Career Readiness Challenge

Development of an online platform to support the translation of professional competencies learned through athletic participation to career readiness

CAREER PREPARATION

COLLABORATION

PROFESSIONALISM COMMUNICATION

GLOBAL FLUENCY LEADERSHIP

DIGITAL TECHNOLOGY

CRITICAL THINKING

PROBLEM

While the ability to translate competencies learned through athletic participation into real-world applications outside of the athletics context is a high-impact practice, athletic and academic responsibilities limit the student-athlete's ability to engage in career service activities that can support their career preparation.

Objective

To develop a career readiness program that can enhance attitudes towards career planning and support the translation of professional competencies into the career context.

INTERVENTION

The *Career Readiness Challenge* was developed as an online and asynchronous program that utilized gamified elements to encourage participation.

Incorporated Game Elements

- Progress Bar
- Leaderboard
- Challenges
- Levels
- Inter-team Competition
- Bonus opportunities
- Focus on user type

Pilot Implementation

6 teams across 3 sports
116 participants
Duration – 7 weeks

KEY FINDINGS

Perception of Professional Competency

High contribution from athletic participation on professional competencies of leadership, communication, and collaboration

CRC Participation

22% of participants actively complete challenges

User type has a strong impact on the types of challenges that are completed.

Significant gains in perspectives on career agency and work-life balance

Participation (by points earned) increased occupational awareness

IMPLICATIONS

Direct implementation into the Canvas LMS makes the course more accessible to student-athletes but may require IT support.

Timing of when the CRC is offered is important to participation. Holiday breaks may limit participation.

Coaches can have a strong influence on participation by showing interest in career readiness.

Valuable to all academic levels, but more relevant for those closer to graduation.

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2019 NCAA Innovations in Research and Practice Grant
Final Report

July 29, 2020

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Problem Statement

Recent trends have transitioned career services from traditional career counseling to a more significant element embedded throughout the student experience (Dey & Cruzvergara, 2014). As a result, career services are assisting students with demonstrating their career readiness: "the attainment and demonstration of requisite competencies that broadly prepare college graduates for a successful transition into the workplace" (NACE, 2020a). National Association of Colleges and Employers (NACE) identified eight critical competencies that include critical thinking, oral/written communication, teamwork/collaboration, digital technology, leadership, professional/work ethic, career management, and global/intercultural fluency. From these competencies, employers rated critical thinking, teamwork, and professionalism as the top three competencies closely followed by communication (NACE 2020b). However, these same employers only perceived new hires to be somewhat proficient in these areas. Additionally, only 17.3% of these employers perceived new hires to have competency in career management, the ability to "identify and articulate one's skills, strengths, knowledge, and experiences relevant to the position desired and career goals, and identify areas necessary for professional growth" (NACE 2018a).

For student-athletes, the ability to translate competencies learned through athletic participation into real-world applications outside of the athletics context is a high-impact practice (Bell, 2018). Despite the importance of these career competencies, athletic and academic responsibilities may limit student-athletes' ability to engage in career service activities that can support the translation of their skills to future employers (Buzzetta, Lenz, and Kennelly, 2017; Brown, Glastetter-Fender, & Shelton, 2000). Furthermore, studies acknowledge the role that athletic identity plays when considering future career pathways and career maturity (Houle & Kluck, 2015; Cabrita et al. 2014). Specifically, it is possible for a student-athlete to have a high athletic identity separate from their career domain identity (Brown et al., 2000). This compartmentalization of identities can potentially make it difficult for student-athletes to translate their athletic competencies to career readiness competencies. Lastly, many student-athletes are forced to prioritize their sport before their academics, which can negatively affect their overall engagement, career readiness, and identity outside of sports (Comeaux, 2007; Jayakumar & Comeaux, 2016).

The objective of this project was to develop a career readiness program, referred to as the "Career Readiness Challenge" (CRC), that will enhance attitudes towards career planning and support the translation of athletic competencies into the career context. This work addresses the following research questions:

RQ1. How do perceptions of career readiness competency relate to student-athlete identities?

RQ2. How do student-athletes engage in the CRC?

RQ3. How does participation in the CRC affect career planning attitudes?

Literature Review

Identity development is important for all college students as they begin college and transition from seeing themselves as high school students to undergraduates. Identity development is also important for college students as they finish college and transition from identifying as students to professionals. Many traditional college-aged students (i.e., 18-21 year olds) go through a stage of "identity vs. identity confusion," where students try to determine who they are as individuals (Pascarella & Terezini, 2005). For college students who have multiple or intersecting identities, such as student-athletes, the transition process into and out of college can be complex. Student-athletes must begin to explore professional careers and ponder a sports exit strategy.

Many college students have opportunities to engage in "educationally purposeful" activities on their campuses (Pascarella & Terenzini, 2005). However, older students with spouses or children, students with jobs, and students who play a collegiate sport have less time to participate in "educationally purposeful" activities. For example, due to time constraints, student-athletes report interacting with students, that may only include their classmates, other than teammates more often than any other type of engagement (Gayles and Hu, 2009). Student-athletes also report participation in student groups and organizations less often (Gayles and Hu, 2009). Furthermore, student-athletes in low profile sports reap more educational benefits from attending college than student-athletes in high profile sports (Gayles & Hu, 2009). Given the diverse experiences of student-athletes, more work is needed to understand how student-athletes transition into and out of college. Additional knowledge is also needed concerning the type of engagement student-athletes have in "educationally purposeful" activities and how student-athletes develop an identity as professionals in their respective degree fields.

Conceptual Framework: Gamification

Gamification is defined as "the use of game design elements in non-game contexts" (Deterding, 2011). Gamification or "gameful learning" is grounded in self-determination theory (Deci & Ryan, 2002). Self-determination theory posits that motivation to engage in an activity is driven by experiences associated with *autonomy* in the selection of tasks, a sense of *competency* in ability to complete the tasks, and *relatedness* with others who are engaging in the same activities. Game elements rely on autonomy, competency, and relatedness to enhance user motivation (Werbach & Hunter, 2012).

Game elements include game dynamics, game mechanics, and components (Webach & Hunter, 2012). Game dynamics include the constraints, rules, and narrative that users of the experience must follow. Game mechanics encourage the user to move through the game and persist in the application's use. Several examples of game mechanics include rewards, chance, competition, cooperation, and feedback. Components are specific initiations of both mechanics and dynamics (i.e., points, badges, leaderboards, and teams).

When describing the motivations of players or users within a gamified environment, Marczewski (2015) classifies them into six user types (Figure 1). These user types include players, achievers, socializers, free spirits, philanthropists, and disruptors. Each of these players are motivated differently to engage in the gamified activity. While these are discreet classifications of a user, each user can represent multiple user types. For example, a user could be both a player and a socializer, strongly motivated by both the opportunity for rewards as a result of successful

actions and the opportunity to interact and collaborate with other users in the gamified experience.

Figure 1. User types hexad and user motivations (Marczewski, 2015).

Career Readiness Challenge

The Career Readiness Challenge (CRC) was developed as an online platform within the institutions learning management system (LMS), Canvas (Figure 3). This approach was chosen, to encourage participation in the CRC, since a majority of courses on campus already actively use Canvas. Through this integration, any CRC announcements, activities, and feedback were provided to student-athletes through familiar interfaces.

CRC Platform Design

Using the principles of gamification, the CRC was developed to include a progress bar, leader boards, challenges, levels, inter-team competition, and bonus opportunities. The progress bar included the participant's current score, the number of points they needed to advance to the next level, and a graphical representation of their progress through a horizontal bar chart – with a marker indicating their current status (Figure 2).

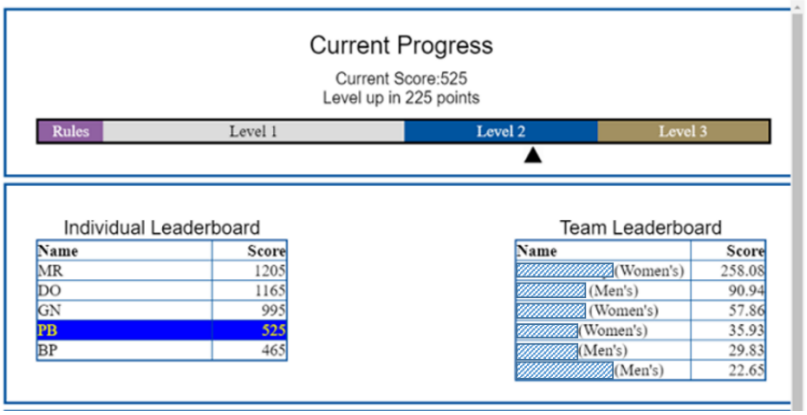


Figure 2. Elements of the CRC progress and status

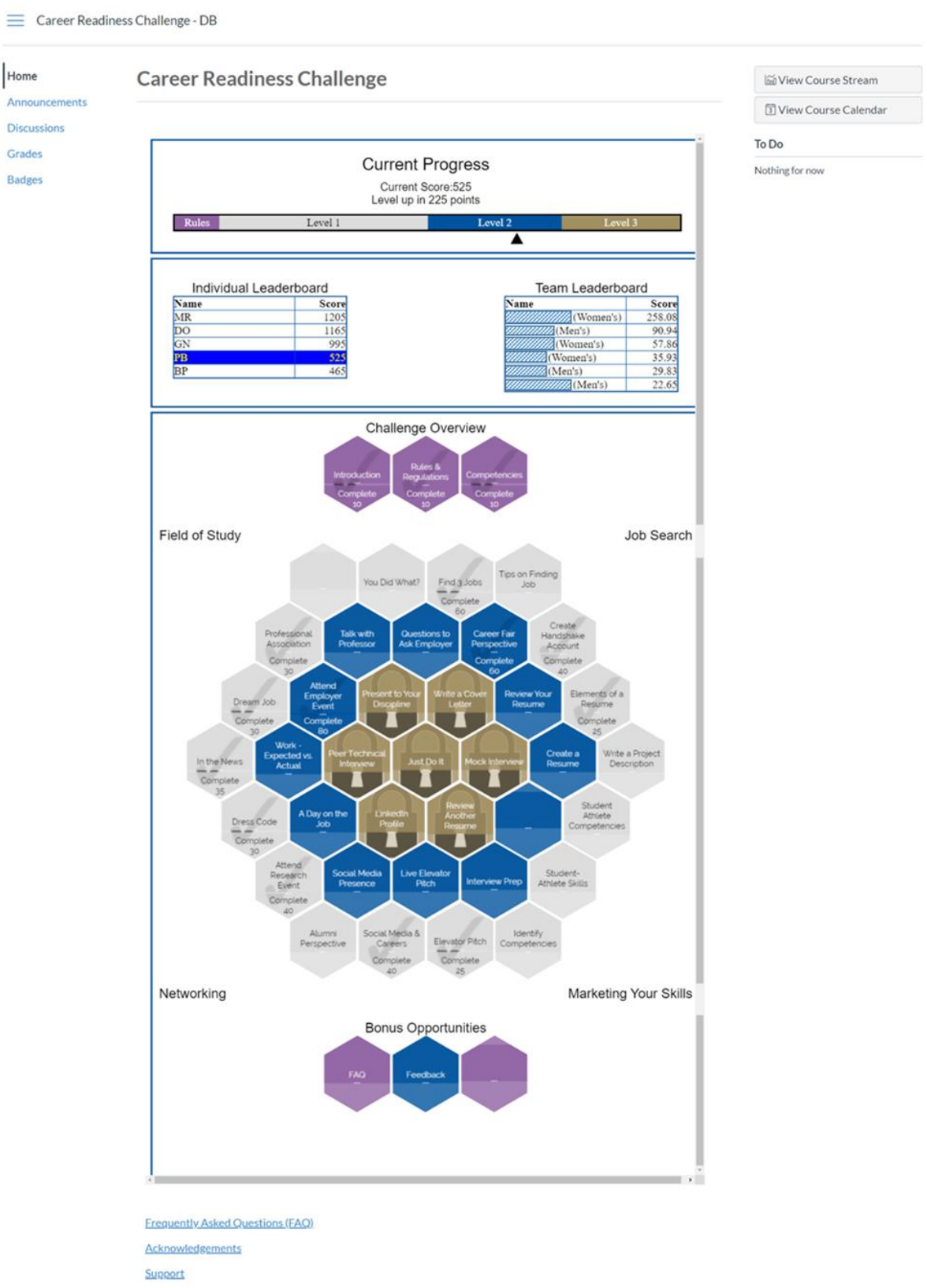
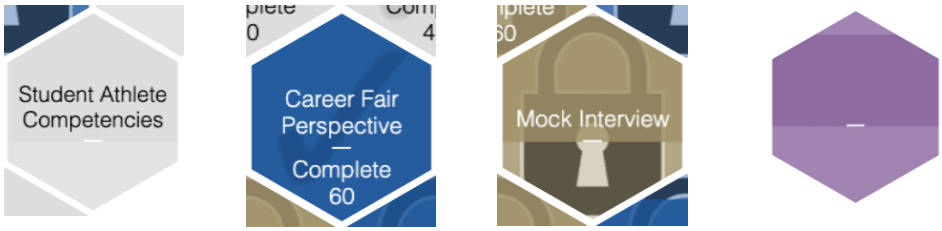


Figure 3. Career Readiness Challenge LMS interface

Leaderboard. To encourage participation, team members could track their individual accomplishments and team ranking via a leaderboard (Figure 2). Through this interface, the participant would readily see their progress in comparison to their peers as represented by the total number of points earned by the participant. The individual leaderboard showed the top five point earners, while highlighting the current participant's points. If the participant was not ranked among the top 5 users, the top five scores were shown then their points. To ensure FERPA compliance, student names were replaced with randomized initials. The leaderboard included the names of each participating team and the average score of all individuals on that team. The use of an average score was intended to create inter-team accountability, where other team members would encourage full team participation in order to earn the most points.

Challenge board. The challenge board contained three main areas: "Challenge Overview," "Main Challenges," and "Bonus Opportunities." A hexagon shape tile identified each challenge in order to appear representative of several contemporary board games and to limit the appearance of a linear workflow. By not having a clear start and end location, participants could exercise autonomy in their selection of challenges to complete. Each of the challenges was color-coded based on their engagement level and made available by the number of points the participant earned. Through the interactive nature of the CRC, participants could readily see the status of each challenge based on icons in the challenge tile (Figure 4). Incomplete challenges had a colored background with the name of the challenge and no graphic. When a participant placed their cursor over the challenge tile, a marker would appear showing "Incomplete" and the number of points the challenge was worth. Once a challenge was completed, a check mark appeared in the background of the tile with a notation indicating "Completed" and the number of points earned. Any challenge that was locked, due to the participant not having enough points, had a lock icon in the background. Finally, several challenges were time dependent with specific short-term release dates. These challenge tiles were blank until the Canvas LMS unlocked the challenge at the specified time; at which point the challenge would appear as an incomplete task.



Incomplete *Complete* *Locked* *Unavailable*

Figure 4. CRC Challenge status icons

The challenge board (Figure 3) began with three onboarding activities classified as the "Challenge Overview." The activities were developed using RISE 360, an interactive course creation tool (https://articulate.com/), to ensure an interactive introduction to CRC. The first activity within the "Challenge Overview" was an "Introduction," which provided a motivation for why students-athletes should participate in the CRC through a student-athlete produced video. The second activity was the "Rules and Regulations," which provided an overview of how students could navigate the CRC platform, submit challenges, and earn points. The third and

final “Challenge Overview” activity was “Competencies,” which provided an overview of the NACE career competencies. These purple tiles, along with all other purple tiles, were available without any earned points.

Main challenge board. Once CRC participants completed all three onboarding challenges, the grey tiles would unlock in the main challenge board. The main challenge board was separated into 4 key areas of career competency development: understanding the field of study, knowing how to conduct a job search, marketing competencies and skills, and networking. The goal of the overall challenge was to work from the outside of the main board to the interior. Grey tiles opened at 30 points after the completion of the “Challenge Overview,” blue tiles opened at 350 points, and gold tiles opened at 750 points. It was intended that successful completion of the CRC would occur at 1500 points. There was no requirement for participants to complete all the challenges, however, the point system was designed so that a minimum number of challenges needed to be completed in each level in order to advance to the next level (Table 1).

Table 1. Point system for the CRC

	Challenge Level				
	Purple	**Grey**	**Blue**	**Gold**	**Bonus**
Points needed to access level	0	30	350	750	-
Number of available challenges	3	18	12	7	3
Average point per challenge	10	48	93	246	37
Minimum and maximum points available in each level	[10,10]	[25, 100]	[60, 140]	[190,320]	[30, 50]
Average number of challenges needed to advance to next level	3	7	4	3	-

Participants could review any of the challenges in the available and incomplete tiles by clicking on the tile, which would take them to the challenge screen (Figure 5). The challenge screen showed the number of points that the participant could earn, a brief motivation for the completion of the challenge, instructions on how to complete it, and additional resources. The challenge also included a rubric detailing how points would be earned; focusing on the elements of general challenge completion and each of the career competencies.

Bonus opportunities. Additional elements of the CRC included bonus opportunities. One of those bonus opportunities required participants to submit questions about the CRC. Responses to these questions would be included in an FAQ, located at the bottom of the main board. An additional bonus opportunity was provided to participants who reached the blue level, allowing them to provide feedback on their CRC experience, up to that point.

Student-Athlete Skills

Submit Assignment

Due No Due Date **Points** 50 **Submitting** a text entry box

(50 PTS)

You've developed skills unique to athletes that will serve you well on the job. These relate readily to the NACE Career Readiness Competencies.

Instructions: Post to the discussion board (Student-Athlete Skills) two skills athletes develop through sport that can lead to success in your professional careers. Provide a brief description of how these skills can benefit you professionally. (*Note:* You can not duplicate a skill that has been previously listed)

Once you have completed this task, type "posted" in the text box submission.

Additional Resources:

- How former student-athletes are equipped to fill the No. 1 workforce skills gap

Student-Athlete Skills				
Criteria	**Ratings**			**Pts**
Challenge Completion	**50.0 pts** **Fully Completed** The challenge was completed as described. Good Job!	**25.0 pts** **Some Improvement Required** Some element of the challenge was not completed to the extent desired. Please see the provided comments.	**0.0 pts** **Not Completed** The challenge was not completed. Please review the instructions for the challenge.	50.0 pts
				Total Points: 50.0

Figure 5. Example of CRC Challenge prompt

Platform Development

Learning Tools Interoperability (LTI) is a technical standard defining how a Learning Management System (LMS) can securely interact with external tools to authenticate users, also referred to as participants in the pilot implementation, and provide basic directory information in a FERPA compliant manner. Each LMS also includes its own Application Programming Interface (API). Once a user has been authenticated through the LTI standard, the API provides secure access to detailed user-level data such as listing available assignments or accessing grade data.

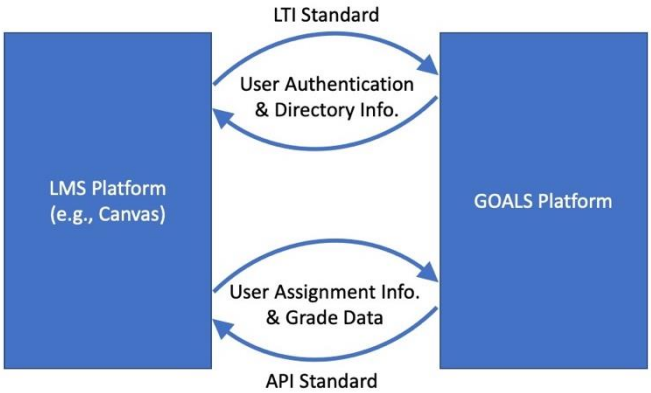


Figure 6. Design of the interface between LMS and CRC platform

Platform development. For the CRC, the project team developed the platform as an LTI-compliant tool for the Canvas LMS. Existing gamification platforms tend to be full end-to-end implementations that are not integrated into existing institutional platforms. By using the LTI and API standards, the platform extends an institution's existing LMS, providing a fully integrated and institutionally authenticated user experience that fits within the existing student and instructor workflow.

The platform is written in PHP: Hypertext Preprocessor with a MySQL database management system backend and runs on a secure LAMP (Linux, Apache, MySQL, PHP) server hosted by ERAU's IT services. Integration required extensive negotiation with the university IT server and security teams. Once the platform was approved by IT security, the University Canvas Administrators provided scoped access to the API as well as installed the LTI. The open source code for the described CRC platform is provided in Appendix A.

Components. The system consists of a front-end authentication and display module that handles the LTI interface and interacts with three core gamification components: assignment tree, leaderboard, and progress bar. The assignment tree component handles the main hexagon-based tile interface. CRC administrators create assignments in the LMS, just as they do for a non-gamified course. The Assignment Tree module uses the API to identify those assignments and organizes them into the non-linear gamified layout. The Assignment Tree Administrators Dashboard allows course administrators to define where any particular assignment is located in the larger hive as well as the color/level of that assignment. The leaderboard component handles both the individual and team scores. For the team leaderboard, course administrators create groups in the LMS corresponding to each sports team. The Leaderboard module accesses the group listing and generates the team's scores. To comply with FERPA requirements, for the individual leaderboard, students see only a pair of obfuscated initials for any of their peers, while administrators see full names. The progress bar component handles tracking which level a student is allowed to access and how many more points they need to unlock the next level.

CRC Implementation

The CRC began on October 25, 2019 and ran for 7 weeks ending on December 16, 2019. After receiving support from their coaches, 6 teams were added to the Canvas course associated with CRC. There was no requirement for student-athletes to actively participate in the CRC. Instead, the pilot implementation relied on the design of the gamified environment to drive participation through the use of game mechanics that could motivate each of the user types.

Methodology and Data Collection

The Career Readiness Challenge was assessed by measuring student-athlete engagement in the CRC and how student-athlete participation affects career-planning attitudes in a mixed-methods research design that included both quantitative surveys with open-response questions, qualitative interviews, and quantitative participation data from the CRC platform (Table 2).

Table 2. Summary of Career Readiness Challenge methodology

Research Question	Data Collection	Data Analysis
RQ1. How do perceptions of career readiness competency relate to student-athlete identities?	Career Futures Inventory (CFI) survey *(pre-CRC)*	Comparison of CFI constructs across demographics
	Interview	Critical ethnography, Interpretative phenomenological analysis
RQ2. How do student-athletes engage in the CRC?	Activity records of CRC engagement	Daily average visits Volume of activity
	UK User Type survey *(pre-CRC)*	Comparison of activity across demographics, user type, career attitudes
RQ3. How does participation in the CRC affect career-planning attitudes?	Career Futures Inventory (CFI) survey *(post-CRC)*	Repeated measures ANOVA across demographics, control/experimental, in/out of season, user type

Participants

The CRC was implemented, as a pilot, to 6 sports teams. The teams represented three sports, including both men's and women's teams, for a total of three women's and three men's teams. The first sport has their championship segment in the Fall semester and were considered in-season. The second sport has their championship segment in the Spring semester and were considered out-of-season. The third sport is a winter sport. At the time that the CRC began, the men's and women's teams were in their championship segment and were classified as in-season for the full duration of the program. Across all six teams, there were 116 participants in the pilot implementation of the CRC (Table 3). Based on institutional data and survey responses, 47% of these participants identified as female. Regarding race, 12% were Black or African American and 3% Hispanic or Latino. In addition, 9% of the participants were international students. Across all sexes and racial demographics, participants were enrolled at all academic levels of higher education, from first-year students to graduate education. Specifically, 28% of the participants were first-year students, 28% sophomores, 23% juniors, 16% seniors, and 4% Master's students.

In addition to the CRC, participants from a control group of 54 student-athletes, represented by two teams, were included in the pre-CRC data collection. These study participants were associated with two teams that were in-season and include the men's and women's team from the same sport.

Table 3. Summary of participation in data collection and in the CRC

		Pre-CRC Data Collection			
	Total	**UK User Type Survey**	**Career Futures Inventory**	**Career Competencies Survey**	**Interviews** *(Fall 2019, N only)*	**CRC Participation** *(Experimental Only)*
Participation						
Control	32% (54)	39% (54)	33% (35)	36% (43)	-	-
Experimental	70% (116)	61% (86)	67% (71)	64% (76)	-	-
Sex						
Male	49% (88)	40% (56)	43% (46)	39% (46)	8	53% (62)
Female	51% (91)	60% (84)	57% (60)	61% (72)	9	47% (54)
Athletic Competition						
In Season	-	-	-	-		71% (82)
Out of Season	-	-	-	-		29% (34)
Race and Hispanic Origin						
White alone	60% (133)	61% (105)	62% (80)	61% (89)	13	59% (85)
Black/African American alone	11% (25)	12% (20)	12% (15)	12% (18)	4	12% (17)
Hispanic or Latino	4% (9)	4% (7)	4% (5)	3% (5)	-	3% (4)
Asian alone	1% (2)	1% (1)	1% (1)	1% (1)	-	1% (2)
Native Hawaiian / Pacific Islander	1% (2)	1% (1)	1% (1)	1% (1)	-	1% (2)
Other	2% (5)	2% (3)	2% (3)	2% (3)	-	3% (5)
Did Not Respond	<1% (1)	1% (1)	0% (0)	1% (1)	-	<1% (0)
Citizenship						
Domestic	84% (151)	83% (101)	83% (84)	83% (99)	-	91% (105)
International	16% (28)	17% (20)	17% (17)	17% (20)	-	9% (11)
Academic Level						
First-Year	30% (54)	34% (47)	34% (36)	34% (41)	-	28% (33)
Sophomore	27% (49)	24% (34)	24% (25)	24% (29)	-	28% (33)
Junior	20% (36)	21% (29)	24% (25)	20% (24)	-	23% (27)
Senior	18% (33)	18% (25)	15% (16)	18% (21)	-	16% (18)
Master's	4% (7)	4% (5)	4% (4)	4% (5)	-	4% (5)

Data Collection

Prior to the start of the CRC, both the experimental and control groups were emailed an electronic survey that included the UK User Type survey (Tondello et al., 2016), Career Futures Inventory (Rottinghaus, Day, & Borgen, 2005), 16 items examining self-perceptions of career competencies, and several demographic questions.

The UK User Type Survey includes 24 Likert items with seven options ranging from "strongly disagree" to "strongly agree" with a "neither" option. Each of the six user types received a summative score from four of the items in the survey. The responses to the survey by both control and experimental groups had in internal reliability, represented by Cronbach alpha, of .778. A confirmatory factor analysis loading onto six factors, associated with the user types, explained 56.5% of the variance in the survey responses.

The Career Futures Inventory (CFI) used in this study was a revised version that included 28 items (Rottinghaus, Day, & Borgen, 2005). The items were Likert-type, with five options ranging from "strongly disagree" to "strongly agree." The items represented five constructs: career agency, occupational awareness, negative career outlook, support, and work-life balance. Among the respondents, the CFI had a Cronbach alpha of .812 and a confirmatory factor analysis of the five constructs explained 56.7% of the variance in the responses.

A post-CRC survey was also administered to the same experimental and control participants. This survey included a replication of the Career Futures Inventory. The experimental participants received additional survey items that asked the respondents to self-evaluate "to what extent participation in the CRC impacted their career readiness and supported the translation of professional competencies learned through athletic participation to your future careers". Responses included 5 Likert-type ratings that ranged from "strong decrease" to "strong increase" with an option for "no impact." Due to moderate levels of individual visitation percentages in comparison to a low number of challenge submissions, additional items asked respondents to identify the intent of their visits to CRC and requested CRC participants provide feedback on their experience through several open response questions.

In addition to the surveys, baseline interview data was collected during the Spring 2019 semester. One-on-one semi-structured interviews were conducted with 16 ERAU student-athletes. Out of the 16 baseline interviews, there were 13 women, three (3) men, nine (9) White student-athletes, five (5) Black student-athletes, two (2) multi-racial student-athletes and one (1) Hispanic student-athlete. In terms of major, there were five (5) aerospace engineers, five (5) mechanical engineers, three (3) civil engineers, two (2) human factors engineers, and one (1) software engineer. During the baseline interviews, student-athletes self-evaluated their competencies (i.e., based on NACE, 2018) with respect to how they identify as a student, athlete, and individual. Five pilot interviews tested our modified interview protocol, which now included a specific question about how student-athletes translated career competencies from their sports participation. Out of the five (5) pilot interviews, there were three (3) women, two (2) men, two (2) White student-athletes, two (2) Black student-athletes, and one (1) Hispanic student-athlete who did not identify with any racial category.

To gather more in-depth knowledge of ERAU student-athletes' self-evaluated competencies, 17 eligible CRC participants participated in semi-structured interviews. When CRC interview participants were recruited, diverse representation was ensured across sex, race, and academic discipline. Eligible CRC participants who had both high and low levels of perceived career readiness were also recruited. Two ERAU student-athletes who participated in baseline interviews fit the above criteria so they were asked to identify any changes in their perception. Out of the 17 Fall 2019 participants, there were nine (9) women, eight (8) men, 13 White student-athletes and four (4) Black student-athletes.

Data Analysis

Initial survey analyses generated descriptive statistics for each of the survey items and instrument constructs, including mean scores with standard deviations, median Likert responses, and correlation analyses.

RQ1: How do perceptions of career readiness competency relate to student-athlete identities? Quantitative analyses included a multivariate analysis of variance with the five constructs of the Career Futures Inventory as dependent variables and the demographics of sex (male, female), race, citizenship (domestic, international), and academic level (first-year, sophomore, junior, senior, master's) as between subject factors. Interviews were analyzed to answer RQ1 using critical ethnography and interpretative phenomenological analysis (Smith & Osborn, 2004).

RQ2: How do student-athletes engage in the CRC? Quantitative analyses involved a univariate analysis of variance using the gamification metrics of number of visits and points earned in the CRC as dependent variables. Between subject factors included the demographic data of sex, race, citizenship, and academic level. Additional covariates included the survey respondents' scores for each user type (player, achiever, philanthropist, socializer, free spirit, and disruptor) and the Career Futures Inventory constructs (career agency, occupational awareness, negative career outlook, support, and work-life balance).

RQ3: How does participation in the CRC affect career planning attitudes? At the time that this report was submitted, data on the impacts of the Career Readiness Challenge, RQ3, were being collected and prepared for analysis, using a repeated measures ANOVA with the control and experimental groups as additional factors.

Findings

Student-Athlete Perceptions of Career Readiness

The self-perceptions of the respondents indicated moderate ability to demonstrate career competencies to future employers (Figure 7). The highest competencies included professionalism, communication, collaboration, and leadership. The order of these career competencies closely resembles the order from the NACE Job Outlook 2018 survey results (NACE, 2020b).

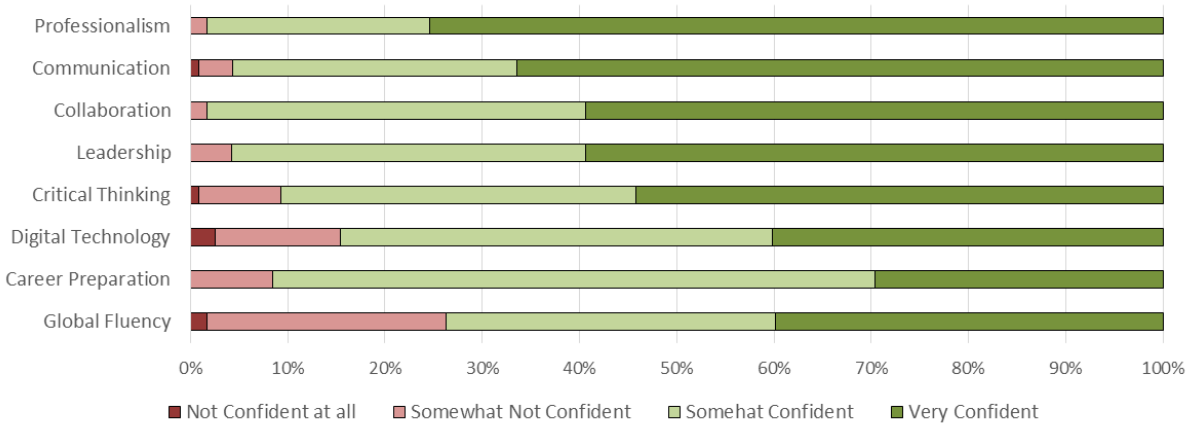


Figure 7. Student-athlete perception of their ability to demonstrate career competencies

Athletic participation was reported to have the strongest impact on the development of competencies associated with leadership, communication, collaboration, and professionalism (Figure 8). Over 75% of participants perceived that athletic participation to have at least a small positive impact on the development of career competencies with the exception of digital technology. A majority of participants perceived that athletic participation had no "contribution to the development of competency in digital technology".

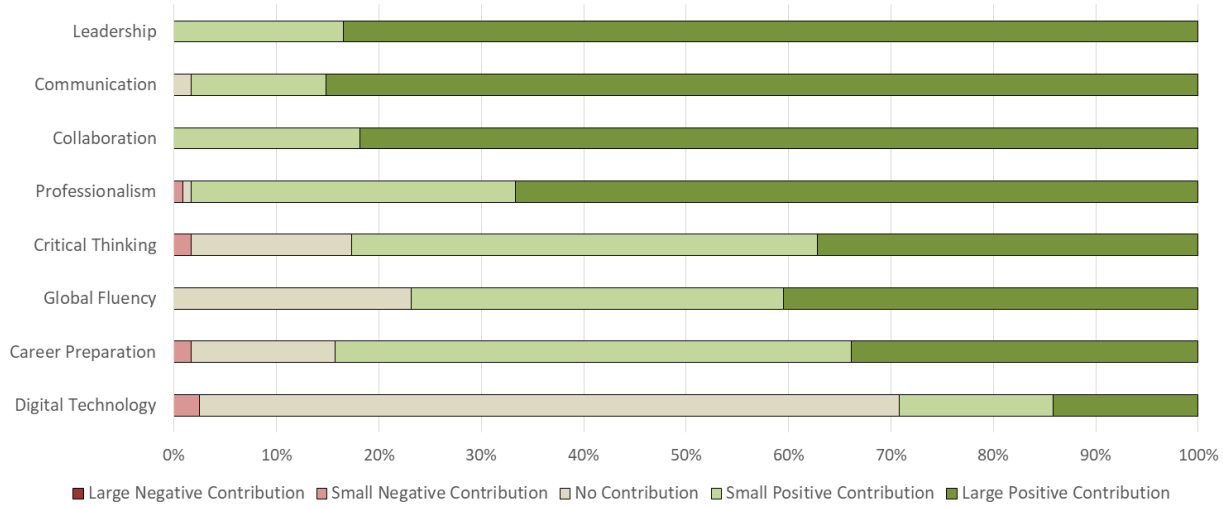
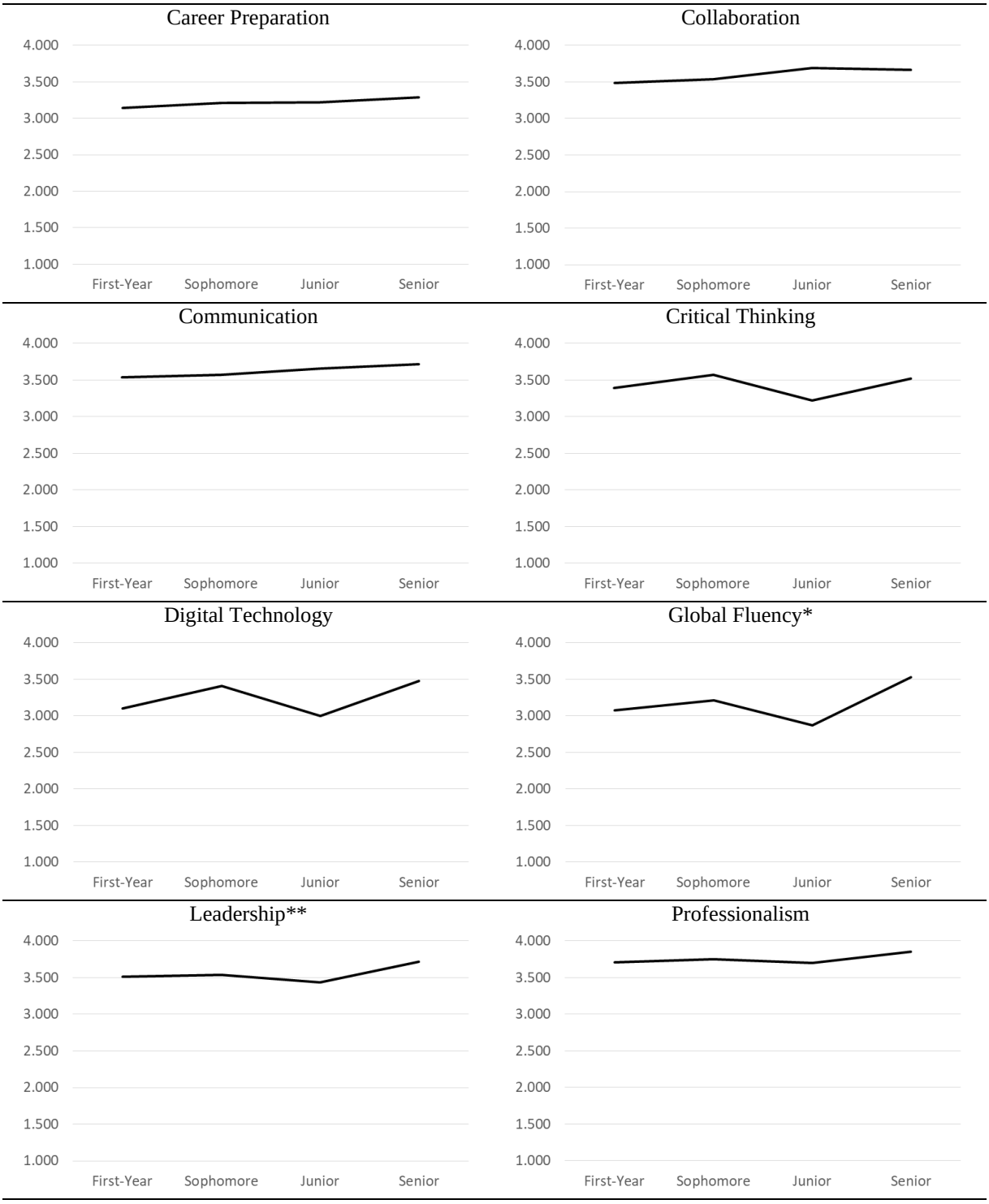


Figure 8. Student-athlete perception of the contribution that athletic participation has on the development of career competencies

These self-perceptions remained relatively constant across the academic levels with the exception of competency of global fluency which saw an increase among senior students. Due to small representation in total number of respondents, Master's students were excluded from this analysis (Figure 9).

Among the above self-perceptions, there were significant differences in perceptions among two groups. Perceptions regarding one's "ability to demonstrate leadership" were significantly lower ($p < .001$) with a moderate effect size (Cohen's $d=.56$) among female participants ($M=3.43$, $SD=.60$) in comparison to male participants ($M=3.74$, $SD=.49$). International participants also perceived the "contribution of their athletic experience to their competency in global fluency" ($M=4.75$, $SD=.44$) significantly higher ($p<.01$) with a larger effect size (Cohen's $d=1.08$) than domestic participants ($M=4.06$, $SD=.79$).



* p<.01 citizenship, ** p<.001sex

Figure 9. Student-athlete self-perceptions of ability to demonstrate career competencies

Findings from interview data, collected as part of the pilot study in the Fall 2019, indicate the most commonly perceived career competencies are professionalism, communication, and collaboration. The following interview excerpts highlight the most commonly perceived career competencies:

> Professionalism
> "I know that career services here has done a great job on, I took my resume there a few times, polished it up, I've taken my resume to NSBE meetings where we had professionals from Lockheed Martin come and they overlooked it, gave me some feedback on it, actually took my resumes over to career fair that we had, it actually landed the internship." - Yvonne
>
> "I think [sport] helps a lot because of, you know, staying organized and on top of my homework, had to manage both of them. I don't think anything else really. That's it." - Azahra
>
> Communication
> "They want you to be good at technical writing, good communication orally and written, so maybe speech is probably good for that." - Melanie
>
> "Definitely building like team skills and people skills through sports makes me feel pretty confident because there's a lot of engineers who don't have those skills at all." - Sara
>
> Collaboration
> "Coming from … [my sport] you have to deal with certain people, even if you don't get along, you have to stick with it if you're going to play with them for a bunch of years. So, I think I'm very well prepared." - S.S.
>
> "I mean I feel like my friends and I always study together and we're always very motivated ... but we're always just supporting each other whatever we decide to do." - Samantha

Visual and accessible formats of these findings can be seen in infographics containing five word clouds and a poster created by undergraduate researchers, including three ERAU student-athletes, in Appendix B and Appendix C.

Among the constructs of the Career Futures Inventory, participants identified high perspectives of career agency, support, work-life balance, and relatively positive career outlook (Figure 10). However, participants generally noted a neutral perspective on occupational awareness.

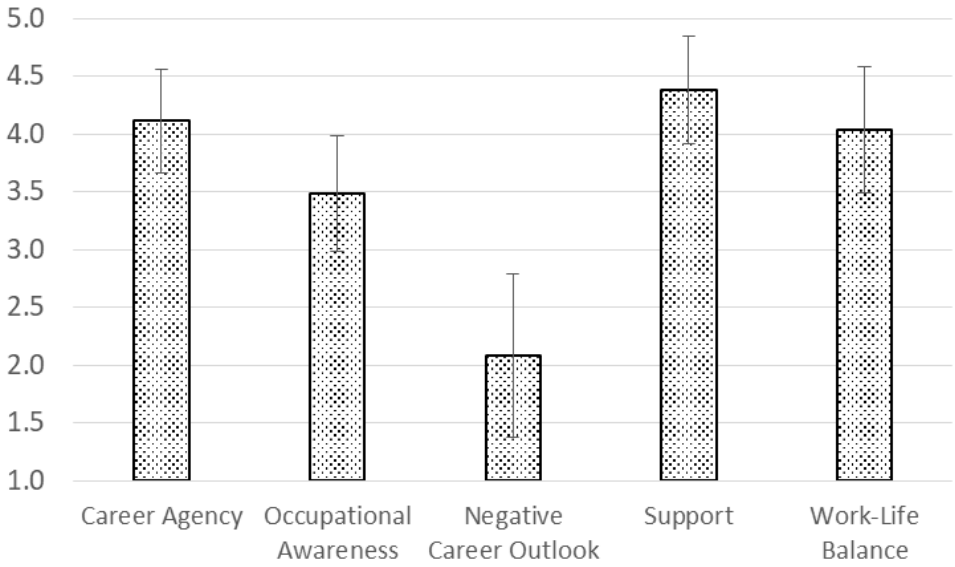


Figure 10. Average score and standard deviation for each construct of the Career Futures Inventory

Further analysis of the quantitative data associated with the Career Futures Inventory shows that citizenship was a significant factor associated with "work life balance" $F(1,25) = 5.78$, $p=019$. A post hoc comparison shows that the mean for international students ($M=4.28$, $SD=.39$) was significantly higher than the mean for domestic students ($M=3.99$, $SD=.53$).

CRC Participation

Participation in the CRC was observed through the number of points earned by participants and how regularly they visited the CRC platform. Overall, in the "Challenge Overview," 53% of the CRC participants completed at least one of the orientation challenges, while the remaining 47% never completing a challenge over the seven week duration of the program (Figure 11). Of all participants, 22% could be considered active participants, who submitted challenges beyond the orientation. Of CRC participants, 16% ended the program in the grey level, 3% in the blue level, and 3% in the gold level.

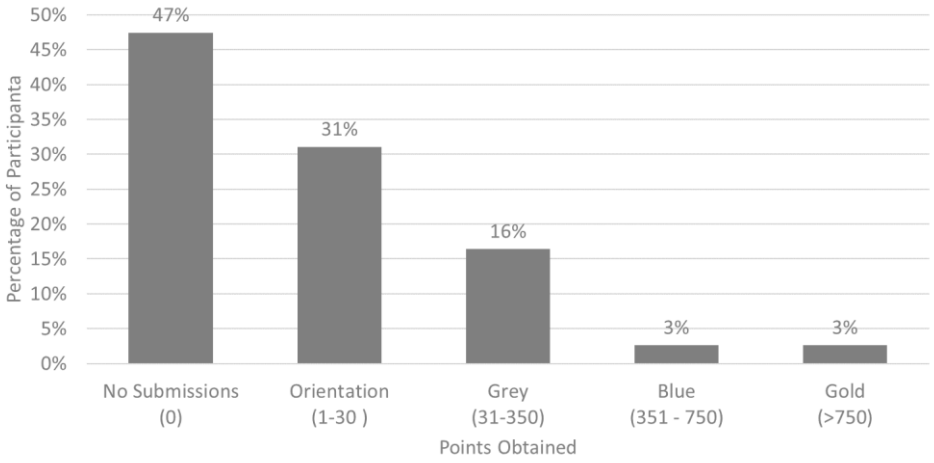


Figure 11. Percentage of participants who finished in each level of the CRC

Despite these relatively low participation numbers, there was more passive participation associated with CRC visits. According to visitation records, throughout the 7 week duration, 44% of CRC participants visited the site at least 40% of the days; indicating a visit to the CRC at least every 3 days (Figure 12). While the LMS could not identify what CRC participants were viewing on the platform, the post-CRC data can provide self-reported insights into the CRC viewing interests. Further analysis of the post-CRC data is in progress.

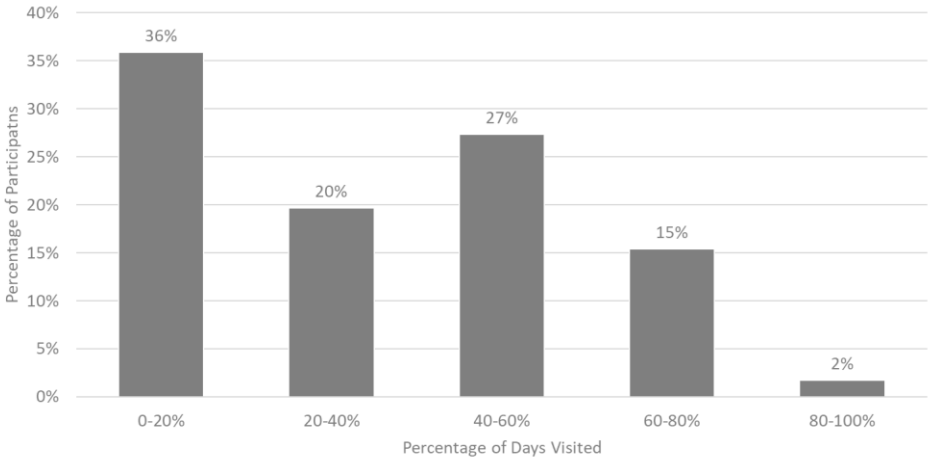


Figure 12. Percentage of participants who visited the CRC

Examination of CRC participation, across the timeline, shows that the number of points earned by all CRC participants occurred during week three, followed by a sharp decline in active participation through the end of the program (Figure 13). Despite this pattern, the number of visits remained relatively constant across weeks 1 through 4 with a decrease during week 5, after which, the percentage of visitors returned to percentages aligned with the previous weeks.

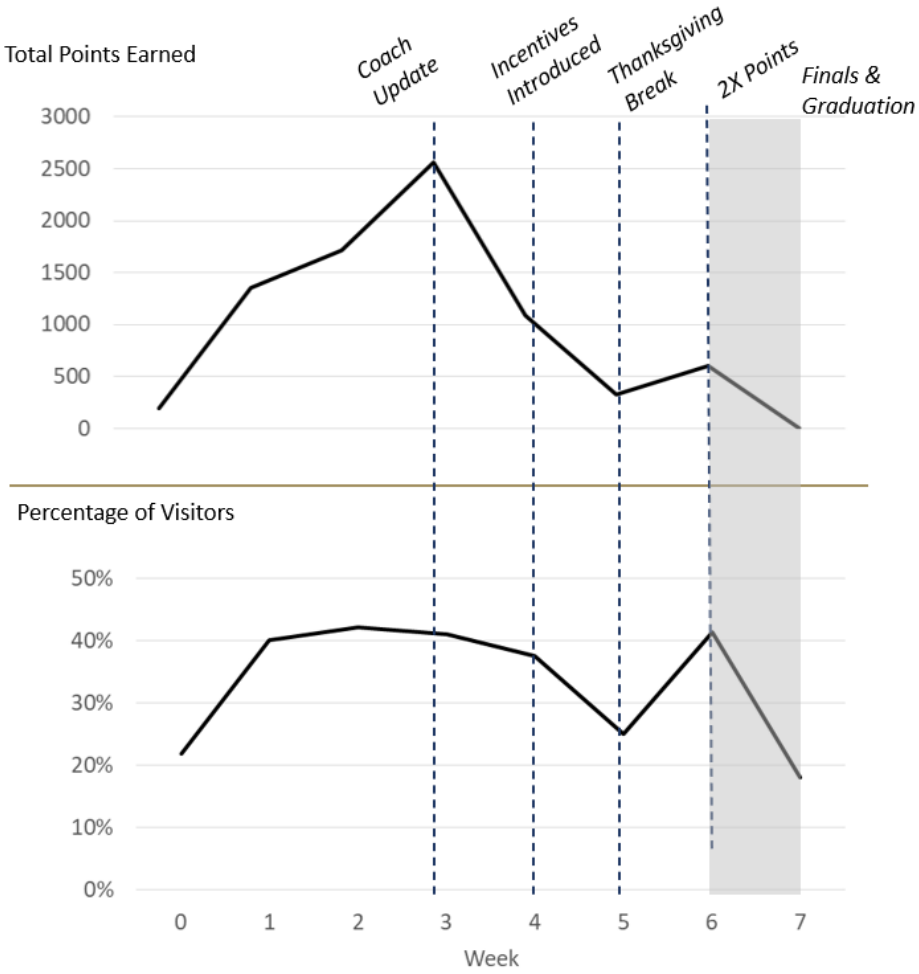


Figure 13. Points earned and percentage of visitors by day and key events

The spike in earned points during week 3 can potentially be attributed to a status update that was sent to the participating teams' coaches. The sharp decrease in both points earned and visits, during week 5, can be attributed to Thanksgiving break. The following decrease in week 6 may be related to finals and the end of the academic term. Interestingly, during week 4, the introduction of incentives did little to motivate participants to complete more challenges. During week 6, all point values in the grey tiles were doubled for that week, then returned to normal levels afterwards. The new incentives to participate created a daily spike in visits, but did little to encourage participants to complete a challenge.

While these participation numbers may seem low, it is important to note that participation among student-athletes was voluntary. A review of campus career service attendance shows that during academic year 2017-2018, only 9% of student-athletes attended a meeting or event and 6% of those student-athletes only attended one of the career fairs. Comparable attendance was seen during the 2018-209 academic year with 13% of student-athletes attending at least one event and only 5% having visited career services to receive some support. In comparison, the CRC was

able to significantly increase the percentage of student-athletes actively participating in career planning.

Some participation, described by points and visits, can be associated with demographics, user types, and career readiness perceptions. The results of the use type survey, among experimental participants, shows that on average CRC participants were primarily characterized as Philanthropist-Achiever-Socializers (Figure 14). Interestingly, the average Player scores were the lowest of the positive user types, indicating that the CRC participants may be less focused on rewards and points as seen by the lack of response to incentives announcements in week 4 and double points in week 6.

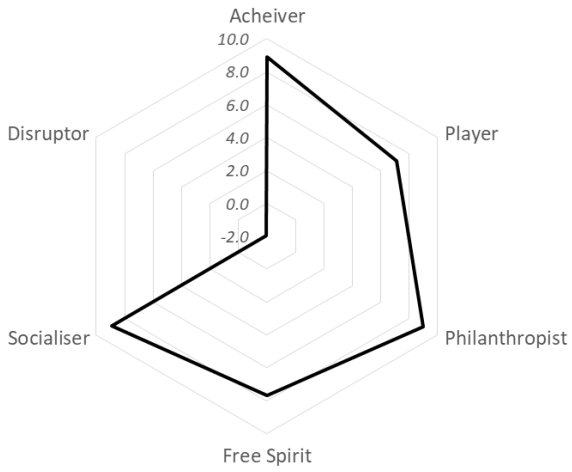


Figure 14. Average user type scores across all CRC participants

Additional analyses of these factors identified a slight correlation (r = .26, p=.02) between points earned and the achiever score, indicating that the higher the achiever score, the higher the points participants earned. This finding aligns with Marczewski (2015) groupings of game elements associated with the user type profiles.

An additional slight correlation (r=-.27, p=.03) was observed between number of visits and occupational awareness. This indicates that CRC participants who had a higher sense of career opportunities visited the CRC less. This could be due to a perceived lack of value in engaging in the CRC beyond what they already knew.

A univariate analysis of variance with points as a dependent variable, demographics as between subject factors, user type score, and career futures inventory scores as covariates created a strong model (R^2=.665). Factors that had a significant effect on the number of points earned included competition season, F(1,32)=4.24, p=.048, sex, F(1,32)=6.69, p=.014, academic level, F(4,32)=4.97, p=.003, and an interaction effect between race and academic level, F(3,32)=3.66, p=.022.

Additional analyses indicated that student-athletes who were in-season earned more points (M=82.4, SD=224.6) than student-athletes that were not in their competition season (M=31.8, SD=39.1).

Female participants (M=95.1, SD=234.5) were shown to have higher participation than male participants (M=43.6, SD=140.7). Interestingly, a further examination of the difference in survey responses between male and female student-athletes shows there is a moderate effect size (Cohen's d=.62) associated with perceptions of occupational awareness.

An examination of the mean points earned by academic level shows that the closer students were to graduation, the more points they earned (Figure 15). This could be a related to juniors and seniors having previously created the artifacts they needed to complete the challenge or there was a more immediate interest in completing the challenges that would support the jobs they were currently looking to obtain. Due to the small numbers representing data associated with race and academic level, no clear pattern was associated with the significant interaction effect.

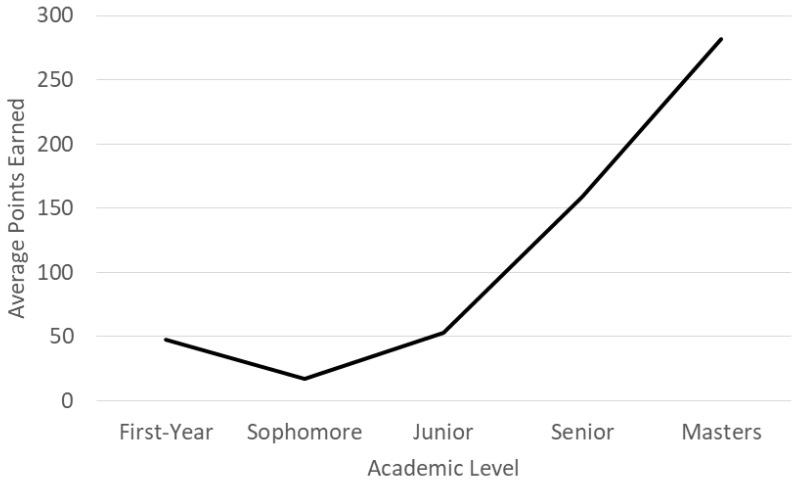


Figure 15. Average points earned by academic level

Impacts of CRC Participation

Following the implementation of the pilot and end of the Fall 19 term, a follow-up survey was sent to all student-athletes who had access to the CRC. This survey included a repeat of the same items from the Career Futures Inventory and some open response questions regarding their participation. Of the original 116 participants, 59 (50.9%) completed the follow-up survey.

In the comparison between pre and post CRC participation, several differences were identified (Figure 16). A paired-samples t-test shows that perspectives on career agency differed before CRC participation (M=4.12, SD = 0.48) and after the CRC (M=4.22, SD = 0.40) at the .05 level of significance (t=2.54, df = 58, p<.05) with a low to moderate effect size (Cohen's d = 0.23). A similar difference was seen for measures of work-life balance prior to the CRC (M=4.06, SD = 0.53) and following the CRC (M=4.22, SD = 0.46) at the .05 level of significance (t = 2.66, df =

58, p<.05) with a low to moderate effect size (Cohen's d = 0.32). Both of these constructs saw slight increases.

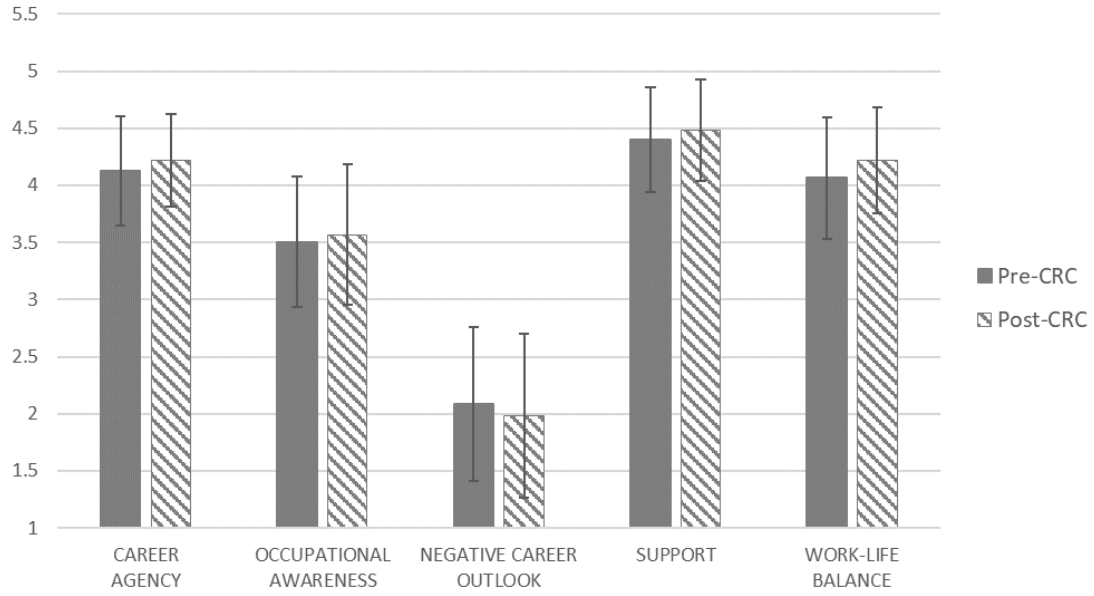


Figure 16. Comparison of Career Future Inventory constructs between pre-CRC and post-CRC participation

Additional multivariate analyses were conducted examining which factors predicted gains (or losses) across the pre and post CRC results of the Career Futures Inventory constructs. Gains in occupational awareness (R^2=.45) were related to the number of points a person earned F(1,21)=5.781, p=.022. The trend indicates that as student-athletes earned more points there was an increase in occupational awareness (r = .35).

These analyses also identified that gains in perspectives on work-life balance (R^2=.53) were predicted by academic level F(4,21)=3.380, p=.020. While it is not linear, there is a general trend that as academic rank increased, participation in the CRC increased positive perspectives on work-life balance.

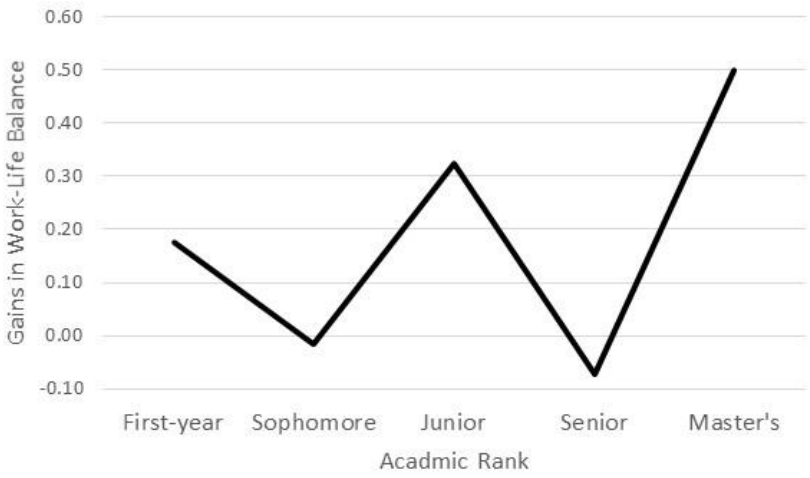


Figure 17. Gains in work-life balance after participating in the CRC

Student Insights and Feedback on CRC Participation

At the conclusion of the follow-up survey, students were prompted to address the following questions:

- What has the CRC done to help you become more career ready and support the translation of your professional competencies learned through athletic participation to your future careers?
- What could the CRC do better to help you become more career ready and support the translation of your professional competencies learned through athletic participation to your future careers?
- What has been the most difficult or challenging component of the CRC?
- What incentives or opportunities would have encouraged your participation in the CRC?

Utilizing an open and axial coding approach to the student-athlete text responses, themes were identified and can be seen in Tables 4-7.

Overall, the CRC provided student-athletes with an intentional focus on their future lives and career prospects (Table 4). The challenges were intentionally situated to draw their attention to the need to focus on next steps, while encouraging them to embrace the skills they can translate from their athletic participation to future careers. The asynchronous and online approach allowed student-athletes to access resources and feedback on their creation of artifacts, without the need to find time during the regularly scheduled career services hours. Having a career services representative, who was dedicated to providing student-athletes with feedback, was a critical and necessary component to this work.

Table 4. Student-athlete perspectives on how the CRC helped them become more career ready

Theme	Description	Example
Focus on future	Through tasks presented in the CRC, participants were able to brainstorm about their future careers and lives post-college.	"It has taught me many different things like professionalism, and career preparation. It helped me think about the future and how to be prepared and have good skills for a good job."
Trend awareness	The CRC encouraged students to take note of trends occurring in the real-world to be able to adjust accordingly.	"Become more aware of changing trends and how to come into contact with possible career options"
Work toward career goal	The CRC gave participants a platform to be able to prepare for life after college by giving interview tips, resume development tools, and job application tips.	"Provided support and tools to me when I was unable to visit Career Services" "Given me an opportunity to have guidance in my professional development"
Present athletic traits to workforce	The CRC taught participants how to translate the skills they have learned on the field/court into skills that benefit them in the workforce.	"I feel that the challenge made it evident to me that as an athlete I have marketable skills that I can use well when transitioning to the workplace."
Access to career service tools & techniques	Helped students develop their resumes, taught students how to apply for jobs and how to be successful in interviews.	"Provided support and tools to me when I was unable to visit Career Services"

The key challenge associated with the CRC was the time needed to complete the tasks (Table 5). The pilot participants encompassed teams that were in-season and out-of-season. Both groups found it difficult to allow any additional time outside of class, practice, and competition beyond what their schedules already allowed for. Some of the issue with time was attributed to the perceived length and difficulty of the tasks. The design of the CRC attributed the points for a given challenge to the assumed level of effort and time it would take to complete. A short reflection on student-athlete career skills was a low point value in comparison to interviewing an alumni to find out what skills they regularly used. A review of the completed challenges shows that student-athletes completed tasks that were low point value but could be completed quickly or challenges that they may have already started completing in a course or as part of another career services program.

Table 5. Student-athlete perspectives on the key challenges associated with the CRC

Theme	Description	Example
Time commitment	With busy school/athletic schedules, some students found it hard to find the time to complete CRC assignments.	"The most challenging part of the CRC was the time commitment, between classes and practice I have very little time to commit to the program."
Assignment difficulty & length	Some students found that there were assignments that took too much time or were too difficult to complete.	"I found the assignments and challenges to be quite lengthy. I was able to complete the first level of challenges, but while taking a full load of courses and being a full-time athlete, it was difficult to keep up with the course."
Staying consistent & focused	Participants sometimes found it difficult to stay focused and work through the assignments.	"Staying on top of it. Doing it consistently!"

While the program saw several successes that were core to the purpose of the CRC, there were several issues that could have reduced participation and limited the overall impact of the program (Table 6). Several of the comments were associated with the overall layout and design. While the hexagon grid was used to encourage autonomy, there were some issues with student-athletes not knowing where to begin and needing some guidance on how to proceed. Additional improvements could have been made to the materials within the platform, including more graphics and improved aesthetics.

Several suggestions were made regarding how to keep student-athletes engaged in the CRC beyond the first few tasks. Several of these perspectives focused on the timing of the launch of the pilot implementation. Providing the entire program all at once was perceived to be overwhelming. In addition, more frequent reminders about participation would have been helpful. A few students noted that leveraging social media could have been beneficial to engage the teams, especially concerning the inter-team competition.

Further engagement could have been enhanced by making the information in the CRC more specific to degree programs and career fields. The content in the platform, similar to resources within career services, was designed to be general. Within the platform, student-athletes were encouraged to seek out information pertinent to their career field. However, student-athletes highlighted the importance and need for information specific to their career field. Several suggested that more discussions with people in their major would have been beneficial. These perspectives align with the "socialiser" user-type which was prominent among our student-athletes (Figure 15).

Table 6. Student-athlete perspectives on what the CRC could have done better

Theme	Description	Example
Easier navigation	The CRC platform was difficult for some participants to navigate.	"I would make it easier to navigate. I just feel like it was very confusing and there was a lot going on."
Better readability	Students suggested that the platform be adjusted to make viewing more pleasurable, possibly with the addition of visuals.	"Make it easier to read everything, everything is so cluster, More visuals"
More frequent reminders	Without consistent reminders, it was hard to remember to participate.	"Make more frequent announcements" "Maybe inform and remind us of tasks to accomplish, giving us notifications to do them and whatnot."
Roll-out program	Participants suggested the CRC would be more effective if they program was rolled out in phases, over a period of time	"Be more engaged. Maybe break it into parts and not roll out the whole thing at once."
Additional information	Some students suggested offering the opportunity earlier and for a longer period of time. They also suggested more reminders, and more information sessions to understand the purpose, instructions, and benefits of participating in the CRC.	"Making it more well-known and having people talk to us in person about it in our off season" "If it was offered sooner and lasted longer"
In-person discussions	Offering in-person discussions would benefit participants by increasing collaboration and as a result would increase participation.	"Maybe set up meetings based on our majors and get us involved in knowing what other people on pother teams have the same major as i do. Creating a athletic group within our own major since we all have the same lifestyle."
More specific sections	Some participants relayed that they would find the CRC to be more beneficial if there were sections that catered to their specific major.	"Be more major focused and separate people into different groups based on majors. Some at this school are not as well-known and not as supported so knowing who the student athlete connections are within your major would be a benefit."
More post-college information	Some participants suggested including more information on possibilities after college.	"Provide more major specific help when it comes to moving to the professional world."

Recognizing student profiles indicated that "player" was not the dominant user-type among the student-athlete participants, the last open-ended question was intended to identify additional areas of motivation and incentive to encourage participation (Table 7). The most prominent response were rewards that were identified in earlier interviews, during the design phase. These included food, gear, and team focused prizes. Other suggestions focused on making an academic impact that either enhanced their GPA or gave them additional access to campus resources, or making the CRC exclusively part of a class that they had to complete.

Table 7. Student-athlete perspectives on incentives that would have encouraged their participation

Theme	Description	Example
Food	Offering food periodically as an incentive to complete tasks could heighten participation.	"Free food (but more often, for example by February 20 whichever team has the most points gets breakfast)"
Gear/equipment	Giving free gear or equipment as an incentive to complete tasks would encourage students to participate.	"Some incentives could be free ERAU apparel."
Team prizes	Offering prizes to the whole team would encourage teammates to get more done for each other.	"Prizes that benefit the whole team, based on how the team is doing collectively."
Academic impact	If completing the CRC contributed to student's GPA in some capacity, they would be more inclined to participate.	"If it were an actual credit course" "If it was a real class I was in and had to take or if I complete certain stuff, I get rewarded for it"

Implications for Campus Level Programming

While the CRC had a positive impact in several areas associated with increased career awareness and student engagement in their future careers, participants identified several keys areas where the platform and implementation could be enhanced. As a research team, we identified the following critical elements for implementation of the CRC on another campus:

Integrate the CRC into the campus LMS – Initial designs for the CRC leveraged other existing platforms that enabled the use of game mechanics. It was determined, during the design phase, that this may limit engagement since it would be a site that students would not regularly go to unless it was part of the campus Learning Management System (LMS). Appendix A provides resources on the gamified platform and other relevant resources. While the platform is FERPA compliant, IT support may be needed to make some of the course content accessible to student-athletes.

Time the implementation of the CRC carefully – It would be best to launch the CRC when teams have the least amount of time conflicts. Preferably, earlier in the academic term and before high competition times. For our population, holiday breaks and high testing times also limited participation. It would also be beneficial to introduce the program to student-athletes very clearly, from the beginning, with frequent reminders to ensure that they have a clear understanding of the purpose of the program and to encourage focus on the completion of the challenges.

Leverage team culture and leadership – Through the implementation of the CRC, we saw that some teams were more invested in the successful completion of the CRC than others. While the team competition supported some teams to excel in the program, it also could have disengaged others that may not have been able to catch up with the lead team. This is a common phenomenon identified in gamified activities, where there is a competitive component. Within this study the coaches were a strong factor to encourage the teams to participate that could overcome those issues.

Interviews with the student-athletes offered additional insights for campus-level programming and the overall development of career competency:

Provide student-athletes (across diverse demographic groups) with paid leadership positions in career service centers – Within our team, the study funded a student-athlete to support the representative from career services and aid in providing feedback to the student-athletes who completed CRC challenges. Their perspective can be valuable insight into how student-athletes can leverage their strengths when pursuing their future careers.

Ensure student-athletes are connected to student chapters of professional organizations – Several challenges in the CRC encouraged student-athletes to identify, become members of, and attend meetings for professional organizations. With clear time limitations, this can be a difficult challenge, but one that can provide critical access to knowledge about future careers and opportunities.

Pair student-athletes with faculty/staff and experienced peers for career mentoring – As can be seen in the infographic associated with Appendix B, summarizing the interviews with the student-athletes, professors, advisors, and peers are key resources for the development of career competencies. Providing and encouraging the opportunity to foster these relationships can be beneficial to the student-athletes future careers or graduate school pursuits.

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Appendix A. Open source code for the CRC platform

https://github.com/mverleger/NCAA_CRC

GOALS

GOALS - Game Oriented Adaptive Learning System

GOALS is a non-linear gamification UI for the Canvas LMS system. Instead of using the vertical "modules" system or manually creating a rectangular page, GOALS provides a hexagon-based layout that encourages non-linear curricular organization. The toolset implements multiple gamification elements, specifically

- Individual and Team leaderboards based on Canvas Groups
- A Progress Bar
- Multiple "Levels"
- A non-linear UI with level locking
- Rubric based outcomes reporting

GOALS requires integration with Canvas in two ways:

1. Using Developer Keys to allow for Canvas API access
    - Used to access the assignments and tracking completion status
2. As an LTI tool for launching an authenticated user
    - Used to generate the GOALS main page

Installation

Setup Pre-requisites:

- Web Server
- MySQL Database
- Canvas LMS

Once the web-server is setup, update the config.php file to reflect the server location. For the database, the "Setup" folder contains GOALS.sql which creates the tables. Once the database is setup, the /Setup/LMS_Preconnection_Setup.php creates the LMS access in the database. In Canvas, create a developer key (contact your Canvas admin) and update config.php. Then, add the tool through the LTI tools settings. The Setup/ToolSettings.xml file contains the xml settings for adding the LTI tool. Update it to reflect the server location. Finally, create a page in Canvas. On that page, add the tool as an external tool.

References

GOALS is built on the following tools:

- https://github.com/IMSGlobal/LTI-Tool-Provider-Library-PHP
    - Updated to replace the "mysql" data connector with the "mysqli" data connector.
- https://github.com/cesbrandt/canvas-php-curl
    - Handles the API interfacing

Appendix B. Student-Athlete Career Competencies Infographic

This infographic includes five word clouds containing the perceived career competencies of student-athletes at Embry-Riddle Aeronautical University (ERAU). Embry-Riddle is a mid-sized private university in the Southeast that competes in Division 2 (D2) of the National Collegiate Athletic Association (NCAA). Findings from one-on-one interviews with 16 current or past ERAU student-athletes led to the creation of the infographic's five word clouds. Among ERAU student-athletes, the most commonly perceived career competencies are a) career preparation, b) professionalism, c) communication and d) collaboration.

Appendix C. Career Competencies: More than Students, More than Athletes

The ability for student-athletes to translate athletic experiences into career competencies is valuable, but student-athletes may not know how to leverage the career competencies they have gained through sports participation. In addition, student-athlete's time demands may limit access to career support services. This project summarizes the perceived career competencies of student-athletes at Embry-Riddle Aeronautical University (ERAU). Embry-Riddle student-athletes compete in the Sunshine State Conference of the National Collegiate Athletic Association's (NCAA) Division II. Findings from one-on-one interviews with 16 current or past ERAU student-athletes led to the creation of an infographic, containing five word clouds. Among ERAU student-athletes, the word clouds indicate the most commonly perceived career competencies are a) career preparation, b) professionalism, c) communication and d) collaboration. To help ERAU student-athletes further develop their career competencies, a 2-3 minute promotional video will spread awareness about a recently developed app called Career Readiness Challenge (CRC). This work is a part of a larger study titled, Gamified Online Platform to Support Student-Athlete Career Readiness, funded by the NCAA Innovations in Research and Practice Grant Program.

This poster was presented at the ERAU Student Research Symposium on November 20, 2019 by undergraduate researchers and student-athletes Melanie Canfield, Sydney Jones, and Olivia Roa who were mentored by Dr. Leroy Long III.

https://commons.erau.edu/db-srs/2019/poster/11/

Appendix D. STEM and Medical Careers Related to Sports

This infographic includes science, technology, engineering, math and medical (STEMM) careers related to sports. The targeted audience for the infographic is college counselors, professors, coaches and student-athletes who pursue STEMM degrees while playing a National Collegiate Athletic Association (NCAA) sport. The infographic may also be useful to K-12 students, parents, teachers and coaches. A job description, average salary, and undergraduate major are listed for a variety of careers such as data scientist, video game designer, sports engineer, sports economist, physical therapist, and mental health clinician.

CAREER COMPENTENCIES AT ERAU

FOR STUDENT-ATHLETES*

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COURSE WORK

PROJECTS

PEERS

CLUBS

MAJOR DEPARMENTS

COLLABORATION

SPORTS

TEAMMATES

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Appendix C. Career Competencies: More than Students, More than Athletes

The ability for student-athletes to translate athletic experiences into career competencies is valuable, but student-athletes may not know how to leverage the career competencies they have gained through sports participation. In addition, student-athlete's time demands may limit access to career support services. This project summarizes the perceived career competencies of student-athletes at Embry-Riddle Aeronautical University (ERAU). Embry-Riddle student-athletes compete in the Sunshine State Conference of the National Collegiate Athletic Association's (NCAA) Division II. Findings from one-on-one interviews with 16 current or past ERAU student-athletes led to the creation of an infographic, containing five word clouds. Among ERAU student-athletes, the word clouds indicate the most commonly perceived career competencies are a) career preparation, b) professionalism, c) communication and d) collaboration. To help ERAU student-athletes further develop their career competencies, a 2-3 minute promotional video will spread awareness about a recently developed app called Career Readiness Challenge (CRC). This work is a part of a larger study titled, Gamified Online Platform to Support Student-Athlete Career Readiness, funded by the NCAA Innovations in Research and Practice Grant Program.

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Career Competencies: More than Students, More than Athletes

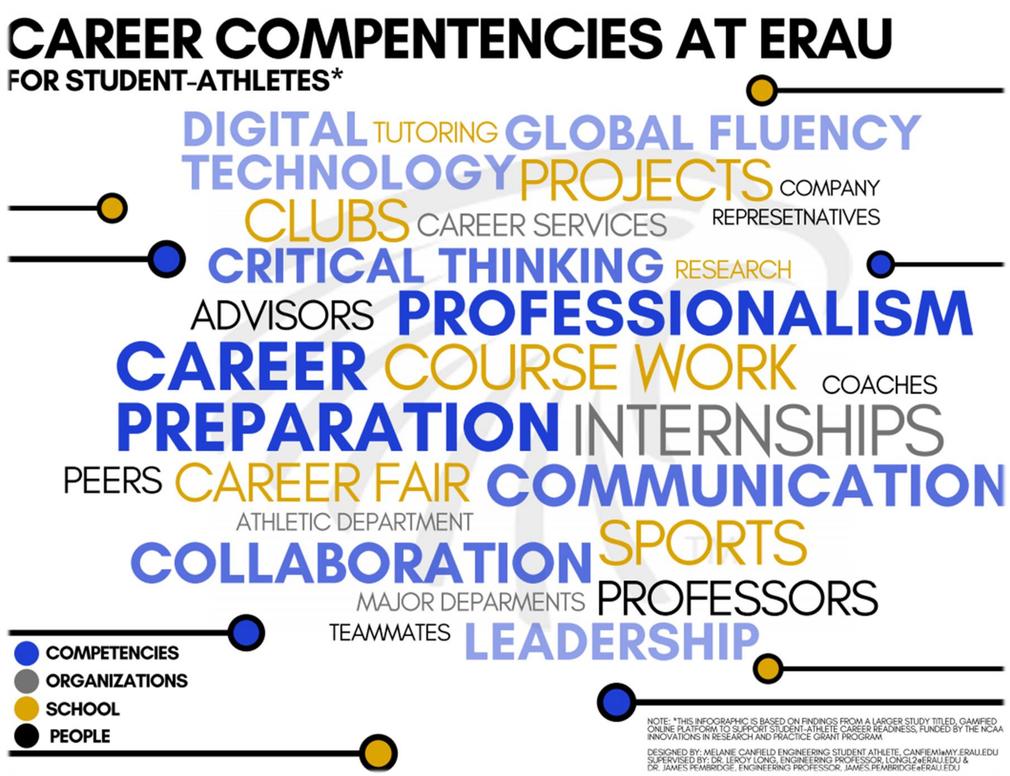
Faculty: Dr. Leroy Long III & Dr. James Pembridge
Student Team: Melanie Canfield, Sydney Jones, Christian Pierre, Olivia Roa

Background

- Ability for student-athletes to translate athletic experiences into career competencies is extremely valuable (Bell, 2018)
- Student-athletes may not know how to leverage the competencies they have gained through sports participation (Bell, 2018)
- Student-athlete's time demands may limit access to career support services (Buzzetta, Lenz & Kennelly, 2017; Brown, Glastetter-Fender & Shelton, 2000)
- This project summarizes the perceived career competencies of student-athletes at Embry-Riddle Aeronautical University (ERAU).

Purpose

- The purpose of this study is to help student athletes further develop their career competencies



Methods

Recruited and interviewed current or prior student athletes to provide background data (primarily women and underrepresented racial and ethic groups)

→ Analyzed data using constant comparison method and determined best methods to obtain career competencies.

Awarded NCAA grant and sent a career readiness survey to specific ERAU athletic teams

→ Development of career readiness challenge through Canvas app

→ Currently conducting interviews on student athletes that completed survey

Findings

- The most commonly perceived career competencies are a) career preparation, b) professionalism, c) communication and d) collaboration.
- The least common perceived career competencies are a) digital technology, b) global fluency, c) critical thinking and d) leadership.

Career Readiness Challenge

- A 2-3 minute promotional video will spread awareness about a recently developed app called Career Readiness Challenge (CRC)
- The app offers tools to help student-athletes prepare for interviews, create resumes, and form expectations for the workforce
- This work is a part of a larger study titled, Gamified Online Platform to Support Student-Athlete Career Readiness, funded by the NCAA Innovations in Research and Practice Grant Program

Participants

- 16 participants
- 13 women & 3 men (1st – 5th year)
- 4 women's sports (basketball, lacrosse, soccer, volleyball)
- 3 men's sports (basketball, lacrosse, track)
- 14 engineering students (aero, civil, mechanical, software) & 2 non-engineering students (human factors)

References

- Bell, L (2018) The Student-Athlete Experience and the Eight Key Elements of High-Impact Practices. Presented at the 2018 FARA Annual Meeting. Baltimore, MD.
- Brown, C., Glastetter-Fender, C., & Shelton, M. (2000). Psychosocial identity and career control in college student-athletes. Journal of Vocational Behavior, 56(1), 53-62.
- Buzzetta, M. E., Lenz, J. G., & Kennelly, E. (2017). Comparing Two Groups of Student-Athletes: Implications for Academic and Career Advising. NACADA Journal, 37(1), 26-36.

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This infographic includes science, technology, engineering, math and medical (STEMM) careers related to sports. The targeted audience for the infographic is college counselors, professors, coaches and student-athletes who pursue STEMM degrees while playing a National Collegiate Athletic Association (NCAA) sport. The infographic may also be useful to K-12 students, parents, teachers and coaches. A job description, average salary, and undergraduate major are listed for a variety of careers such as data scientist, video game designer, sports engineer, sports economist, physical therapist, and mental health clinician.

SCIENCE IN SPORTS

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SPORTS SCIENTIST

- **Improve athlete health and performance**
- **Develop training programs**
- **Perform experimentation and research**

www.sportsengineering.org

MAJOR IN:

Excercise Science
Kinesiology
Exercise Physiology
Biomechanics
Movement Science

AVERAGE SALARY: $59,797

MATERIALS SCIENTIST

- **Research materials**
- **Develop new products**
- **Enhance existing products**
- **Testing and experimentation**

www.owlguru.com

MAJOR IN:

Material Science
Chemistry
Materials Engineering
Chemical Engineering
Mechanical Engineering

AVERAGE SALARY: $73,954

SPORT PSYCHOLOGIST

- **Enhance athlete performance**
- **Develop mental strategies**
- **Help with pressures and stresses of competing**

www.apa.org

MAJOR IN:

Sports Psychology
Psychology
Sports Science
Performance Psychology
Kinesiology

AVERAGE SALARY: $70,000

DATA SCIENTIST

- **Data-analytics problems**
- **Corrects data sets and variables**
- **Devising models and algorithms**
- **Interpreting data to solve problems**

www.discoverdatascience.org

MAJOR IN:

Mathematics
Statistics
Computer Science
Management
Information Systems

AVERAGE SALARY: $72,000

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TECHNOLOGY IN SPORTS

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IoT Architect

- **Control cameras and sensors**
- **Capture accurate and real-time data**
- **Ensure security of the network**
- **Protect data from being hacked**

WWW.dayofstem.org

MAJOR IN:

Computer Science
Computer Engineering
Mechanical Engineering
Electrical Engineering
Unmanned Aircraft Systems

AVERAGE SALARY: $77,798

Video Game Designer

- **Create core features of games**
- **Design characters**
- **Develop goal and plot of games**
- **Engage and entertain players**

www.yourfreecareertest.com

MAJOR IN:

Game Design and Development
Computer Science
Software Engineering
Artifical Intelligence
Design and Development Analysis

AVERAGE SALARY: $62,260

Engineering Technician

- **Solve technical problems**
- **Research and development**
- **Manufacturing and construction**
- **Inspection and maintenance**

www.careercornerstone.org

MAJOR IN:

Engineering Technology

AVERAGE SALARY: $47,916

Biological Technician

- **Collect and test samples**
- **Analyze results of substances**
- **Use lab instrumentation and robotics**
- **Develop computer software**

www.northeastern.edu

MAJOR IN:

Biological Technology
Biology
Science
Life Sciences

AVERAGE SALARY: $51,770

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ENGINEERING IN SPORTS

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Sports Engineer

- **Research of areas in sports**
- **Develop technologies, products, and processes**

www.sportsengineering.org

MAJOR IN:

Mechanical Engineering
Industrial Engineering
Biomechanics
Computer Science
Aeronautical Engineering

AVERAGE SALARY: $85,860

3-D Printing Engineer

- **Develop printing processes**
- **Recommend products to print**
- **Utilize computer-aided design**

WWW.studylink.com

MAJOR IN:

Materials & Chemical Science
Mechanical Engineering
Electronic Engineering
Mechatronics
3D Modelling/Industrial Design

AVERAGE SALARY: $82,633

Biomedical Engineer

- **Develop devices to enhance capabilities**
- **Improve the quality of life for individuals with impairments**
- **Prevent athlete injuries**
- **Enhance performance**

www.bachelorsportal.com

MAJOR IN:

Biomedical Engineering
Biotechnology
Engineering Technology
Molecular Biology
Pharmaceutical Sciences

AVERAGE SALARY: $85,860

Chemical Engineer

- **Solve problems with the use of chemicals**
- **Conduct research in the involvement chemicals in products**
- **Design processes and equipment**

www.ichemeblog.org

MAJOR IN:

Chemical Engineering
Biochemistry
Engineering Technology
Forensic Chemistry
Materials Engineering

AVERAGE SALARY: $104,910

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MATHMATICS IN SPORTS

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SPORTS STATISTICIAN

- **Develop mathematical programs and models to predict outcomes**
- **Recommend changes to increase team success**

www.careerigniter.com

MAJOR IN:
Mathematics
Statistical Analysis
Economics
Computer Science

AVERAGE SALARY: $80,500

SPORTS ECONOMIST

- **Research and solve economic problems**
- **Conduct surveys and collect data**
- **Analyze data using mathematical models, statistical techniques, and software**

www.collegegrad.com

MAJOR IN:
Economics

AVERAGE SALARY: $100,270

MARKET RESEARCH ANALYST

- **Study current economic market conditions**
- **Help sports organizations become aware of potential sales for their products**

www.sports-management-degrees.com

MAJOR IN:
Market Research
Statistics
Mathematics
Computer Science

AVERAGE SALARY: $88,350

OPERATIONS RESEARCH ANALYST

- **Use techniques like optimization, data mining, statistical analysis and mathematical modeling**
- **Develop solutions for organizations to operate more efficiently and cost-effectively**

WWW.money.usnews.com

MAJOR IN:
Mathematics
Operations Research
Statistics
Computer Science
Management Science

AVERAGE SALARY: $81,390

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HEALTH IN SPORTS

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Sports Dietitian

- Individual and team nutrition counseling
- Educate to enhance performance
- Menu development plans
- Analyze outcomes of nutritional services

www.scandpg.org

MAJOR IN:

Sports Nutrition
Nutrition
Kinesiology
Food Science
Dietetics

AVERAGE SALARY: $42,261

Physical Therapist

- Rehabilitate injured athletes
- Diagnose problems
- Evaluate patient progress
- Develop treatment plans

www.landyourlife.com

MAJOR IN:

Kinesiology
Biology
Health Sciences
Athletic Training
Exercise Physiology

AVERAGE SALARY: $82,390

Personal Trainer

- Help create a healthier lifestyles
- Educate about health and fitness
- Achieve clients' personal fitness goals

personaltraineredu.org

MAJOR IN:

Exercise Science
Personal Training
Sports Medicine
Fitness and Health Management
Exercise Physiology

AVERAGE SALARY: $60,136

Chiropractor

- Improve athletic performance
- Improve range of motion and flexibility
- Prevent injuries
- Adjust patient spinal column
- Advise patients on health and lifestyle

www.truity.com

MAJOR IN:

Chiropractic
Human biology
Kinesiology
Exercise Science

AVERAGE SALARY: $68,640

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HEALTH IN SPORTS

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ORTHOPEDIC SURGEON

- **Prevention, diagnosis, and treatment of musculoskeletal disorders and athlete injuries**

www.degreequery.com

MAJOR IN:

Biology
Pre-medicine
Human Physiology
Health Sciences
Chemistry

AVERAGE SALARY: $477,260

PHYSIATRIST

- **Treatment of function and to treat a variety of disorders**
- **Help athletes recover from a previous injury and surgery.**

www.aapmr.org

MAJOR IN:

Physical Therapists
Occupational Therapists
Physician Extenders

AVERAGE SALARY: $230,600

PODIATRIST

- **Work with lower body extremities involving feet, ankles, and lower legs**
- **Diagnose and treat which can lead to surgery**

www.truity.com

MAJOR IN:

Anatomy
Physiology
Pharmacology
Pathology

AVERAGE SALARY: $201,550

MENTAL HEALTH CLINICIAN

- **Provide counseling services**
- **Help athletes over-come fear of performing**
- **Help with anxieties in life**

www.brighter-beginnings.org

MAJOR IN:

Counseling
Psychology
Social Work
Social Science
Sports Psychology

AVERAGE SALARY: $61,800

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