Education and Scholarship of Teaching, *10*(1), 58–72. https://doi.org/10.1080/01596306.2018.1549702

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*(2), 350–383. https://doi.org/10.2307/2666999

Eguchi, A. (2016). RoboCupJunior for promoting STEM education, 21st century skills, and technological advancement through robotics competition. *Robotics and Autonomous Systems*, *75*, 692–699. https://doi.org/10.1016/j.robot.2015.05.013

European Parliament and Council. (2006). *Key competences for lifelong learning: European reference framework*. https://www.voced.edu.au/content/ngv%3A59967

Falco, L., & Steen, S. (2018). Using school-based career development to support college and career readiness: An integrative review. *Journal of School-Based Counseling Policy and Evaluation*, *1*(1), 51–67. https://doi.org/10.25774/v1t4-c816

Ferrara, M., Talbot, R., Mason, H., Wee, B., Rorrer, R., Jacobson, M., & Gallagher, D. (2018). Enriching undergraduate experiences with outreach in school STEM clubs. *Journal of College Science Teaching*, *47*(6), 74–82.

Fisher, D. R., Bagiati, A., & Sarma, S. (2017). Developing professional skills in undergraduate engineering students through cocurricular involvement. *Journal of Student Affairs Research and Practice; Oxford*, *54*(3), 286–302. https://doi.org/10.1080/19496591.2017.1289097

Fondo, M., & Jacobetty, P. (2019). LThe lights and shadows of intercultural exchange projects for 21st-century skills development: Analysis and comparison of two online case studies. In A. Plutino, K. Borthwick, & E. C. Corradini, *New educational landscapes: Innovative perspectives in language learning and technology* (1st ed., pp. 63–69). Research Publishing. https://doi.org/10.14705/rpnet.2019.36.957

Garner, B. R., Gove, M., Ayala, C., & Mady, A. (2019). Exploring the gap between employers' needs and undergraduate business curricula: A survey of alumni regarding core business curricula. *Industry and Higher Education*, *33*(6), 439–447. https://doi.org/10.1177/0950422219876498

Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Routledge.

Greenberg, E. B. (2016). *Destination Imagination: An examination of highly creative children's experiences on their journey through imagination* (Publication No.10188739) [Doctoral dissertation, William James College]. ProQuest Dissertations Publishing

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough?: An experiment with data saturation and variability. *Field Methods*, *18*(1), 59–82. https://doi.org/10.1177/1525822X05279903

Guilmette, M., Mulvihill, K., Villemaire-Krajden, R., & Barker, E. T. (2019). Past and present participation in extracurricular activities is associated with adaptive self-regulation of goals, academic success, and emotional wellbeing among university

students. *Learning and Individual Differences*, *73*, 8–15. https://doi.org/10.1016/j.lindif.2019.04.006

Haddad, B., & Marx, A. (2018). Student perceptions of soft skills and career decision self-efficacy through participation in SAE. *Journal of Agricultural Education*, *59*(4), 159–176. https://doi.org/10.5032/jae.2018.04159

Halcomb, E. J., & Davidson, P. M. (2006). Is verbatim transcription of interview data always necessary? *Applied Nursing Research*, *19*(1), 38–42. https://doi.org/10.1016/j.apnr.2005.06.001

Helwig, A. (2004). A ten-year longitudinal study of the career development of students: Summary findings. *Journal of Counseling & Development*, *82*(1), 49–57. https://doi.org/10.1002/j.1556-6678.2004.tb00285.x

Hendrix, R., & Morrison, C. (2018). Student perceptions of workforce readiness in agriculture. *Journal of Agricultural Education*, *59*(3), 213–228. https://doi.org/10.5032/jae.2018.03213

Hennessey, B. (2010). The creativity—Motivation connection. In *The Cambridge handbook of creativity* (pp. 342–365). Cambridge University Press. https://doi.org/10.1017/CBO9780511763205.022

Hennessey, B. (2017). Intrinsic motivation and creativity in the classroom. In *Nurturing Creativity in the Classroom*. Cambridge University Press.

Hille, A., & Schupp, J. (2015). How learning a musical instrument affects the development of skills. *Economics of Education Review*, *44*, 56–82. https://doi.org/10.1016/j.econedurev.2014.10.007

Hinkle, C. M., & Koretsky, M. D. (2019). Toward professional practice: Student learning opportunities through participation in engineering clubs. *European Journal of Engineering Education*, *44*(6), 906–922. https://doi.org/10.1080/03043797.2018.1477119

Hira, A., & Hynes, M. (2018). People, means, and activities: A conceptual framework for realizing the educational potential of makerspaces. *Education Research International*, *2018*, 1–10. https://doi.org/10.1155/2018/6923617

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigour in qualitative case-study research. *Nurse Researcher (through 2013); London*, *20*(4), 12–17. https://doi.org/10.7748/nr2013.03.20.4.12.e326

Huffman, C., Tallant, A., & Young, S. (2019). Preliminary impact of DegreePlus: An institutional program to provide transferable skill development through extracurricular activities. A practice report. *Student Success*, *10*(1), 131–139. https://doi.org/10.5204/ssj.v10i1.1094

Jackson, D. (2016). Re-conceptualising graduate employability: The importance of pre-professional identity. *Higher Education Research & Development*, *35*(5), 925–939. https://doi.org/10.1080/07294360.2016.1139551

Jackson, D. (2019). Student perceptions of the development of work readiness in Australian undergraduate programs. *Journal of College Student Development*, *60*(2), 219–239. https://doi.org/10.1353/csd.2019.0020

Jackson, D., & Bridgstock, R. (2018). Evidencing student success in the contemporary world-of-work: Renewing our thinking. *Higher Education Research &*

Development, *37*(5), 984–998. https://doi.org/10.1080/07294360.2018.1469603

Jackson, D., & Bridgstock, R. (2020). What actually works to enhance graduate employability? The relative value of curricular, co-curricular, and extra-curricular learning and paid work. *Higher Education*. https://doi.org/10.1007/s10734-020-00570-x

Jackson, K., Lower, C. L., & Rudman, W. J. (2016). The crossroads between workforce and education. *Perspectives in Health Information Management*, *13*. https://perspectives.ahima.org/

Jacob, S. A., & Furgerson, S. P. (2012). Writing interview protocols and conducting interviews: Tips for students new to the field of qualitative research. *Qualitative Report, 17*(42), 1-10.

Jang, H. (2016). Identifying 21st century STEM competencies using workplace data. *Journal of Science Education and Technology*, *25*(2), 284–301. https://doi.org/DOI 10.1007/s10956-015-9593-1

Jang, S. (2018). Outcomes of an academic scholarship program at the City University of New York-New York City College of Technology. *Journal of STEM Education: Innovations and Research*, *19*(2), 32–41.

Jenson, C. I., McElreath, D. H., & Graves, M. (2017). *Introduction to intelligence studies*. Routledge.

Kanbul, S., & Uzunboylu, H. (2017). Importance of coding education and robotic applications for achieving 21st-century skills in North Cyprus. *International*

Journal of Emerging Technologies in Learning, *12*(1), 130–140. https://doi.org/10.3991/ijet.v12i01.6097

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education*, *29*(4), 127–140.

Khanlari, A. (2013). Effects of robotics on 21st century skills. *European Scientific Journal*, *9*, 11. https://doi.org/10.19044/esj.2013.v9n27p%25p

Kovarik, A., & Warren, G. (2020). Improved soft skill and university club involvement. Are they connected? *Journal of Business*, *5*(1), 01–06. https://doi.org/10.18533/job.v5i1.131

Kunz, R., & de Jager, H. (2019). Performance of newly employed trainee accountants in Gauteng, South Africa, versus the skills expectations of employers: How big is the gap? *Industry and Higher Education*, *33*(5), 340–349. https://doi.org/10.1177/0950422219845999

Lekes, N., Bragg, D., Loeb, J., Oleksiw, C. A., Marszalek, J., Brooks-LaRaviere, M., Zhu, R., Kremidas, C., Akukwe, G., Lee, H.-J., & Hood, L. (2007). *Career and technical education pathway programs, academic performance, and the transition to college and career*. National Research Center for Career and Technical Education.

Li, Z. (2017). Citizenship education 'goes global': Extra-curricular learning in an overseas campus of a British civic university. *International Journal of Lifelong Education*, *36*(6), 662–678. https://doi.org/10.1080/02601370.2017.1375565

Lim, J. W., Tan, D. E. K., Wong, C., & Nur Hanani, M. (2018). University students' competencies and character qualities developed in design thinking. *INTI Journal*, *1*(20).

Low, M., Botes, V., De La Rue, D., & Allen, J. (2016). Accounting employers' expectations—The ideal accounting graduates. *E-Journal of Business Education and Scholarship of Teaching*, *10*(1), 36–57.

Makulova, A. T., Alimzhanova, G. M., Bekturganova, Z. M., Umirzakova, Z. A., Makulova, L. T., & Karymbayeva, K. M. (2015). Theory and practice of competency-based approach in education. *International Education Studies*, *8*(8). https://doi.org/10.5539/ies.v8n8p183

Malin, J. R., Bragg, D., & Hackmann, D. G. (2017). College and career readiness and the Every Student Succeeds Act. *Educational Administration Quarterly*, *53*(5), 809–838. https://doi.org/10.1177/0013161X17714845

Martínez Ortiz, A. (2015). Examining students' proportional reasoning strategy levels as evidence of the impact of an integrated LEGO robotics and mathematics learning experience. *Journal of Technology Education*, *26*(2), 46–69. https://doi.org/10.21061/jte.v26i2.a.3

Maxwell, J. (2009). Designing a qualitative study. In L. Bickman & D. Rog, *The Sage handbook of applied social research methods* (pp. 214–253). Sage Publications. https://doi.org/10.4135/9781483348858.n7

McGunagle, D., & Zizka, L. (2020). Employability skills for 21st-century STEM students: The employers' perspective. *Higher Education, Skills and Work-Based Learning*, *10*(3), 591–606. https://doi.org/10.1108/HESWBL-10-2019-0148

Menekse, M., Higashi, R., Schunn, C., & Baehr, E. (2017). The role of robotics teams' collaboration quality on team performance in a robotics tournament. *Journal of Engineering Education*, *106*(4), 564–584. https://doi.org/10.1002/jee.20178

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Miller, K., Sonnert, G., & Sadler, P. (2018). The influence of students' participation in STEM competitions on their interest in STEM careers. *International Journal of Science Education, Part B*, *8*(2), 95–114. https://doi.org/10.1080/21548455.2017.1397298

Milner, S., Cousins, W., & McGowan, I. (2016). Does all work and no play make a dull graduate? Perceptions of extra-curricular activities and employability. *Journal of Perspectives in Applied Academic Practice*, *4*(1), 13–18. https://doi.org/10.14297/jpaap.v4i1.183

Mirra, N., & Pietrzak, G. (2017). An undeniable force: Supporting urban middle school students as scholars and citizens through debate. *Voices from the Middle*, *24*(3), 20–24.

Mislia, M., Mahmud, A., & Manda, D. (2016). The implementation of character education through Scout activities. *International Education Studies*, *9*(6), 130. https://doi.org/10.5539/ies.v9n6p130

Missett, T. C. (2012). *The development of critical and creative thinking skills for 21st century learning* (Publication No. 3525032) [Doctoral dissertation, University of Virginia]. ProQuest Dissertations Publishing

Missett, T. C., Callahan, C. M., & Hertberg-Davis, H. (2013). Evaluating the impacts of Destination Imagination on the creative problem-solving skills of middle school students. *International Journal of Creativity and Problem-solving*, *23*(2), 97. Expanded Academic ASAP. http://www.creativity.or.kr/page/archive/?year=2013

Moustakas, C. (1994). *Phenomenological Research Methods*. Sage Publications.

Nair, P. K., & Fahimirad, M. (2019). A qualitative research study on the importance of life skills on undergraduate students' personal and social competencies. *International Journal of Higher Education*, *8*(5), 71. https://doi.org/10.5430/ijhe.v8n5p71

National Research Council. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century* (J. W. Pellegrino & M. L. Hilton, Eds.). The National Academies Press. https://doi.org/10.17226/13398

Nazha, B., Salloum, R. H., Fahed, A. C., & Nabulsi, M. (2015). Students' perceptions of peer-organized extra-curricular research course during medical school: A qualitative study. *PLoS ONE*, *10*(3), 1–10. https://doi.org/10.1371/journal.pone.0119375

Negrini, L., & Giang, C. (2019). How do pupils perceive educational robotics as a tool to improve their 21st century skills? *Journal of E-Learning & Knowledge Society*, *15*(2), 77–87. https://doi.org/10.20368/1971-8829/1628

Noddings, N. (2013). Standardized curriculum and loss of creativity. *Theory into Practice*, *52*(3), 210–215. https://doi.org/10.1080/00405841.2013.804315

Nuijten, M. P. J., Poell, R. F., & Alfes, K. (2017). Extracurricular activities of Dutch university students and their effect on employment opportunities as perceived by both students and organizations. *International Journal of Selection and Assessment*, *25*(4), 360–370. https://doi.org/10.1111/ijsa.12190

Orange, A. (2016). Encouraging reflexive practices in doctoral students through research journals. *Qualitative Report*, *21*(12), 2176–2190.

Organization for Economic Co-operation and Development, (OECD). (2005). *The definition and selection of key competencies. Executive summary*. OECD. https://www.oecd.org/pisa/35070367.pdf

Ozis, F., Pektas, A. O., Akca, M., & DeVoss, D. A. (2018). How to shape attitudes toward STEM careers: The search for the most impactful extracurricular clubs. *Journal of Pre-College Engineering Education Research*, *8*(1). https://doi.org/10.7771/2157-9288.1192

Pang, E., Wong, M., Leung, C. H., & Coombes, J. (2019). Competencies for fresh graduates' success at work: Perspectives of employers. *Industry and Higher Education*, *33*(1), 55–65. https://doi.org/10.1177/0950422218792333

Papavlasopoulou, S., Giannakos, M. N., & Jaccheri, L. (2017). Empirical studies on the Maker Movement, a promising approach to learning: A literature review. *Entertainment Computing*, *18*, 57–78. https://doi.org/10.1016/j.entcom.2016.09.002

Papert, S. (1993). *Mindstorms: Children, computers, and powerful ideas.* Ballantine Books.

Partnership for 21st-Century Learning. (2001). *P21 framework definitions*. http://www.battelleforkids.org/networks/p21

Patton, M. (2015). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice.* Sage Publications.

Pazil, A., & Razak, C. (2019). Perspectives of Asian employers on graduates' soft skills: A systematic review. *Universal Journal of Educational Research*, *7*(11), 2397–2405. https://doi.org/10.13189/ujer.2019.071117

Penprase, B. E. (2018). The fourth industrial revolution and higher education. In N. W. Gleason (Ed.), *Higher education in the era of the fourth industrial revolution* (pp. 207–229). Springer. https://doi.org/10.1007/978-981-13-0194-0_9

Percy, W. H., Kostere, K., & Kostere, S. (2015). Generic qualitative research in psychology. *Qualitative Report*, *20*(2), 76–85. http://www.nova.edu/ssss/QR/QR20/2/percy5.pdf

Pinto, L., & Pereira, P. C. (2019). 'I wish to do an internship (abroad)': Investigating the perceived employability of domestic and international business internships. *Higher Education*, *78*(3), 443–461. https://doi.org/10.1007/s10734-018-0351-1

Pinto, L., & Ramalheira, D. C. (2017). Perceived employability of business graduates: The effect of academic performance and extracurricular activities. *Journal of Vocational Behavior*, *99*, 165–178. https://doi.org/10.1016/j.jvb.2017.01.005

Ravitch, S., & Carl, N. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological.* Sage Publications.

Richard, A. (1999). Odyssey of the Mind separates into two organizations. *Education Week*, *7*(19), 6. https://www.edweek.org/ew/articles/1999/10/13/07edskul.h19.html

Rojewski, J. W. (2002). Preparing the workforce of tomorrow: A conceptual framework for career and technical education. *Journal of Vocational Education Research*, *27*(1), 7–34. https://doi.org/10.5328/JVER27.1.7

Rojewski, J. W., & Hill, R. B. (2014). Positioning research and practice in career and technical education: A framework for college and career preparation in the 21st century. *Career & Technical Education Research*, *39*(2), 137–150. https://doi.org/10.5328/cter39.2.137

Rojewski, J. W., & Hill, R. B. (2017). A framework for 21st century career-technical and workforce education curricula. *Peabody Journal of Education*, *92*(2), 180–191. https://doi.org/10.1080/0161956X.2017.1302211

Rubenstein, E., Fuhrman, N., Duncan, D., & Conner, N. (2018). Undergraduate student's reflections on teaching agricultural education abroad: An opportunity for soft skill development. *Transformative Dialogues: Teaching & Learning Journal*, *11*(3), 1–16.

Rubin, H., & Rubin, I. (2012). *Qualitative interviewing: The art of hearing data* (3rd ed.). Sage Publications.

Sahin, A., Ayar, M., & Adiguzel, T. (2014). STEM related after-school program activities and associated outcomes on student learning. *Educational Sciences: Theory & Practice*, *14*(1), 309–322. https://doi.org/10.12738/estp.2014.1.1876

Sahin, A., Gulacar, O., & Stuessy, C. (2015). High school students' perceptions of the effects of International Science Olympiad on their STEM career aspirations and twenty-first century skill development. *Research in Science Education*, *45*(6), 785–805. https://doi.org/10.1007/s11165-014-9439-5

Saldaña, J. (2016). *The coding manual for qualitative researchers (3rd ed.).* Sage Publications.

Schworm, S. K., Cadin, L., Carbone, V., Festing, M., Leon, E., & Muratbekova-Touron, M. (2017). The impact of international business education on career success—Evidence from Europe. *European Management Journal*, *35*(4), 493–504. https://doi.org/10.1016/j.emj.2017.02.009

Shackelford, T. D., Ratliff, M. S., & Mezuk, B. (2019). Participating in a high school debate program and college matriculation and completion: Evidence from the Chicago Debate League. *Educational Research and Reviews*, *14*(11), 397–409. https://doi.org/10.5897/ERR2019.3740

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63–75. https://doi.org/10.3233/EFI-2004-22201

Shin, N., & Jang, Y. (2017). Group creativity training for children: Lessons learned from two award-winning teams. *Journal of Creative Behavior*, *51*(1), 5–19. https://doi.org/10.1002/jocb.82

Siedman, I. (2012). Why interview. In *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College Press.

Simmons, D. R., Creamer, E. G., & Yu, R. (2017). Involvement in out-of-class activities: A mixed research synthesis examining outcomes with a focus on engineering students. *Journal of STEM Education: Innovations and Research*, *18*(2), 10–16.

Spall, S. (1998). Peer debriefing in qualitative research: Emerging operational models. *Qualitative Inquiry*, *4*(2), 280-. https://doi.org/10.1177/107780049800400208

Stewart, C., Wall, A., & Marciniec, S. (2016). Mixed signals: Do college graduates have the soft skills that employers want? *Competition Forum*, *14*(2), 276–281.

Tharumaraj, J., Krishnan, S., & Perumal, R. (2018). Learners' perspective: 21st century essential fluencies. *English Teacher*, *47*(3), 92–103.

Teng, W., Ma, C., Pahlevansharif, S., & Turner, J. J. (2019). Graduate readiness for the employment market of the 4th industrial revolution: The development of soft employability skills. *Education + Training*, *61*(5), 590–604. https://doi.org/10.1108/ET-07-2018-0154

Thiel, B., & Marx, A. (2019). The influence of agriscience research SAEs on perceived self-efficacy of 21st century skill attainment. *Journal of Agricultural Education*, *60*(1), 80–95. https://doi.org/10.5032/jae.2019.01080

Tiessen, R., Grantham, K., & Cameron, J. (2018). The relationship between experiential learning and career outcomes for alumni of international development studies programs in Canada. *Canadian Journal of Higher Education*, *48*(3), 23–42. https://doi.org/10.7202/1057127ar

Treffinger, D. D. J., Selby, D. E. C., & Schoonover, D. P. F. (2004). *Destination Imagination program evaluation*. 74. https://www.destinationimagination.org/wp-content/uploads/2016/02/2004-Center-for-Creative-Learning-DI-Report.pdf

Triyono, M. B., Trianingsih, L., & Nurhadi, D. (2018). Students' employability skills for construction drawing engineering in Indonesia. *World Transactions on Engineering and Technology Education*, *16*(1), 29–35.

Tymon, A. (2013). The student perspective on employability. *Studies in Higher Education*, *38*(6), 841–856. https://doi.org/10.1080/03075079.2011.604408

United Nations Educational, Scientific and Cultural Organization, U. (2011). *Information and communication technologies (ICT) competency framework for teachers*. http://www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/unesco-ict-competency-framework-for-teachers/

von Glasersfeld, E. (1995). A constructivist approach to teaching. In *Constructivism in education.* (pp. 3–15). Erlbaum.

Voogt, J., & Roblin, N. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal*

of Curriculum Studies, *44*(3), 299–321. https://doi.org/10.1080/00220272.2012.668938

Wasik, S. Z., & Barrow, J. (2017). Odyssey of the Mind: Using a creative problem-solving competition to promote career readiness in elementary school. *Journal of Education*, *197*(3), 46–50. https://doi.org/10.1177/0022057418782335

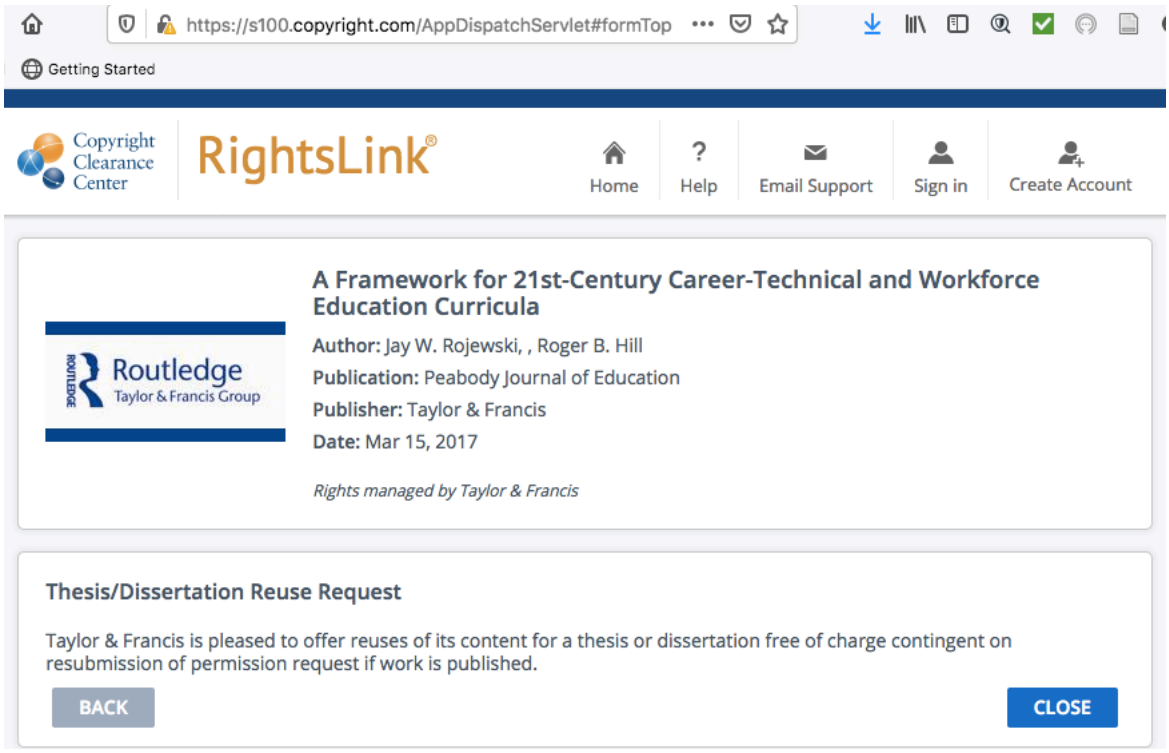
Wilcox, K., Stephen, A. T., Laran, J., & Zubcsek, P. P. (2016). How being busy can increase motivation and reduce task completion time. *Journal of Personality & Social Psychology*, *110*(3), 371–384. https://doi.org/10.1037/pspa0000045

Wong, H., & Leung, S. (2018). How do tertiary education students perceive co-curricular activities under the new education system? *International Education Studies*, *11*(2), 83–96.

World Economic Forum, & Boston Consulting Group. (2015). *New vision for education: Unlocking the potential of technology*. British Columbia Teachers' Federation. http://www3.weforum.org/docs/WEFUSA_NewVisionforEducation_Report2015.pdf

Zoom. (2020). *HIPPA Compliance Guide*. Zoom. https://zoom.us/docs/doc/Zoom-hipaa.pdf

Appendix A: Publisher's Permission to Use the Framework Graphic



Appendix B: Code Book

Construct	Child Code	Grandchild Code	Great Grandchild Code	Code Description	Exemplar Excerpt for the Code
Work Ethic	Teamwork			Collaborate, delegate, community, contribute	"You work with a team in DI ... it's one of the awesome things that prepared me for working with people (P11) "Valuing everybody's contribution" (P5)
		Psychological Safety		Feeling safe in a team, risk taking,	"Not being afraid to pull someone else in and ask for help" (P9)
			Failure	Owing mistakes, learning from failure, taking criticism	"Always ways you can improve, take the criticism and run with it, don't get offended by it" (P11) "failure was really valuable, we were still really proud" (P6)
	Communication			Written, spoken	[DI] "helped with my writing ... strengthen how I explain something" (P2) "be more concise in what I'm saying" (P1)
		Conflict Resolution		Managing disagreements	"Dealing with people who have different opinions and be able to clear headedly pick out which solution is going to be the best for the problem" (P11)
		Listening		Listening	"DI definitely teaches you ... when you need to listen" (8)
	Project Management			Break up tasks, delegate,	"Being able to delegate those different pieces out to different people and find ways to take giant tasks and make them sizable, starting with DI for me" (P6)
		Decision making		Set goals, research, prioritize, optimize	"We had to research different things" (P8) "how they prioritize what they thought" (P8) "how can they optimize their solutions" (P11)
		Time Management		Task completion, organization	"You don't have all the time in the world ... this is going to get done" (P3)
	Presentation			Presentation, performance	"Talking to adults and showing off your best stuff ... showcase yourself, to get that job" (P7)
		Confidence		Comfortable, stand up for self	[DI was] "super instrumental in bringing me out of my shell when I was a kid" (P9)
	Emotional Intelligence			Interpersonal relationships	"Social interaction with other people, you have a lot of different personalities, and that is definitely something that comes up in DI" (P2)
		Flexibility		Adaptable, deal with change	"Things constantly change and you have to adapt on the spot" (P2)
		Humility		Being humble	"Sharing the credit is a big thing" (P3)
Innovation	Creativity			Novel, new ideas	"DI helped me an incredible amount just fostering that are outside the box, creative thinking" (P11). "it's more valuable if you can make something your own" (P6)
	Problem-solving			Solve problems	"Creative problem-solving, which is pretty much what DI is" (P11)
		Tools		List of tools learned	Learning to: sew, paint, pulleys, hot glue, staple gun, power tools, Python, Sign language, Excel
		Trial & Error		Try it, rework it to improve it	"I'm going to take what I have and make it better for version two ... realize you're going to have to keep revising stuff until it gets perfect" (P3)

		Brainstorming	Quick thinking, idea generation	"Fast thinking that instant challenges instill" (P1)
		Learn-by-Doing	Hands on learning	"Have to build everything completely from scratch ... actually build things with their hands" (P5)
		Spatial Reasoning	Thinking in 3D	"In order to make anything you have to have a picture in your head" (P11)
	Critical thinking		Analyze problems, reading & thinking	"A lot of the critical thinking skills [I learned doing] ... instant challenges or even doing the central challenge has really helped me being an engineer" (P5)
Career Navigation	Life-Long Learning		Drive towards continuous improvement	"I have to continuously work to always be the best version of myself" (P11)
		Curiosity	Wanting to learn new things, ask questions	"I would definitely say a craving for learning is what DI has given me" (P7) "when I want to learn something new I'll sign myself up for it, and that comes from DI" (P6)
		Perseverance	Not giving up, work hard, continuous improvement	"I you really want something to happen you have to campaign really hard for it" (P6)
		Reflection	Thoughtful of self & practice	"I'm very introspective ... reflecting on how certain experiences have affected me, and maybe that's attributable to DI" (P9)
		Ownership	Motivation, self-direction, engagement in own learning	"I saw all of my students rise to the occasion because they had but ownership and that's what DI gives students" (P6)
	Initiative		Self-starting	"My advisors compliment that I take initiative on a lot of stuff and I do my own projects without necessarily asking first" (P2)
Career Choice	Directly Influenced		DI directly influenced their career choice	"A lot of the whole reason that I believe I'm an engineer is because of DI" (P5)
	Nourished		DI supported their career choice	"I've always been an engineering focused person ... but I will say that DI really nourished that" (P11)
	Pivot		DI taught them to be comfortable with change	"DI gave me the Ok with not knowing what I wanted to do" (P6)
Discrepant Data	Funding		Financial inequity	"Unfair because ... [other teams] had a lot more structure ... more guidance ... one Team Manager for a couple of teams" (P5)
	Grading		Transfer DI philosophy to work	"I approach my grading in that way, rather than taking away [points], giving them [students] credit for what they did do" (P5)
	Volunteering		Giving back to the community, service	"DI also really instilled a sense of community ... and giving back" (P5)
	Pin Trading		Trading pins at Global Finals	I think it is a unique component of DI. It teaches so many skills. (P7)