CAREER READINESS CHALLENGE

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

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

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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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
- 44% of participants visited on regular basis
- User type has a strong impact on the types of challenges that are completed.
- High participation by student-athletes closer to graduation

GLOBAL FLUENCY

COLLABORATION

LEADERSHIP

CRITICAL THINKING

DIGITAL TECHNOLOGY

PROFESSIONALISM

COMMUNICATION

CAREER PREPARATION
Career Readiness Challenge: Development of an online platform to support the translation of professional competencies learned through athletic participation to career readiness

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

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 the student-athlete, 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 the student-athlete’s 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.

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?, and
- **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 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 the 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 applications 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 socialiser, 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.


**Career Readiness Challenge**

The Career Readiness Challenge (CRC) was developed as an online platform within the institution's 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 would be provided to the student-athlete through already familiar interfaces.

**CRC Platform Design**

Using the principles of gamification, the CRC was developed to include a progress bar, leaderboards, 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 Error! Reference source not found.).

![Figure 2. Elements of the CRC progress and status](image)
Figure 3. Career Readiness Challenge LMS interface
In order to encourage participation, individual accomplishment and competition across competing teams was encouraged through an individual and a team 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 leader board showed the top five point earners were shown, with the current participant’s points being highlighted. If the participant was not in the top 5, the top five scores were shown, then their points. To ensure FERPA compliance, student names were replaced with randomized initials. The team leaderboard included the names of each team participating in this pilot implementation and the average score of all individuals on that team. The use of average score was intended to encourage inter-team accountability where other team members would encourage full team participation in order to earn the most points.

The challenge board contained three main areas: “Challenge Overview”, “Main Challenges”, and “Bonus Opportunities”. A hexagon shape was selected as the tile for 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 one of the challenges were color-coded and made available by the number of points the participant had 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 that 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 the challenge would appear as an incomplete task.

The challenge board (Figure 3) began with three onboarding activities classified as the “Challenge Overview”. The activities were developed using RISE 360 to ensure an interactive introduction to CRC. These activities included “Introduction” which provided a motivation for why students-athletes should participate in the CRC through a student-athlete produced video, “Rules and Regulations” providing an overview of how students could navigate the CRC platform, submit challenges, and earn points, and “Competencies” which provided an overview
of the NACE career competencies. These purple tiles, along with all other purple tiles were available to access without earning any points.

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>
<thead>
<tr>
<th>Table 1. Point system design for the CRC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Challenge Level</strong></td>
</tr>
<tr>
<td>Purple</td>
</tr>
<tr>
<td>Points needed to access level</td>
</tr>
<tr>
<td>Number of challenges available</td>
</tr>
<tr>
<td>Average point per challenge</td>
</tr>
<tr>
<td>Minimum and maximum points available in level</td>
</tr>
<tr>
<td>Average number challenges needed to advance to next level</td>
</tr>
</tbody>
</table>

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 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.

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 the CRC experience up to that point.
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 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.
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 with a MySQL database backend and runs on a secure LAMP 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.

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 in the larger hive any particular assignment is located as well as the color/level of that assignment. The leaderboard component handles both the individual and team leaderboards. For the team leaderboard, course administrators create groups in the LMS corresponding to each team. The Leaderboard module accesses the group listing and generates the team’s leaderboard. 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 and ran for 7 weeks ending on December 16. After receiving support from their coaches, 6 teams were added to the Canvas course associated with CRC. There was no requirement for the 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 motivated 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 interviews, qualitative interviews, and quantitative participation data from the CRC platform (Table 2).
### Table 2. Summary of Career Readiness Challenge methodology

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

### Participants
The CRC was implemented as pilot to 6 teams. The teams represented three sports with both men’s and women’s teams making a total of three women’s teams 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 team 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, 21% of the participants identified as being non-White, including 12% Black or African American and 3% Hispanic or Latino. In addition, 9% of the participants were international students. Across all sex and race demographics, participants were enrolled at all academic levels of higher education, from first-year students to graduate education. 28% of the participants were first year students, 28% sophomore, 23% junior, 16% senior, and 4% Master’s.

In addition to the CRC participants 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

<table>
<thead>
<tr>
<th>Participation</th>
<th>Total</th>
<th>UK User Type Survey</th>
<th>Pre-CRC Data Collection</th>
<th>CRC Participation (Experimental Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Career Futures Inventory</td>
<td>Career Competencies Survey</td>
<td>Interviews (Fall 2019, N only)</td>
</tr>
<tr>
<td>Control</td>
<td>32% (54)</td>
<td>39% (54)</td>
<td>33% (35)</td>
<td>36% (43)</td>
</tr>
<tr>
<td>Experimental</td>
<td>70% (116)</td>
<td>61% (86)</td>
<td>67% (71)</td>
<td>64% (76)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>49% (88)</td>
<td>40% (56)</td>
<td>43% (46)</td>
<td>39% (46)</td>
</tr>
<tr>
<td>Female</td>
<td>51% (91)</td>
<td>60% (84)</td>
<td>57% (60)</td>
<td>61% (72)</td>
</tr>
<tr>
<td>Athletic Competition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Season</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Out of Season</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>60% (133)</td>
<td>61% (105)</td>
<td>62% (80)</td>
<td>61% (89)</td>
</tr>
<tr>
<td>Non-White</td>
<td>20% (44)</td>
<td>19% (33)</td>
<td>19% (25)</td>
<td>20% (29)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>11% (25)</td>
<td>12% (20)</td>
<td>12% (15)</td>
<td>12% (18)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4% (9)</td>
<td>4% (7)</td>
<td>4% (5)</td>
<td>3% (5)</td>
</tr>
<tr>
<td>Asian</td>
<td>1% (2)</td>
<td>1% (1)</td>
<td>1% (1)</td>
<td>1% (1)</td>
</tr>
<tr>
<td>Native Hawaiian /</td>
<td>1% (2)</td>
<td>1% (1)</td>
<td>1% (1)</td>
<td>1% (1)</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2% (5)</td>
<td>2% (3)</td>
<td>2% (3)</td>
<td>2% (3)</td>
</tr>
<tr>
<td>Did Not Respond</td>
<td>&lt;1% (1)</td>
<td>1% (1)</td>
<td>0% (0)</td>
<td>1% (1)</td>
</tr>
<tr>
<td>Citizenship</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>84% (151)</td>
<td>83% (101)</td>
<td>83% (84)</td>
<td>83% (99)</td>
</tr>
<tr>
<td>International</td>
<td>16% (28)</td>
<td>17% (20)</td>
<td>17% (17)</td>
<td>17% (20)</td>
</tr>
<tr>
<td>Academic Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First-Year</td>
<td>30% (54)</td>
<td>34% (47)</td>
<td>34% (36)</td>
<td>34% (41)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>27% (49)</td>
<td>24% (34)</td>
<td>24% (25)</td>
<td>24% (29)</td>
</tr>
<tr>
<td>Junior</td>
<td>20% (36)</td>
<td>21% (29)</td>
<td>24% (25)</td>
<td>20% (24)</td>
</tr>
<tr>
<td>Senior</td>
<td>18% (33)</td>
<td>18% (25)</td>
<td>15% (16)</td>
<td>18% (21)</td>
</tr>
<tr>
<td>Master’s</td>
<td>4% (7)</td>
<td>4% (5)</td>
<td>4% (4)</td>
<td>4% (5)</td>
</tr>
</tbody>
</table>
Data Collection

Prior to the start of 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 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 range 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 to provide feedback on the 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 to test 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 gender, 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 19 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.

Addressing 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 (white, non-white), 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?, was addressed in quantitative analyses through 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).

At the time that this report was submitted, data on the impacts of the Career Readiness Challenge, RQ3, were being collected and prepared to analyze 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).

Athletic participation was reported to have the strongest impact on the development of competencies associated with Leadership, communication, and 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 7. Student-athlete perception of their ability to demonstrate career competencies](image)

![Figure 8. Student-athlete perception of the contribution that athletic participation has on the development of career competencies](image)

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 these self-perception there were significant differences in perceptions among two groups. Perceptions regarding the 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).

Figure 9. Student-athlete self-perceptions of ability to demonstrate career competencies
Findings from baseline interview data 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 an 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, and work-life balance and relatively positive career outlook (Figure 10). However participants generally noted a neutral perspective on occupational awareness.
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).

This analysis also identified significant interaction effect between sex*race*academic level with respect to “support”, F(2, 25) = 3.40, p=.03. Further examination of the means across the significant demographic factors show that support for career trajectories increases for both white-men and non-white-female participants increase as they near graduation, whereas this support decreases for white-females (Figure 11). The perception of support among non-white-males is highly variable across the academic levels.

![Figure 10. Average score and standard deviation for each construct of the Career Futures Inventory](image)

![Figure 11. Comparison of support among the demographics of race, sex, and academic level](image)
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, 53% of the CRC participants completed at least one of the orientation challenges in the “Challenge Overview” with the remaining 47% never completing a challenge over the seven week duration of the program (Figure 12). 22% of all participants could be considered active participants, who submitted challenges beyond the orientation. 16% of CRC participants ended the program in the grey level, 3% in the blue level, and 3% in the gold level.

![Figure 12. Percentage of participants who finished in each level of the CRC](image)

Despite these relatively low participation numbers, there was more passive participation associated with CRC visits. According to CRC visitation records, 44% of the CRC participants visited the site at least 40% of days throughout the 7 week duration; indicating a visit to the CRC at least every every 3 days (Figure 13). 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 13. Percentage of participants who visited the CRC](image)
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 14). 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 15).

A further analysis of participation at the daily level, in association with key events, explains some of the patterns observed in the observations (Figure 16). The spike in earned points during week 3 can potentially be attributed to a status update that was sent to the participating teams’ coaches during the third week. The sharp decrease in both points earned and visits during week 5 can be attributed to Thanksgiving break and the following decrease in week 6 related to the end of the academic term and finals. Interestingly, the introduction of incentives during week 4 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 returning to the normal levels afterwards. This incentive 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 the 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 2018-2019 academic year with 13% of student athletes attending at least one event and only 5% having visited career services to receive some career support. In comparison, the CRC was able to significantly increase the percentage of student-athletes actively participating in career planning.

![Figure 16. Points earned and percentage of visitors by day and key events](image)

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 17). 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.
Additional analyses of these factors identified a slight correlation \((r = .26, p=.02)\) was observed between points earned and the achiever score, indicating that the higher the achiever score, the higher the points participants earned. This findings confirms some of the theories 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, and 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 indicate that student-athletes who were in-season earned more points \((M=82.4, SD=224.6)\) than those student-athletes that were on in their competition season \((M=31.8, SD=39.1)\).

Female participants \((M=95.1, SD=234.5)\) were also 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 that there is a moderate effect size \((\text{Cohen’s } d=.62)\) associated with perceptions of occupational awareness. In relation to the slight correlation

An examination of the mean points earned by academic level shows that the closer students were to graduation, the more points they earned (Figure 18). 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 identified associated with the significant interaction effect.

**Figure 18.** Average points earned by academic level

**Impacts of CRC Participation**
At the time that this report was submitted, the impacts of CRC participation were still being analyzed. An update to this report will occur after March 1.
References


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.
CAREER COMPETENCIES AT ERAU FOR STUDENT-ATHLETES*

- Digital Tutoring
- Global Fluency Projects
- Technology Collaboration
- Critical Thinking Research
- Advisors Professionalism
- Career Course Work
- Preparation Internships
- Peers Career Fair
- Communication Professors
- Collaboration Sports
- Leadershio Teammates
- Competencies School People
- Organizations
- School
- People

NOTE: *This infographic is based on findings from 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 PREPARATION

COURSE WORK

SPORTS

PROJECTS

STUDENTS

ADVISORS

PROFESSORS

CLUBS

INTERNSHIPS

TUTORING

COACHES

TEAMMATES

MAJOR DEPARTMENTS

CAREER FAIR

CAREER SERVICES

NOTE: *THIS INFOGRAPHIC IS BASED ON FINDINGS FROM 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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PROFESSIONALISM
COURSE WORK
INTERNSHIPS
SPORES
PROJECTS
CLUBS
ATHLETIC DEPARTMENT
COACHES
FAMILY
TUTORING
COMPANY
REPRESENTATIVES
MAJOR DEPARTMENTS
ADVISORS
CAREER SERVICES
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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.

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/
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.

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)

Methods

- Recruited and interviewed current or prior student athletes to provide background data (primarily women and underrepresented racial and ethnic 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

References

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.
### Sports Scientist

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

**MAJOR IN:**
- Exercise Science
- Kinesiology
- Exercise Physiology
- Biomechanics
- Movement Science

**AVERAGE SALARY:** $59,797

### Materials Scientist

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

**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

**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

**MAJOR IN:**
- Mathematics
- Statistics
- Computer Science
- Management
- Information Systems

**AVERAGE SALARY:** $72,000

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ENGINEERING IN SPORTS

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

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

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

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

MAJOR IN:
- Chemical Engineering
- Biochemistry
- Engineering Technology
- Forensic Chemistry
- Materials Engineering

AVERAGE SALARY: $104,910

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NOTE: This infographic is based on findings from a larger study titled, Gamified online platform to support student-athlete career readiness, funded by the NCAA Innovations in Research and Practice Grant Program.
MATHMATICS IN SPORTS

SPORTS STATISTICIAN
• Develop mathematical programs and models to predict outcomes
• Recommend changes to increase team success

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

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

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

MAJOR IN: Mathematics
Operations Research
Statistics
Computer Science
Management Science

AVERAGE SALARY: $81,390

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HEALTH IN SPORTS

SPORTS DIETITIAN

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

**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

**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

**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

**MAJOR IN:**
Chiropractic
Human biology
Kinesiology
Exercise Science

**AVERAGE SALARY:** $68,640

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**HEALTH IN SPORTS**

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

**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.

**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

**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

**MAJOR IN:**
- Counseling
- Psychology
- Social Work
- Social Science
- Sports Psychology

**AVERAGE SALARY:** $61,800

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NOTES:
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