



From Academia
to the Workforce:

CRITICAL GROWTH AREAS FOR STUDENTS TODAY

APLU Series on Employability Skills
in Agriculture & Natural Resources

Pat Crawford
Wendy Fink



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APLU SERIES ON EMPLOYABILITY SKILLS IN AGRICULTURE AND NATURAL RESOURCES

One of the core missions of public universities is preparing students to enter the workforce. Understanding and meeting the needs of employers and the skills future alumni will take with them into the workplace is vital when developing curricula and degree programs.

In 2010, the Association of Public and Land-grant Universities' (APLU) Academic Programs Section (APS)¹ commissioned research on specific employability skills—the nontechnical skills used every day in the workforce to ensure the smooth operation of projects and offices. Then, as now, administrators were responding to concerns from employers about new graduates' skills in leadership, professionalism, teamwork, self-management, decision making, and problem solving and communication. In order to redesign degree program curricula and co-curricular opportunities, administrators wanted to consider specific skills and experiences that could be provided to help students meet employer expectations.

The goal of the research was to provide data-driven insights on employers' needs that administrators and faculty could consider when changing or updating academic programs. Researchers settled on the primary question of “What employability (soft skills) are important for new graduates to succeed in the workplace?” They decided to explore the

question from the viewpoint of four stakeholders: employers, alumni, faculty and students.

Anecdotal evidence supported the idea that employers and faculty might view employability skills differently. The first survey was distributed nationally in 2011 through 31 participating universities and garnered 8,111 responses. The 2011 report on that survey's findings, “*Comparative Analysis of Soft Skills: What is Important for New Graduates?*” (Crawford, Lang, Fink, Dalton, & Fielitz) focused on identifying employability skill priorities. The study employed forced ranking of preferences, a technique used in marketing when all the items on a list are desirable, and the goal is to identify the most desirable (Vanette, 2019). The rankings provide valuable information for decision making when resources are limited, helping to target efforts for maximum effect.

Following release of the 2011 study, several institutions attempted to implement the findings into their curriculum. Additionally, other researchers continued exploring the employability skills identified as most important, including testing teaching methods for targeted skills or looking for disciplinary differences in employability skills.

APLU initiated discussions of a second round of survey work in 2017. The previous employability skills identification and ranking created a solid foundation for a deeper dive into the



gap between importance of selected employability skills of new employees and how well universities were preparing students with those skills. Areas of rising concern included new employees' ability to navigate persistence, ambiguity, change, and conflict in the workplace. These were addressed through open-ended questions.

Again, college faculty and administrators determined that gathering perceptions at a national scale across stakeholder groups was critical to unearthing curricular and co-curricular implications that could be accepted by diverse universities. The survey was distributed in 2018–2019 through 31 APLU member participating universities, Agricultural Futures of America (AFA) and AgCareers.com, garnering 11,428 responses.

This data is collectively presented in two reports. This report, *From Academia to the Workforce: Critical Growth Areas for Students Today*, focuses on the quantitative data and gap analysis. The second report, *From Academia to the Workforce: Navigating Persistence, Ambiguity, Change and Conflict in the Workplace*, is a qualitative analysis of the open-ended questions.

The critical growth areas represent 11 skills out of the 42 identified in the 2011 report. The other 31 skills were not chosen for further study because there was a smaller

preparedness gap in what employers need and what universities are delivering. That is notable and a sign that universities are on the right track. When considering change in the academy, administrators and faculty must be mindful of not losing focus or techniques that are working in support of the other 31 employability skills.

While the study was primarily focused on employers, faculty, alumni, and students from colleges of agriculture, the skills and preparedness gaps are not limited to these academic programs. Employers in the survey represented industry beyond traditional agriculture and natural resources and the skills that were examined are applicable to virtually all fields.

Much remains to be examined, particularly with respect to how to incorporate these results into formal and informal teaching settings. Further, more exploration and collaboration are needed to strengthen the relationships between academia and employers to improve the transition of new graduates to employment.

1. APS is a Section of the Board on Agriculture Assembly, a national organization of public university colleges of agriculture.



SUMMARY OF CRITICAL GROWTH AREAS FOR STUDENTS TODAY

1 Thirty-one APLU member universities, AFA and AgCareers.com participated in the 2018-2019 APLU national survey exploring employability skills for new graduates. A total of 11,428 people representing employers, alumni, faculty and students predominantly in agriculture and natural resources shared their perspectives on the importance and preparedness of new graduates on 11 skills identified as critical growth areas.



31 PARTICIPATING INSTITUTIONS

4 STAKEHOLDER GROUPS

- Students
- Alumni
- Employers
- Faculty

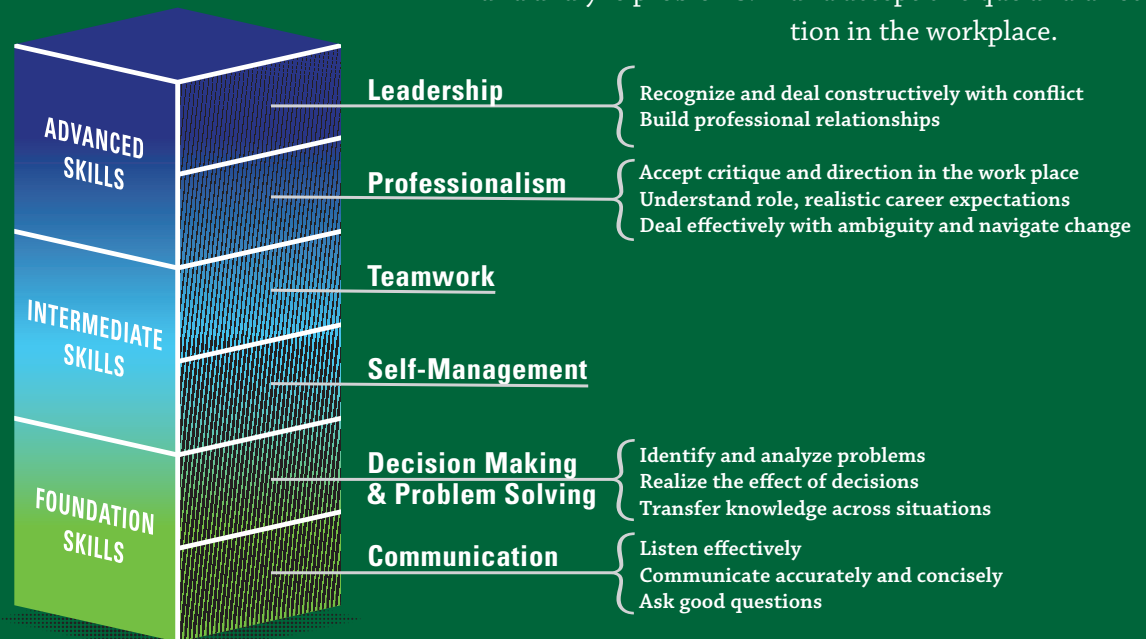


2 The national survey confirmed that all 11 skills selected for this research have statistically significant gaps in skill preparedness and are considered growth areas. All four stakeholder groups — employers, alumni, faculty and students — concurred with this assessment.

3 Of the 11 critical growth areas studied, the employers identified the top three skills most important to them and top three employability skills where graduates are the least prepared (largest preparedness gap).

The top three most important skills are foundational: listen effectively; communicate accurately and concisely; and identify and analyze problems.

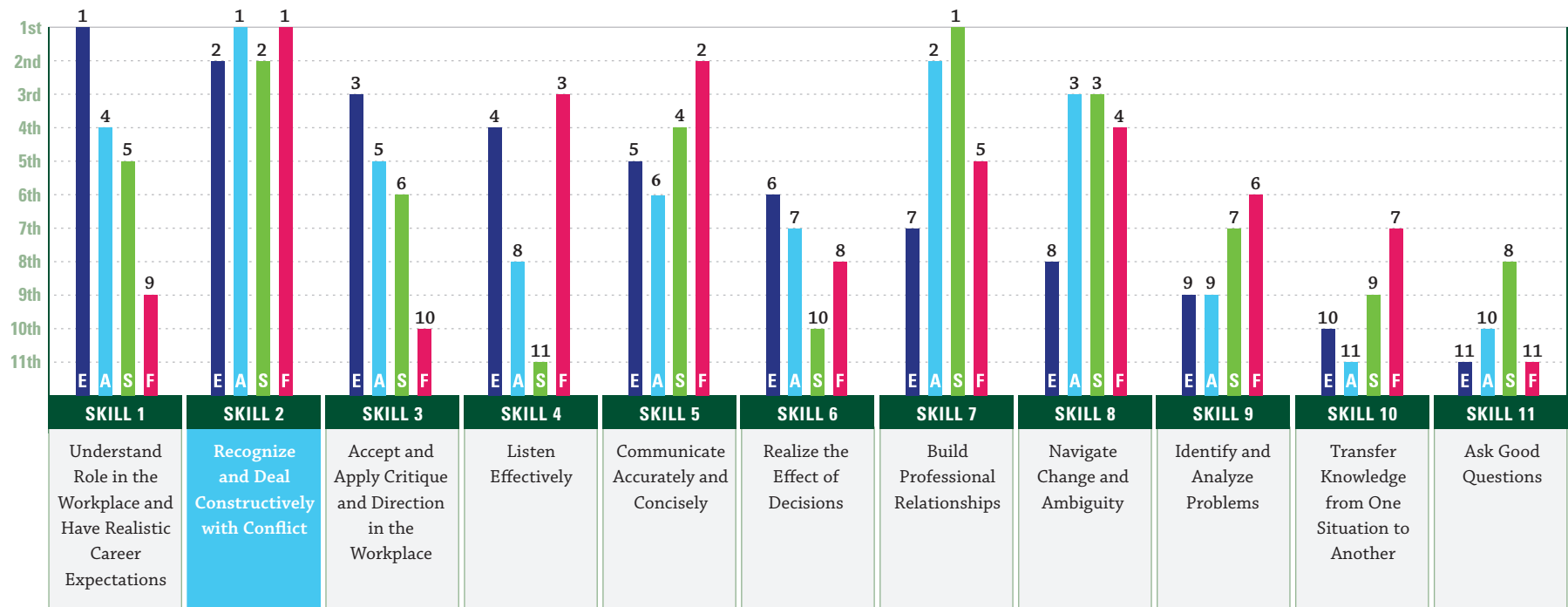
The top three skills with the largest preparedness gap are advanced skills: understand role and realistic career expectations; recognize and deal constructively with conflict; and accept critique and direction in the workplace.



Mean Gap Rank by Stakeholder Group

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

E Employer **A** Alumni **S** Current Students **F** Faculty



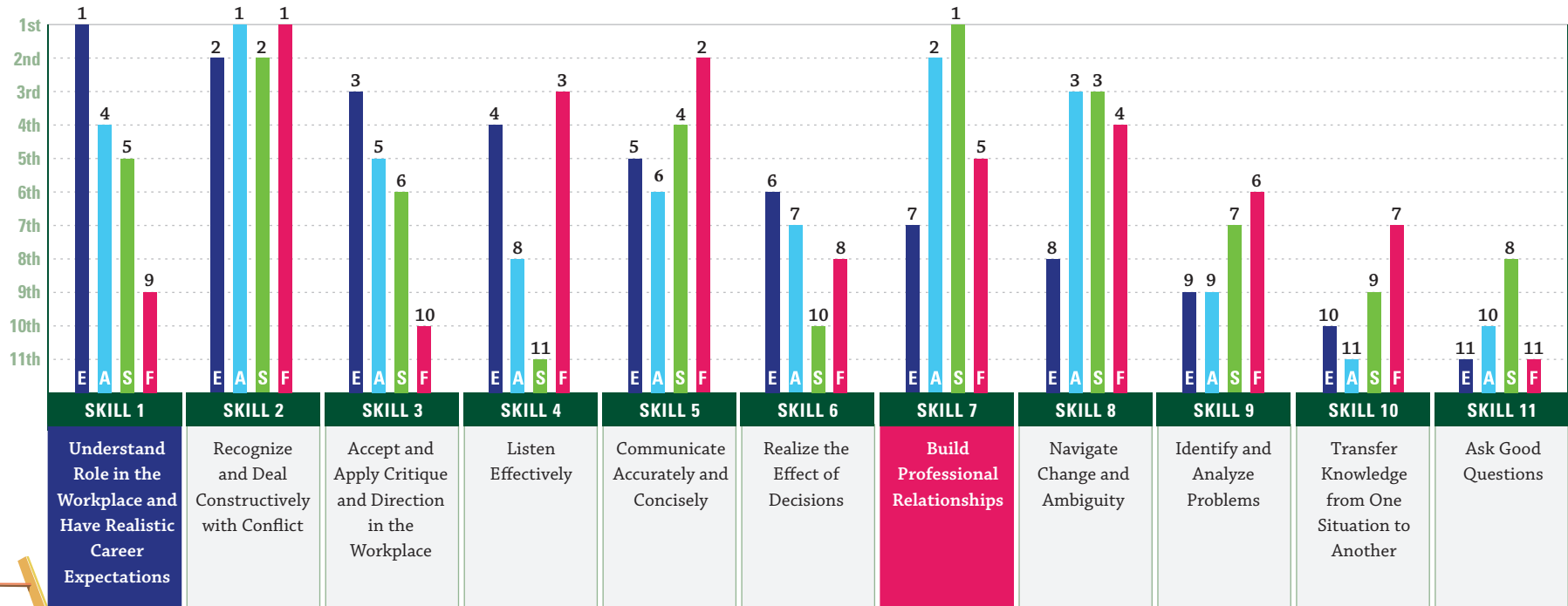
NAVIGATING CONFLICT:
A concern for all stakeholder groups, with a large preparedness gap.

Concern about new employees' preparedness to recognize and deal constructively with conflict came through as a high ranking least prepared skill across employers, alumni, faculty and students. This may connect with the differing sense of the role of a new employee in the workplace. If the expectation of role or influence is higher than is found in reality, this can lead to unanticipated feelings of conflict or frustration. Differences may also be playing into what is identified as conflict. For example, one person could identify a situation as a difference of opinion, while another may perceive the situation to be uncomfortable and categorize the interaction to be conflict.

Mean Gap Rank by Stakeholder Group

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

E Employer **A** Alumni **S** Current Students **F** Faculty



5 ROLE VS. RELATIONSHIPS

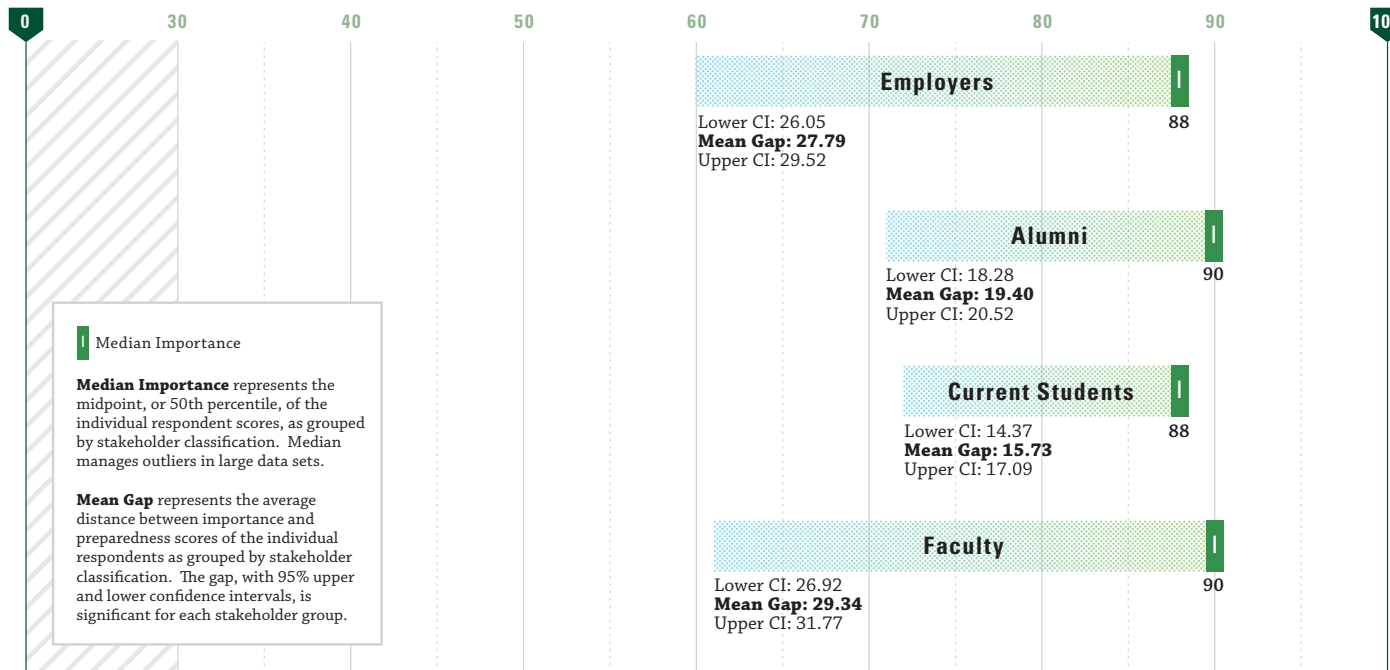
While employers feel the largest preparedness gap is in new employees understanding their role in the workplace, students feel their largest skill gap for entry level employment is in building professional relationships.

This creates a disconnect in perspective between the employer and the new hire. For example, students and new hires want to know how to connect socially and find a mentor, while the employer is focused on clarifying the role and tasks that are deemed appropriate for a new employee.



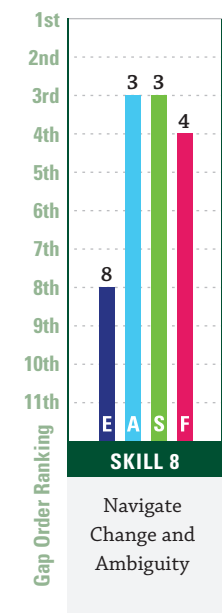
SKILL 8 Navigate Change and Ambiguity

Median Importance with Mean Importance-Preparedness Gap Confidence Intervals



Median Importance represents the midpoint, or 50th percentile, of the individual respondent scores, as grouped by stakeholder classification. Median manages outliers in large data sets.

Mean Gap represents the average distance between importance and preparedness scores of the individual respondents as grouped by stakeholder classification. The gap, with 95% upper and lower confidence intervals, is significant for each stakeholder group.



6

The sense of being underprepared in navigating change and ambiguity is significant for all the participants. Alumni, students and faculty place a higher gap ranking (3rd, 3rd and 4th respectively in bar chart) on the ability to navigate change and ambiguity than employers where it fell to the 8th spot. This represents another vital disconnect between the employer and the new hire. Employers place navigating change and ambiguity

in the lower third of their rankings of importance and preparedness gap. In academia, including the entire K-12 system, students receive a high level of direction, continuous feedback, and use of rubrics for setting expectations and evaluation. This level of information decreases dramatically when entering the workplace as new employees are expected to function with a certain level of independence.

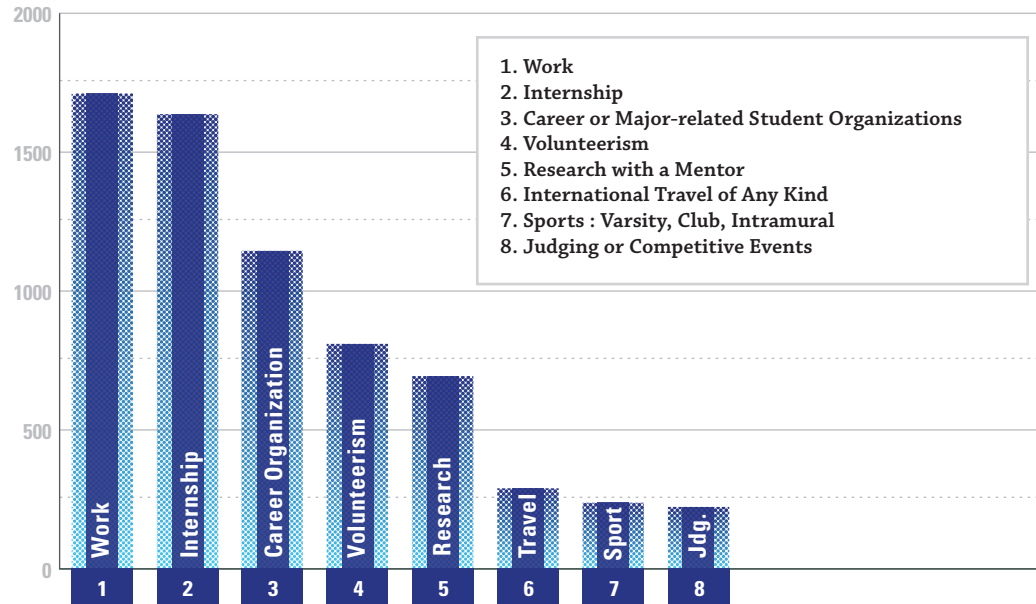




Employers and faculty identify the same top eight activities as important for developing employability skills outside the classroom. Employers are looking for these activities on resumes, and faculty feel these activities build employability skills. Activities identified as useful in building skills are: work, internships, career- or major-related student organization, volunteerism, research with a mentor, international travel of any kind, varsity and club or intramural sports, and judging or competitive events. While many students and alumni report engaging in these activities while they are in college, those who do not should be encouraged to join in such activities.

Activities to Build Employability Skills - Employer Response Frequency

Employer top college activities looking for on a resume. Total Frequency of Activities Selected: 7845



This study focused on 11 skills out of the 42 identified in the 2011 report. The other 31 skills were not chosen because there was a smaller preparedness gap in what employers need and what universities are delivering. This is notable and a sign that universities are on the right track. When considering change in the academy, university leaders should be mindful of not losing focus or techniques that are working in support of the other 31 employability skills.

VIEW EMPLOYABILITY SKILLS NAVIGATING IN THE WORKPLACE:
www.aplu.org/Employability-Skills-Navigating-in-the-Workplace

VIEW EMPLOYABILITY SKILLS CRITICAL GROWTH AREAS:
www.aplu.org/Employability-Skills-Critical-Growth-Areas

VIEW THE EMPLOYABILITY SKILLS EXECUTIVE SUMMARY:
www.aplu.org/Employability-Skills-Executive-Summary

VIEW THE 2011 REPORT:
www.aplu.org/Comparative-Analysis-of-Soft-Skills

OVERVIEW OF THE 2011 REPORT:

Comparative Analysis of Soft Skills: What is Important for New Graduates? Perceptions of Employers, Alum, Faculty and Students

(Crawford, Lang, Fink, Dalton & Fielitz)

The inquiry began in 2010 with agriculture and natural resource members of the Association of Public and Land-grant Universities (APLU) asking the question, “what employability/soft skills are important for new graduates to succeed in the workplace?” There was anecdotal evidence that university and employer perspectives would lead to different answers. As the conversation progressed, it was decided to explore the question from the viewpoint of multiple stakeholders: employers, alumni, faculty and students. The first survey was distributed nationally in 2011 through 31 participating universities and garnered 8,111 responses. The 2011 report, “*Comparative Analysis of Soft Skills: What is Important for New Graduates?*” (Crawford, Lang, Fink, Dalton, & Fielitz) focused on identifying employability skill priorities. A goal of the work was to provide data driven insights on employer employability skill priorities to academic unit administrators and faculty for consideration in developing curricular change. Forced ranking of preferences is a marketing technique used when all the items on a list are desirable, and the goal is to identify the most desirable (Vanette, 2019). The rankings provide valuable information for decision making when resources are limited, helping to target efforts for maximum effect.

The 2011 survey covered six areas:

1. Ranking of skill type importance across employability skills, discipline knowledge, discipline technical skills, and project management skills.
2. Preparedness ratings of employability skills, discipline knowledge, discipline technical skills and technology skills.
3. Employability skill rankings of seven employability skill clusters and descriptive characteristics within each employability skill cluster.
4. Ranking of learning environment effectiveness across guided, active learning environments and self-directed, informal learning experiences.
5. Rating of who is responsible for employability skill training between academia, employers and shared responsibility.
6. Open-ended responses about the skills they did, and did not, learn while in college.

The 8,111 respondents to the survey, included 2,699 students, 898 faculty, and 4,266 alumni, and 291 employers.

Employers and alumni rated employability skills as the most important of disciplinary knowledge, technology skills and employability skills, while faculty and students rated discipline knowledge as most important. Students consistently perceived their employability skills set to be much more prepared for the workplace than did employers perceive that of new college graduate hires, while the opposite was true for technology skills.



Table 1: Employability/Soft Skill Ranking by Employers (2011)

1. COMMUNICATION SKILLS:

- Listen effectively
- Communicate accurately and concisely
- Effective oral communications
- Communicate pleasantly and professionally
- Effective written communications
- Ask good questions
- Communicate appropriately and professionally using social media

2. DECISION MAKING / PROBLEM SOLVING SKILLS:

- Identify and analyze problems
- Take effective and appropriate action
- Realize the effect of decisions
- Creative and have innovative solutions
- Transfer knowledge across situations
- Engage in life-long learning
- Think abstractly about problems

3. SELF-MANAGEMENT SKILLS:

- Efficient and effective work habits
- Self-starting
- Well-developed ethic, integrity and loyalty
- Sense of urgency to complete tasks
- Work well under pressure
- Adapt and apply appropriate technology
- Dedication to continued professional development

The employability skill clusters and descriptive characteristics were derived from a pile-sort cluster analysis of the skills identified through a literature review. (See Appendix 1: Bibliography of 2011 employability skills literature used in the analysis to develop employability skill clusters and characteristic.)

The employability skill findings, organized in rank order of employers, are: 1. Communications, 2. Decision-Making/ Problem-Solving, 3. Self-Management, 4. Teamwork, 5. Professionalism, 6. Experiences, and 7. Leadership. The complete listing, with descriptive characteristics, is provided in table 1.

Communication ranked as the most important employability skill cluster across all the stakeholder groups. Employers ranked communication, decision-making, and self-management as the top three skill clusters. Within communication, 31% of the employers ranked listening as the most important attribute for new employees. *Oral communications* ranked higher than *written communication* for all groups, while faculty valued written higher than any of the other groups.

In the Decision-making cluster, *identifying problems* and *taking appropriate action* ranked the highest for all groups. Employers ranked *realizing the effect of decisions* third, while faculty ranked the ability for *creative and innovative solutions* as third. *Effective work habits* are the highest self-management characteristic as ranked by employers. Students ranked *self-starting*, a characteristic of the self-management cluster, lower than employers, faculty and alumni. *Productivity, a positive attitude* and *meeting deadlines* are the top three ranked characteristics for teamwork. Just over half of the employers ranked a positive attitude as 1st or 2nd in their individual ranking within the teamwork cluster.

The professionalism cluster ranked 5th overall for employers, while the students placed it 7th, putting it at the end of the skill clusters. The top two characteristics included *managing effective relationships with customers* and *accepting critique and direction in the workplace*. The 6th and 7th clusters in the employer ranking were experiences and leadership.

4 . TEAMWORK SKILLS:

- Productive as a team member
- Positive and encouraging attitude
- Punctual and meets deadlines
- Maintains accountability to the team
- Work with multiple approaches
- Aware and sensitive to diversity
- Share ideas to multiple audiences

5. PROFESSIONALISM SKILLS:

- Effective relationships with customers, businesses and the public
- Accept critique and direction in the workplace
- Trustworthy with sensitive information
- Understand role, realistic career expectations
- Deal effectively with ambiguity
- Maintain appropriate decorum and demeanor
- Select mentor and acceptance of advice

6. EXPERIENCES:

- Related work or internship experiences
- Teamwork experiences
- Leadership experiences
- Project management experiences
- Cross disciplinary experiences
- Community engagement experiences
- International experiences

7. LEADERSHIP SKILLS:

- See the “big picture” and think strategically
- Recognize when to lead and when to follow
- Respect and acknowledge others’ contributions
- Recognize and deal constructively with conflict
- Build professional relationships
- Motivate and lead others
- Recognize change is needed and lead the change effort

While the 2011 soft skill (employability skill) rankings are forced to reveal priorities when choices are required, it is important to emphasize that all the skills are important. The rank order can be considered as representing a growth order of skills progressing from foundational skills, such as *communication*, through intermediate skills, such as *teamwork*, and culminating with advanced skills, such as *leadership*.

When asked about learning environment effectiveness, all the stakeholder groups ranked guided, active learning as the most effective. These included internships, co-curricular activities, experiential and active learning (collaborative, problem-based and cross-disciplinary learning). Employers and faculty ranked traditional classroom environments third, while students and alumni prefer extra-curricular activities over the classroom. Fifty-five percent of the survey respondents agreed that

responsibility for training new graduates in the needed employability skills is shared between universities and employers.

In response to open-ended questions about the most important things they learned in college, an alum shared, “the most important thing I learned was that you need to understand who your audience is in whatever you are doing.” Another alum shared that they did not learn that “not all you need to learn is in books. You’re going to fail sometimes and it’s OK.”

The findings were distributed as plenary presentations at the 2011 APLU Academic Programs Summit, the 2011 AgCareers.com North American AG HR Roundtable, and the 2012 University-Industry Consortium. The final report is publicly accessible on the APLU website at: www.aplu.org/Comparative-Analysis-of-Soft-Skills



HOW THE 2011 REPORT IS USED BY OTHERS AND CURRENT LITERATURE ON EMPLOYABILITY SKILLS

Since the 2011 study, the discussion and research on employability skills for new graduates has continued, with the APLU study findings being cited as a fundamental source to base further research. The report has 137 unique citations (identified through Google Scholar, 20 June 2020) and has been cited by international educators and researchers from United Kingdom, Poland, Spain, Australia, South Africa, China, Indonesia, and Croatia.

Summary of How the 2011 Report is Used by Others

Overall, the original APLU Employability Skills study by Crawford, Lang, Fink, Dalton, and Feilitz (2011) has been used in a variety of ways to progress employability skills research and lead to more effective university programs. The findings have been the basis for numerous studies looking to better prepare university students for the workplace. Although the research originally focused on the field of agriculture, and is still used within that field, several other fields have adopted the findings to apply to their own disciplines, or used the model in a way to conduct similar research within a given specialty.

Most research conducted based on the original APLU findings has focused on how to improve curriculum to meet the needs of

employers by incorporating employability skills training into coursework, rather than teaching a class specifically focused on one or two skills. Several teaching methodologies have been tested and found to develop employability skills in the classroom, focusing especially on communication, decision making/problem solving, and leadership. While communication and decision making/problem solving tend to be mentioned as the top skills desired by employers and those that researchers are trying to develop, the majority of studies tried to develop or identify many of the skills identified in the original APLU study. Numerous teaching methodologies have been recommended as ways to improve current university program practices.

Though much research remains to further hone the best ways to teach employability skills to university students, the APLU research has thus far played a role in advancing knowledge and practice. A summary of how the study has been used is provided in Appendix 2: How is the 2011 Employability Skills Report is Used by Others.

Summary of Current Literature on Employability Skills

The need for university to prepare graduates with employability skills is real and current. A 2017 survey of 200 campus career service centers including 3,370 employers from a diverse range of professions by the Career Services Network & Collegiate Employment Research Institute (2017) revealed that 82% of respondents had hired a new college grad in the last year and similar numbers planned to do so within a year. They generally viewed the college labor market as good to excellent, but still faced some challenges. In ranking the challenges of recruiting in the college labor market from 1 to 11, students lacking the

right employability skills (cited as problem solving, interpersonal, communication, and teamwork) ranked as the biggest or second biggest challenge overall when comparing challenges by organization size. Competition from other employers as the other highest for all employers except for organizations with less than 50 employees.

To make the hiring process more effective and to quickly identify the skills employers want from their workforce, hiring software has been developed to select candidates based on employability skill competencies (including professionalism, interpersonal skills, problem solving and adaptability, personal value commitment, managing others, and leadership) and past work performance. The software argues that hiring managers tend to “go with their gut” and rely on tools such as self-reported personality tests and general feedback rather than specific task performance (SkillSurvey, 2015).

The internet and bloggers have attempted to teach new hires how to successfully use employability skills at work. Career readiness blogs highlight how to be a “professional” at work and the other employability skills of communication, teamwork, self-management, decision-making, and problem solving that go with professionalism (Green, 2013).

New graduates face a lot of competition and increasingly challenging hiring expectations when entering the workforce. Employability skills are highly desired by employers, resulting in a demand on universities to actively incorporate employability skills training into their curriculum.

A summary of current literature is provided in Appendix 3: Summary of Current Employability Skills Research.

Peer Review Publications Providing Additional Perspectives of the 2011 Data Set

The 2011 report focused on a macro-level look at the data. Three deeper dives into the data provided in-depth examinations of skill priorities across stakeholders within a discipline, comparing across the seven main fields represented in the survey population, and a review of the full data set divided by gender.

A focus on stakeholder differences in skill priorities was conducted focusing on landscape architecture and allied professions (Crawford & Dalton, 2014). The majority of significant differences were between students and employers. The employers ranked skills at the foundational level (communication, self-management, teamwork and decision-making) statistically significantly higher than the students. The students placed a significantly higher priority on the advanced skills of professionalism and leadership skills.

A comparison of soft skill priorities between the built environment fields and the seven other fields represented in the survey population (Crawford & Dalton, 2016) revealed few statistically significant differences. The built environment professions emphasized asking good questions, creative and innovative solutions and cross-disciplinary experiences and international experiences higher than the other fields.

A comparative exploration of how men and women prioritize the employability skills (Dalton, Crawford, Weiss, Fink, 2018) generated insights into gender differences in preferred work environment. The differences between women and men surfaced in the intermediate and advanced skills of teamwork through leadership. “Skills that foster connecting and building – across contexts, people and knowledge – were prioritized by women. Skills that foster standing out and achieving work goals – individual strengths, being heard, and seeing the big picture – were prioritized by men.” (p.305).



FROM ACADEMIA TO THE WORKFORCE:

Emerging Growth Areas for Students Today

In 2017 APLU felt it was time to re-examine employability skills as a focused curricular topic. A sub-committee was formed consisting of APLU member university representatives, AgCareers.com, National FFA Organization and the social science researcher from the 2011 survey.

At a meeting in Georgia, the team came to consensus that the employability skills identification and ranking (Crawford et al, 2011) created a solid foundation for a deeper dive into the gap between importance and preparedness of selected employability skills of new employees. Again, it was determined that gathering perceptions at a national scale across stakeholder groups was critical to unearthing curricular implications that would be accepted by diverse universities.

While it was important in the 2011 survey for respondents to rank all the clusters and characteristics within clusters to gain a sense of importance over the full spectrum of skills, the resulting length was a weakness of the survey design. For the 2018 survey, the team agreed that focusing on fewer skills would yield valuable information for focusing the conversation on employability skills and academic curricula.

APLU 2018 SURVEY SUBCOMMITTEE

Nancy Barcus, COO, Agriculture Future of America (AFA)

Joel Brendemuhl, Associate Dean, College of Agricultural & Life Sciences, University of Florida

Cathy Carr, Alumni and Career Services, College of Agricultural and Life Sciences, University of Florida

Pat Crawford, Director, School of Design, College of Arts, Humanities & Social Sciences, South Dakota State University

Wendy Fink, Executive Director, Academic Programs Section, APLU

Tracy Hoover, Associate Dean for Undergraduate Education, College of Agricultural Sciences, The Pennsylvania State University

Kelly Millenbah, Associate Dean, Academic & Student Affairs, College of Agriculture & Natural Resources, Michigan State University

Erika Osmundson, Director of Marketing and Communications, AgCareers.com

Kasee Smith, Assistant Professor, Ag & Extension Education, College of Agriculture & Life Sciences, University of Idaho

Mark Stewart, President and CEO, Agriculture Future of America (AFA)

Susan Sumner, Associate Dean and Director, College of Agriculture and Life Sciences, Virginia Polytechnic Institute and State University

Brian Warnick, Associate Dean for Academic Programs, College of Agriculture, Utah State University

Christine White, Chief Program Officer, National FFA Organization



Identifying the Critical Growth Areas

Determining which skills to focus on for the new study was derived from a review of three sources: 1) skills identified in the 2011 survey and committee discussions, (skills listed in table 1), 2) data mining and coding of the 2011 open-ended questions about which skills respondents did not learn while in University (Smith, 2017) and 3) a targeted dean and employer survey with academic associate deans and employers ranking the importance and preparedness of the 2011 skills.

OPEN-ENDED RESPONSE ANALYSIS: EMPLOYABILITY SKILLS NOT LEARNED IN COLLEGE

In 2017, Kasee Smith conducted a content analysis of the “Employability Skills Not Learned in College” response set. The open-ended responses yielded similar frequencies to the rank scores noted in the quantitative analysis. Of the 5,897 data points coded, 5,381 related to the employability skills. Two new areas for preparing new graduates for entry into the workforce were identified. First, identifying opportunities and learning about hiring procedures, and second, to acquire an understanding of basic business structure and components.

The top eleven skills identified as not learned in college included:

1. Identify career opportunities and hiring procedures.
2. Recognize and deal constructively with conflict
3. Productive as a team member
4. Motivate and lead others
5. Build professional relationships
6. Maintain appropriate decorum and demeanor
7. Understand role and realistic career expectations
8. Communicate pleasantly and professionally
9. Effective relationships with customers, businesses and the public
10. Effective oral communications
11. Understand basic business structures and components

TARGETED DEAN AND EMPLOYER SURVEY AND BORICH GAP ANALYSIS TOOL

A targeted dean and employer survey with academic associate deans and employers rating the importance and preparedness of the 2011 skills was conducted in 2017 (Michigan State University IRB exempt 17-1029). The survey included all the employability skill clusters except the Experience cluster. The Experience cluster was removed as its focus is on ways of learning employability



skills rather than the specific employability skills themselves. The respondents (n=25) included 13 associate deans and 12 employers selected from across the US for regional and sector diversity.

Committee members Brian Warnick and Kasee Smith provided expertise for use of the Borich Gap Analysis tool to identify skill gaps. The Borich Model was created to collect data that can be weighted and ranked to inform decision making for program improvement (Borich, 1980). The mean weighted discrepancy score takes into account importance of the skill and size of gap to determine the most important employability skills for consideration of inclusion in the national survey.

Using the Borich model, the importance score is subtracted from the preparedness score to calculate the discrepancy score (DS) for each respondent. The discrepancy score is divided by the population (n) to find the individual weighted discrepancy score (WDS). Then, the sum of WDS is divided by population (n) to determine the mean weighted discrepancy score (MWDS) for the group.

The survey was distributed on-line using Qualtrics with a slider scale response format for importance and preparedness of each skill (Figure 1).

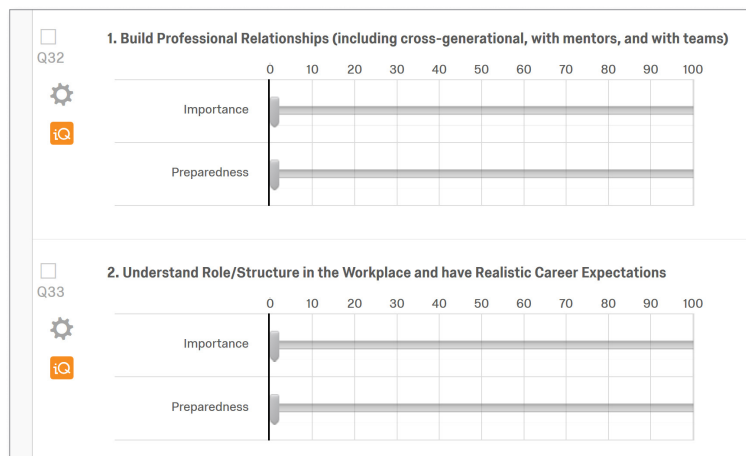


Figure 1: Slider Response Scale

The top 15 importance – preparedness mean weighted discrepancy scores for employers, in rank order, included:

1. Realize the effect of decisions
2. See the “big picture” and think strategically
3. Transfer knowledge from one situation to another
4. Recognize and deal constructively with conflict
5. Communicate accurately and concisely
6. Creative and innovative solutions
7. Asks good questions
8. Identify and analyze problems
9. Select appropriate mentor and acceptance of advice
10. Accept and apply critique and direction in the workplace
11. Efficient and effective work habits
12. Take effective and appropriate action
13. Listen effectively
14. Build professional relationships
15. Dedication to continued professional development

The top 15 importance – preparedness mean weighted discrepancy scores for academic associate deans, in rank order, included:

1. Effective written communication
2. Communicate accurately and concisely
3. Accept and apply critique and direction in the workplace
4. Communicate pleasantly and professionally
5. Recognize and deal constructively with conflict
6. Trustworthy with sensitive information
7. Effective relationships with customers, businesses and the public
8. Deal effectively with ambiguity
9. See the “big picture” and think strategically



10. Aware and sensitive to diversity
11. Build professional relationships
12. Effective oral communication
13. Communicate appropriately and professionally using social media
14. Recognize change is needed and lead the change effort
15. Maintain accountability to the team.

The open-ended question, “Are Universities providing the needed employability skills training?” provided some insights into burgeoning areas of concern for faculty and employers, as well as, potential disconnects around expectations of new graduates, employers and educators.

An academic responded,
“Experiencing failure is one of the best ways to learn these skills and many students that we see have rarely been presented with that concept or feeling while growing up.”

An employer stated,
“Most employers don’t expect graduates to light the world on fire with strategic thinking and ground-breaking innovative ideas... most are just looking for loyal, grounded, hard-working individuals who can work well with others...”

SELECTING THE SKILLS FOR INCLUSION IN THE NATIONAL SURVEY

From a review and committee discussion of the three sources, eleven skills were identified as important and with potential gaps in preparedness to include in the national survey. Thirty-one skills were not included for further investigation in the national survey. This was due to smaller gap sizes or lack of agreement on perceived gap between the academic and employer stakeholder groups. Table 2 shows the selected skills and the associated 2011 skill clusters.

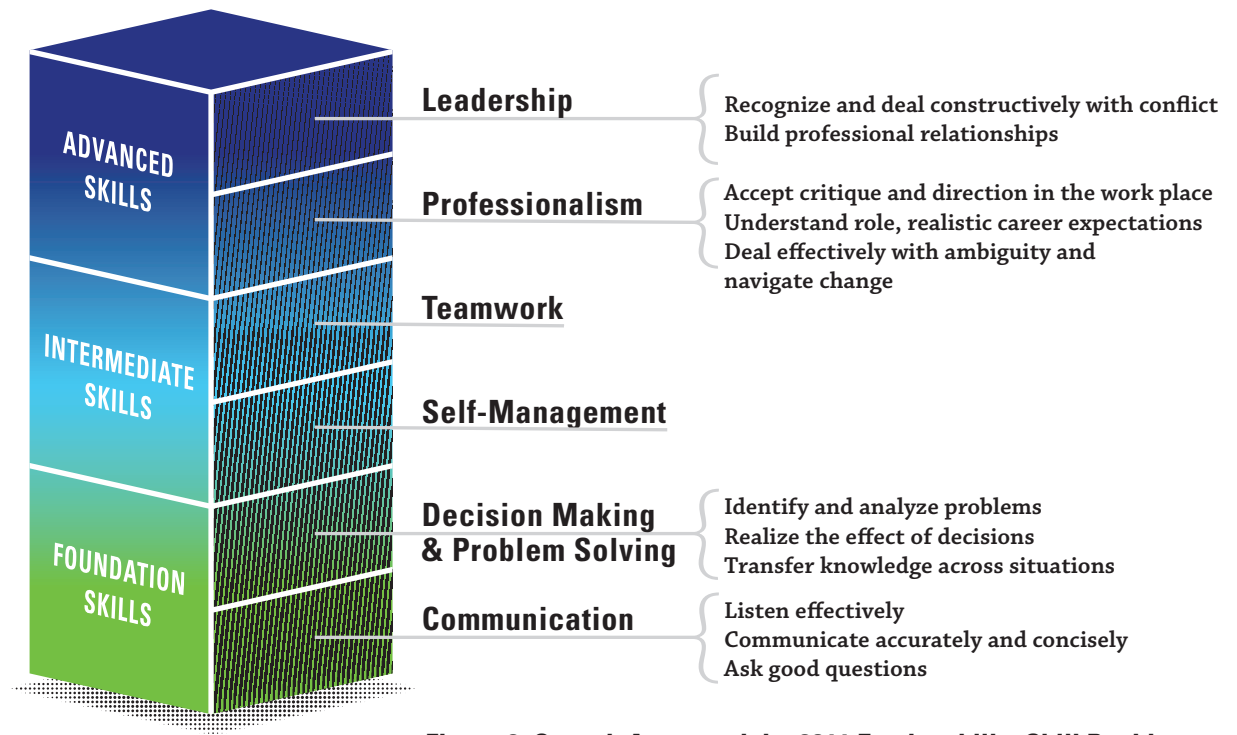


Figure 2: Growth Areas and the 2011 Employability Skill Ranking



Two skills (identified as bold in table 2) selected were in the top “skills not learned in college”, and the top skill gaps identified in the targeted dean and employer survey for both academic and employers:

1. building professional relationships
2. deal constructively with conflict.

The next two skills (identified with ** in table 2) selected ranked in the targeted dean and employer survey top 10 gaps for academics and employers:

3. communicate accurately and concisely
4. accept and apply critique and direction in the workplace.

The next four skills (identified with * in table 2) selected were from the top eight of the employer targeted dean and employer survey gap ranking:

5. asks good questions
6. realize the effect of decisions
7. identify and analyze problems
8. transfer knowledge from one situation to another

One skill (identified with + in table 2) was included because it received an “overprepared” rating by academics and “underprepared” by employers:

9. listen effectively.

The tenth skill (identified with ^ in table 2) was selected for inclusion as representing issues of understanding workplace role and structure identified in the Smith (2017) analysis of skills not learned in college:

10. Understand role/structure in the workplace and realistic career expectations.

Table 2: Employability Skills Identified as Critical Growth Areas and the Associated 2011 Skill Clusters

	Skills	2011 Study Skill Cluster
1	Listen Effectively +	communication
2	Communicate Accurately and Concisely **	communication
3	Ask Good Questions *	communication
4	Realize the Effect of Decisions *	decision making
5	Identify and Analyze Problems *	decision making
6	Transfer Knowledge from One Situation to Another *	decision making
7	Understand Role/Structure in the Workplace and Realistic Career Expectations ^	professionalism
8	Accept and Apply Critique and Direction in the Workplace **	professionalism
9	Build Professional Relationships (including cross-generational, with mentors, and with teams)	professionalism
10	Recognize and Deal Constructively with Conflict	leadership
11	Navigate Change and Ambiguity ^^	(new)



A final eleventh skill (identified with ^^ in table 1) was added from committee discussions, though ambiguity was in the original 2011 survey:

11. Navigate change and ambiguity

The critical growth areas selected for the national survey represent characteristics in the two base skill clusters, (communication and decision-making) and the two advanced skill clusters, (professionalism and leadership). (Figure 2). All of the skills, with the exception of listening, received lower preparedness ratings than importance ratings for both academics and employers. This is not surprising, as new graduates have much to learn as they transition from academia to the workforce.

The 31 skills not selected, including the middle developmental levels of self-management and teamwork, represented smaller gaps in preparedness. This is being interpreted as a reasonable level of preparedness for a new graduate. Another perspective is these 31 skills are perceived as less pressing than the eleven identified for further study.

Survey Development and Distribution

The on-line survey was created using Qualtrics Survey Software and the research protocol was been approved through Michigan State University (STUDY00000176) and South Dakota State University (19030015-EXM) IRB boards. The APLU Survey Committee reviewed several drafts of the survey question content and pilot tested the Qualtrics tool for functionality.

Agriculture and natural resources college members of APLU and the Non-land-grant Agriculture and Renewable Resources Universities (NARRU) were invited to participate in the national survey. Thirty-one universities participated, including:

1. Arkansas Tech University
2. Clemson University
3. Cornell University
4. Kansas State University
5. Louisiana State University and Agriculture & Mechanical College
6. McNeese State University
7. Michigan State University
8. Montana State University
9. Murray State University
10. North Carolina A&T State University
11. North Carolina State University
12. Northwest Missouri State University
13. Oklahoma State University
14. Oregon State University
15. Purdue University
16. South Dakota State University
17. Stephen F. Austin State University
18. Texas Tech University
19. The Ohio State University
20. The Pennsylvania State University
21. The University of Georgia
22. The University of Rhode Island



23. The University of Tennessee, Knoxville
24. University of Arizona
25. University of Arkansas
26. University of Florida
27. University of Maryland, College Park
28. University of Nebraska-Lincoln
29. University of Nevada, Reno
30. University of Wisconsin, Madison
31. Virginia Polytechnic Institute & State University

To increase employer participation, requests for participation were also sent by APLU, AFA and AgCareers.com to their employer networks.

Participants distributed unique survey links to their respective stakeholder groups (alumni, students, faculty and employer contacts) through an email invitation to participate. A draft text was provided for each institution to customize for their audiences.

Draft invitation letter:

Dear [univ name - alumni/students/
faculty/employers]

We are asking for your assistance to help us understand critical 21st Century employability skills. This is part of a nationwide survey with the Association of Public and Land-grant Universities (APLU). Your responses will inform educational practices at [univ name] and across the US.

The survey link is provided below and will take about 15 minutes. Questions are organized into three sections:

1) learning a little bit about your background,

2) your assessment of the importance and preparedness of 11 critical employability skills for students today; and

3) ideas about how students can better prepare for persistence, ambiguity, change, and conflict in the workplace.

[customized link]

Responses tended to come in within 48 hours of the initial email invitation and sending a second email reminder was encouraged to boost participation. For the 31 universities participating, the mean number of responses was 355, with a range of 46-1,289.

Respondent Demographics: Stakeholder Group, Race, Gender, Generation (Age), and Education

Valid responses were received from 11,428 respondents across the stakeholder groups: 2,743 employers, 4,800 alumni, 1,371 faculty, and 2,514 students. Each of the stakeholder groups (employers, alumni, faculty and students) has a unique and experientially positioned perspective from which they view employability skills for new graduates. Respondents self-identified the perspective from which they would answer the survey questions. For example, when a person received the survey invitation because of their alumni status with a university, and in their work-life they are an employer of new graduates, they could self-select which perspective they would use in the survey – alumni or employer.

Race descriptors included 88% selecting white and 12% selecting across the multiple descriptors of American Indian or Alaska Native, Asian, Black or African American, Hispanic/Latino,



	Alumni	Student	Employer	Faculty	Total
Before 1946	3.7%	0.1%	1.3%	0.6%	5.7%
1946 - 1964	11.5%	0.2%	9.6%	4.6%	25.9%
1965 - 1979	8.8%	0.6%	7.2%	3.9%	20.5%
1980 - 1995	17.8%	7.8%	5.9%	2.4%	33.9%
1996 - 2000	0.6%	13.2%	0.1%	0.1%	14.0%
Total	42.4%	21.9%	24.1%	11.6%	100%

	Percent
Associate's	1.1%
Bachelor's	76.9%
Post-Baccalaureate / Graduate	22.0%
Total	100.0%

Native Hawaiian or other Pacific Islander, or more than one race. The respondents self-identified gender included 50.2% male, 49.4% female and 0.4% non-binary.

The survey was limited to those 18 years of age or older to give informed consent for participation. The birth year ranges were selected to match with generational groupings: Gen Z: 1996 - 2000, Millennial: 1980-1995, Gen X: 1965-1979, Baby Boomers: 1946-1964, and the Silent Generation: born 1945 or before. Use of generational groupings were selected to enhance the ability to mine the data for generational influences, trends and changes.

“Generations exhibit similar characteristics—such as communication, shopping, and motivation preferences—because they experienced similar trends at approximately the same life stage and through similar channels (e.g., online, TV, mobile, etc.). Generation-shaping trends are most influential as people come of age, which means that members of a particular generation will develop and share similar values, beliefs, and expectations. It is important to remember that at an individual level, everyone is different. But looking at people through a generational lens offers useful predictability for those trying to reach, inform, or persuade a large cross-section of a population.” (Center for Generational Kinetics, 2016).

The largest respondent group, when aggregated by stakeholder and generation, is alumni between 23-28 years of age (17.8%). The second largest is students within the generation group ranging in age between 18 and 22 (13.2%). The largest generation group for employers and faculty (by a small margin) are between 54-72 years of age, 9.6% and 4.6% respectively of the overall respondents (Table 3).

Just over a third of the respondents have completed a bachelor's degree and 46.6% have a post-baccalaureate / graduate degree. Of those with graduate degrees, over half are Master's level (57.2%) and a third are PhD level (32.5%).

Current students in the survey are predominately at the bachelor's level (76.9%) and 22% at the graduate level (Table 4).



Table 5: Current Degree Area - Students	
Degree Area	Percent
Animal Sciences	22.4
Agricultural Business and Management	14.3
Related Sciences (biological sciences, physics, chemistry, geology, earth sciences, geography, biotechnology)	12.2
Agricultural Public Services (communications, extension education, ag education, ag leadership)	9.1
Wildlife Sciences and Management	6.5
Natural Resource Conservation	6.0
Plant and Soil Sciences (agronomy, crop science, production)	6.0
Environmental Sciences / Studies	5.9
Food Sciences, Bioprocessing	3.8
Nutrition	3.5
Horticulture (viticulture, enology, turf, greenhouse operations, floriculture)	3.1
Forestry, Wood Products	2.7
Family and Consumer Sciences	1.4
Agricultural Mechanization and Engineering	1.2
Landscape Architecture, Design	0.9
Other	0.9
Apparel and Textiles	0.2
Total	100.0

Respondent Demographics: Degree Area and Field of Work

To gather a sense of the breadth of disciplines across the respondents, faculty and students were asked to indicate their degree area of study or teaching. (Tables 5-6). The four highest degree areas for students represented include animal sciences (22.4%); agricultural business and management (14.3%); related sciences, including biological sciences, physics, chemistry, geology, earth sciences, geography, and biotechnology (12.2%); and agricultural public services, including communications, extension education, ag education, and ag leadership (9.1%). (Figure 3).

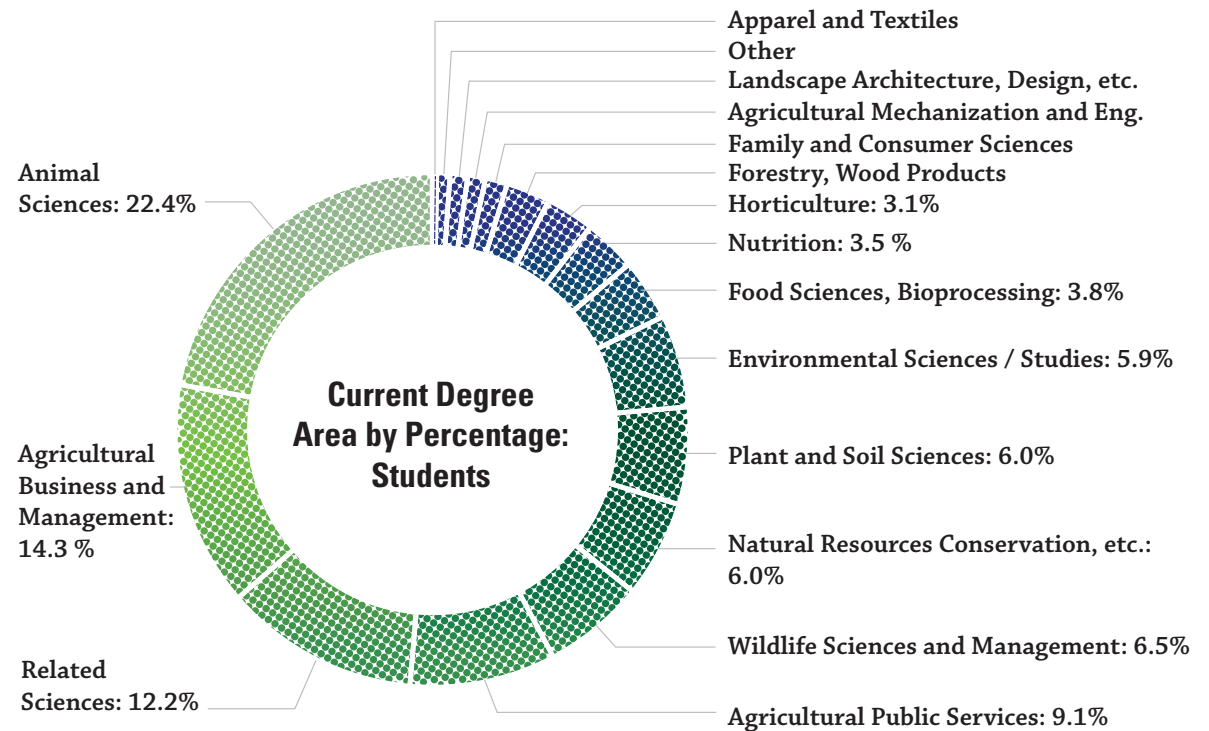


Figure 3: Students Degree Area



The top three areas of work for faculty teaching and area of work include agricultural public services (15.7%); related sciences, including biological sciences, physics, chemistry, geology, earth sciences, geography, and biotechnology (12.7%); and animal sciences (12.3%). Plant and social sciences (11.8%) is the fourth highest and agriculture business and management is the fifth for faculty area of work, at 8.6%. (Figure 4).

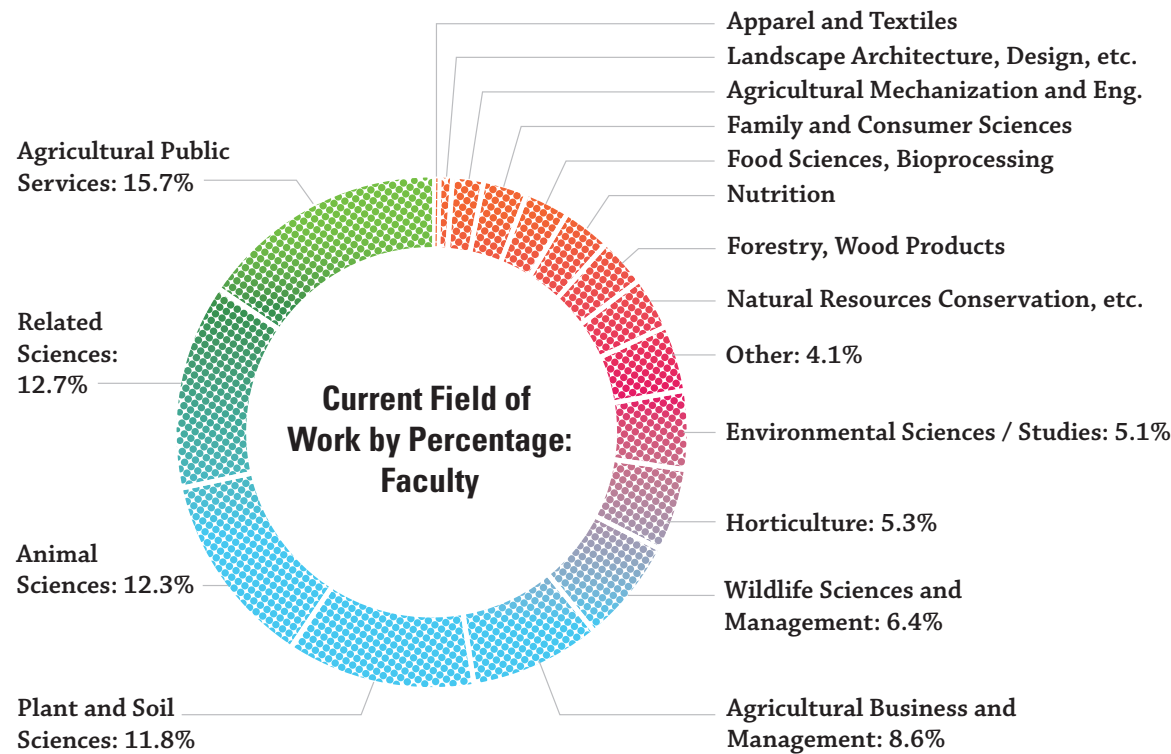


Figure 4: Faculty Field of Work

Current Field	Percent
Agricultural Public Services (communications, extension education, ag education, ag leadership)	15.7
Related Sciences (biological sciences, physics, chemistry, geology, earth sciences, geography, biotechnology)	12.7
Animal Sciences	12.3
Plant and Soil Sciences (agronomy, crop science, production)	11.8
Agricultural Business and Management	8.6
Wildlife Sciences and Management	6.4
Horticulture (viticulture, enology, turf, greenhouse operations, floriculture)	5.3
Environmental Sciences / Studies	5.1
Other	4.1
Natural Resources Conservation, etc.	3.5
Forestry, Wood Products	3.0
Nutrition	3.0
Food Sciences, Bioprocessing	2.9
Family and Consumer Sciences	2.6
Agricultural Mechanization and Engineering	1.9
Landscape Architecture, Design, etc.	1.0
Apparel and Textiles	0.1
Total	100.0



Table 7: Alumni Employment Status	
Employment Status	Percent
Full time	74.6
Working part-time	6.2
Caring for family members / homemaker	1.6
Retired	15.7
Unemployed	1.8
Other	0.1
Total	100.0

Table 8: Alumni Economic Sector	
Economic Sector	Percent
Government	19.2
For-Profit / Commercial	49.3
Nonprofit / Non-Government	11.3
Higher Education	16.4
Other	3.0
Multiple Sectors	0.8
Total	100.0

Table 9: Alumni Organization Type	
Organization Type	Percent
Education	19.5
Health Care	13.7
Agricultural Production	9.7
Policy, Legal, or Government	8.2
Consulting / Service Providers	7.0
Natural Resources Management	6.5
Finance, Banking, Insurance, Real Estate	6.5
Manufacturing	5.2
Other	4.4
Sales	4.3
Marketing, Media, or Communications	2.8
Landscape Design or Construction	2.6
Research	2.3
Information Technology or Software Development	1.9
Energy	1.5
Social Services	1.5
Leisure and Hospitality	1.2
Military / Defense	0.6
Arts & Entertainment	0.5
Total	100.0

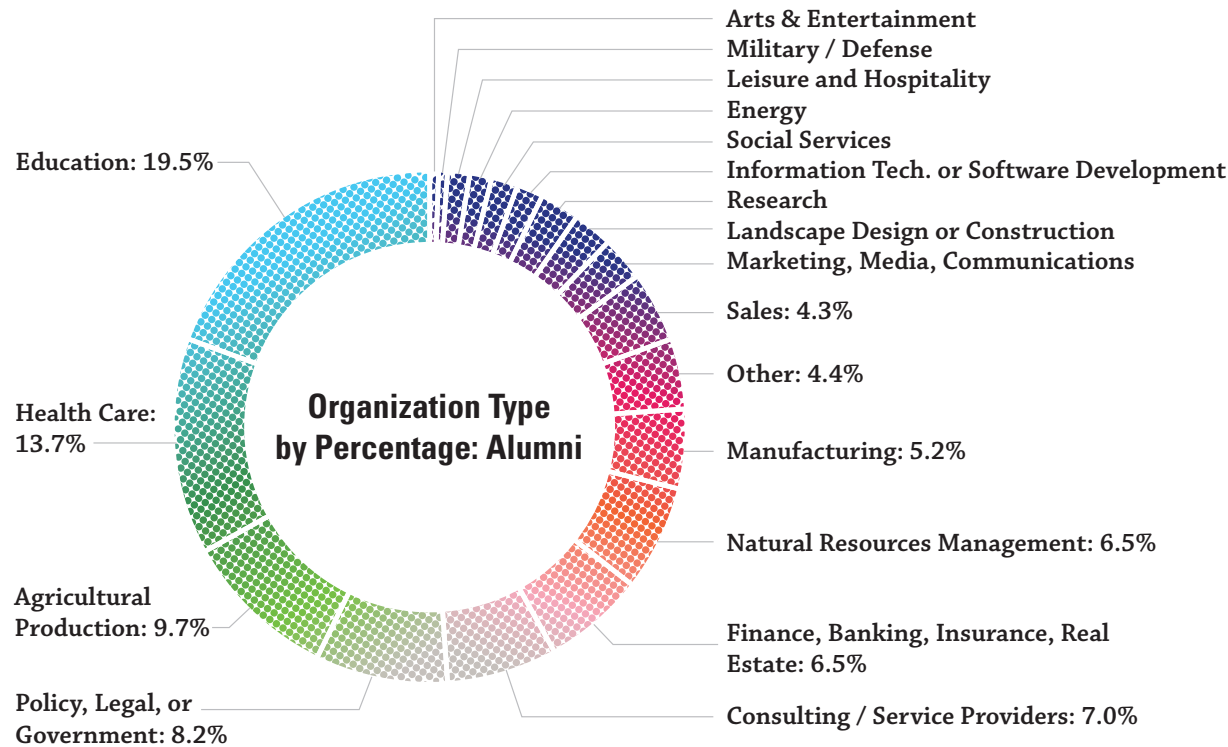


Figure 5: Alumni Organization Type



Table 10: Employer Economic Sector	
Economic Sector	Percent
Government	22.9
For-Profit / Commercial	60.8
Nonprofit / Non-Government	10.1
Higher Education	5.1
Other	0.9
Multiple Sectors	0.2
Total	100.0

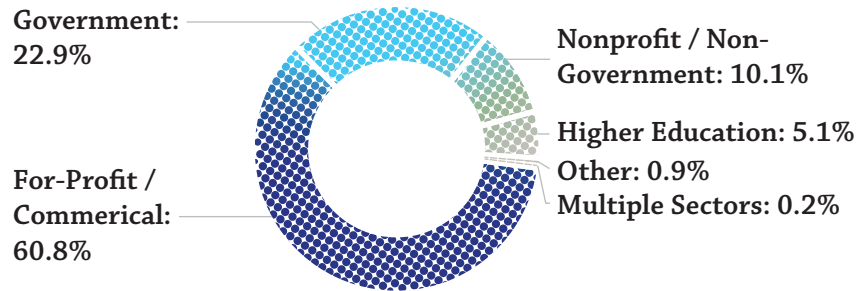


Figure 6: Employer Economic Sector

Table 11: Employer Number of Employees in Organization	
Number of Employees	Percent
1-20	28.2
21-500	41.4
501-5,000	17.2
5,001-25,000	7.3
25,001+	6.0
Total	100.0

Alumni were asked to indicate their employment status, organizational type and economic sector. (Tables 7-9). Three-quarters (74.5%) are working full time and 15.7% retired. Almost half (49.3%) are in the for-profit commercial sector. Organization types are diverse, such as education, health care, agriculture production, consulting, resource management, finance, sales, research and hospitality. (Figure 5).

Employer demographic data included economic sector and number of employees in the current organization. Over half of the employer respondents are in the for-profit / commercial sector (60.8%). The predominate organization size (number of employees) is 21-500 (41.4%), followed by 1-20 (28.2%) and 501-5,000 (17.2%) (Tables 10-11 and Figures 6-7).

Field of work was not collected for the employers as businesses, especially larger companies, conduct work across a range of fields or services and hire across a breadth of degree areas. Emphasizing the importance of employability skills in hiring decisions, a survey in 2015 sponsored by the Association of American Colleges & Universities found that 91% of employers (n=400) agreed that “a candidate’s demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important than his or her undergraduate major.” (Hart, pg4).

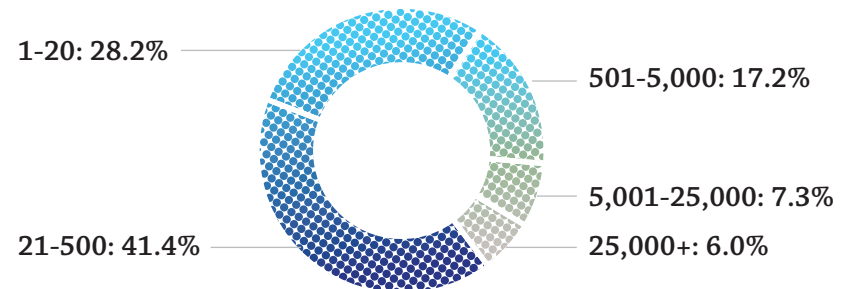


Figure 7: Employer Number of Employees in Organization



Growth Skills Median Importance

For each skill, by stakeholder group, the median importance represents the midpoint, or 50th percentile, of the individual respondent scores. The median is selected as the appropriate reporting statistic to manage outliers in larger data sets.

The order of importance for all eleven skills is the same across the stakeholder groups (Table 12 and Figure 8) with one exception. Faculty and employers view *transfer knowledge from one situation to another* differently in that faculty rated it as fourth most important while employers rated it eighth most important. (Table 12 and Figure 8). The top three skills in importance

are in the foundational skill clusters of communication and decision-making identified in the 2011 soft skills study (Table 1): *communicate accurately and concisely, listen effectively, and identify and analyze problems*. The bottom of the list, 11 out of 11, is *understanding role/structure in the workplace and realistic career expectations*, with importance ratings between 81 and 86.

Employers begin at a high, yet tempered, median rating of 95. Alumni, faculty and students begin at 99 or 100 expressing a strong sense of commitment to evaluating the top two skills as highly important.

Table 12: Skill Median Importance by Stakeholder Group

Skill	Employer	Alumni	Faculty	Student
Communicate Accurately and Concisely	95.00	99.00	99.00	100.00
Listen Effectively	95.00	98.00	97.00	100.00
Identify and Analyze Problems	91.00	92.00	93.00	95.00
Build Professional Relationships	90.00	90.00	90.00	92.00
Accept and Apply Critique and Direction in the Workplace	90.00	90.00	90.00	92.00
Realize the Effect of Decisions	90.00	90.00	90.00	92.00
Recognize and Deal Constructively with Conflict	90.00	90.00	90.00	92.00
Transfer Knowledge from One Situation to Another	89.00	90.00	91.00	92.00
Navigate Change and Ambiguity	88.00	89.50	90.00	88.00
Ask Good Questions	85.00	89.00	89.50	88.00
Understand Role/Structure in the Workplace and have Realistic Career Expectations	82.00	83.00	81.00	86.00



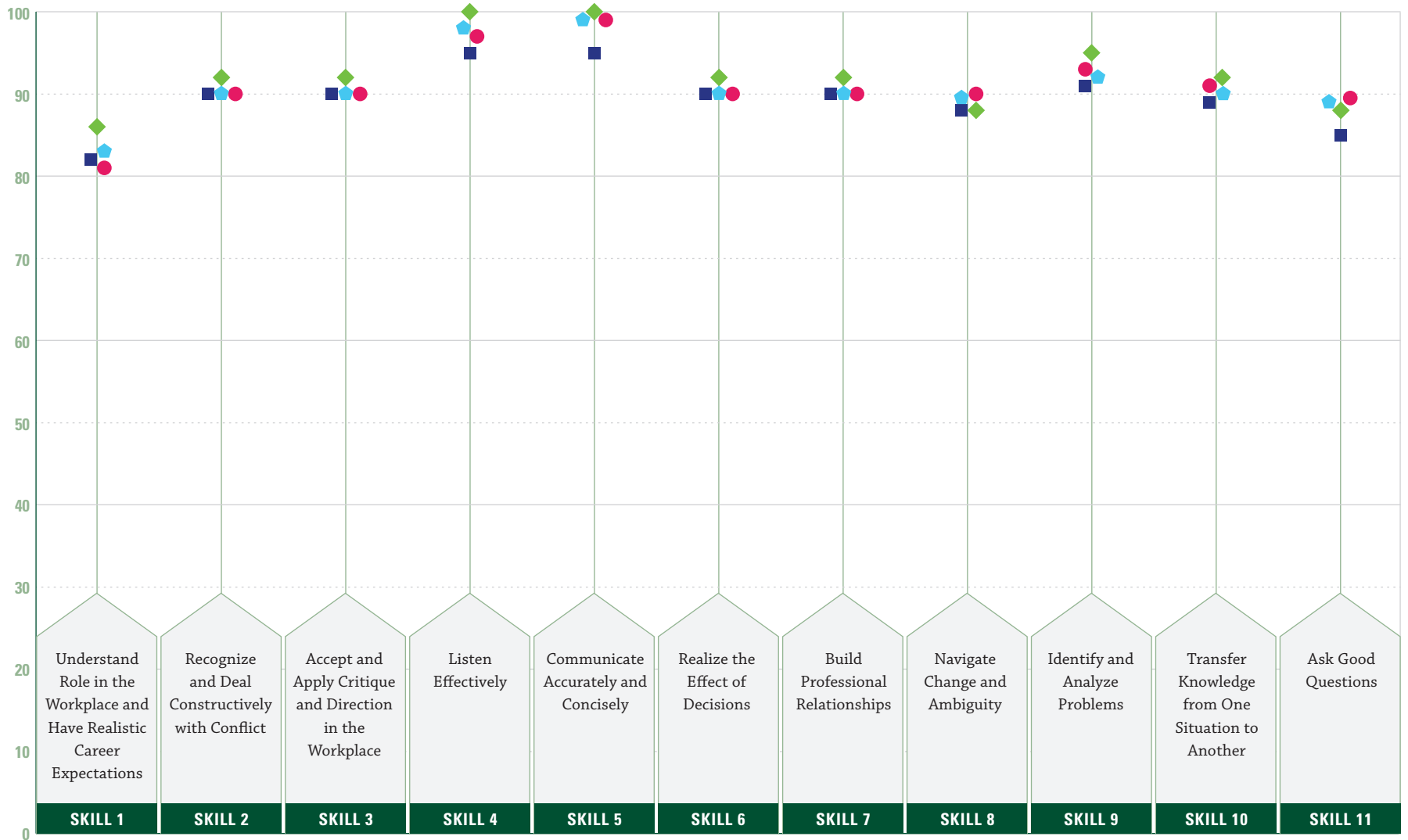


Figure 8: Stakeholder Median Importance

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

■ Employer
 ◆ Alumni
 ◆ Current Students
 ● Faculty



Importance-Preparedness Gap Statistical Analysis

The mean gap (between importance and preparedness) represents the average distance between importance and preparedness scores of the individual respondents as grouped by stakeholder classification. The mean gap is calculated with a Bonferroni adjusted 95% lower and upper confidence intervals.

For example, the employer median importance rating for *understanding role/structure in the workplace and have realistic career expectations* is 82. The mean gap is 33.95, with a lower CI of 32.12 and upper CI of 35.79. (Figure 9).

The mean gap data for each stakeholder group is provided in tables 13-16.

The employer mean gap rank order, from largest gap (1) to smallest gap (11) is:

1. Understand role in the workplace and have realistic career expectations
2. Recognize and deal constructively with conflict
3. Accept and apply critique and direction in the workplace
4. Listen effectively
5. Communicate accurately and concisely
6. Realize the effect of decisions
7. Build professional relationships
8. Navigate change and ambiguity
9. Identify and analyze problems
10. Transfer knowledge from one situation to another
11. Ask good questions

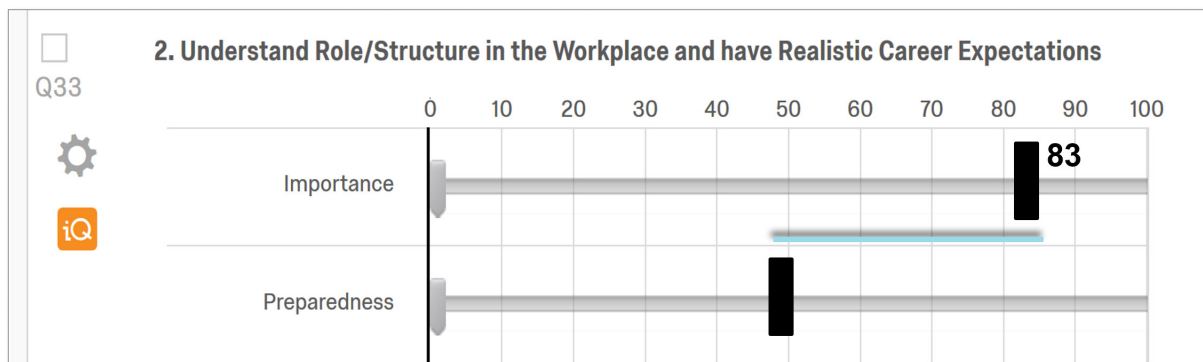


Figure 9: Example Mean Gap Graphic on Slider Scales

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap



Table 13: Employer Preparedness Gap Scores

Skill	Lower CI for Mean	Mean	Upper CI for Mean
Understand Role/Structure in the Workplace and have Realistic Career Expectations	32.12	33.95	35.79
Recognize and Deal Constructively with Conflict	31.75	33.51	35.26
Accept and Apply Critique and Direction in the Workplace	29.88	31.68	33.49
Listen Effectively	29.86	31.54	33.22
Communicate Accurately and Concisely	29.56	31.22	32.88
Realize the Effect of Decisions	28.77	30.45	32.13
Build Professional Relationships	27.58	29.23	30.88
Navigate Change and Ambiguity	26.05	27.79	29.52
Identify and Analyze Problems	24.80	26.32	27.85
Transfer Knowledge from One Situation to Another	22.88	24.33	25.79
Ask Good Questions	18.30	19.85	21.40

Table 14: Alumni Preparedness Gap Scores

Skill	Lower CI for Mean	Mean	Upper CI for Mean
Recognize and Deal Constructively with Conflict	21.88	23.06	24.23
Build Professional Relationships	18.96	20.06	21.15
Navigate Change and Ambiguity	18.28	19.40	20.52
Understand Role/Structure in the Workplace and have Realistic Career Expectations	16.95	18.16	19.36
Accept and Apply Critique and Direction in the Workplace	14.92	15.96	16.99
Communicate Accurately and Concisely	13.78	14.69	15.59
Realize the Effect of Decisions	13.55	14.52	15.50
Listen Effectively	13.48	14.42	15.36
Identify and Analyze Problems	10.53	11.39	12.24
Ask Good Questions	10.05	11.01	11.98
Transfer Knowledge from One Situation to Another	8.82	9.67	10.53



Table 15: Student Preparedness Gap Scores

Skill	Lower CI for Mean	Mean	Upper CI for Mean
Build Professional Relationships	21.29	22.75	24.22
Recognize and Deal Constructively with Conflict	16.05	17.45	18.85
Navigate Change and Ambiguity	14.37	15.73	17.09
Communicate Accurately and Concisely	14.14	15.33	16.53
Understand Role/Structure in the Workplace and have Realistic Career Expectations	12.89	14.45	16.01
Accept and Apply Critique and Direction in the Workplace	12.62	13.89	15.17
Identify and Analyze Problems	12.00	13.15	14.30
Ask Good Questions	10.80	12.17	13.55
Transfer Knowledge from One Situation to Another	10.41	11.56	12.70
Realize the Effect of Decisions	9.79	11.00	12.22
Listen Effectively	9.42	10.49	11.57

Table 16: Faculty Preparedness Gap Scores

Skill	Lower CI for Mean	Mean	Upper CI for Mean
Recognize and Deal Constructively with Conflict	30.74	33.18	35.63
Communicate Accurately and Concisely	30.16	32.35	34.55
Listen Effectively	29.08	31.36	33.63
Navigate Change and Ambiguity	26.92	29.34	31.77
Build Professional Relationships	26.81	28.85	30.88
Identify and Analyze Problems	26.71	28.81	30.90
Transfer Knowledge from One Situation to Another	26.60	28.76	30.92
Realize the Effect of Decisions	26.39	28.64	30.90
Understand Role/Structure in the Workplace and have Realistic Career Expectations	26.23	28.45	30.68
Accept and Apply Critique and Direction in the Workplace	25.85	28.11	30.36
Ask Good Questions	21.16	23.32	25.47



Growth Skills Preparedness Mean Gap Ranking

The preparedness gaps reveal a different ordering of the skills for the stakeholder groups. (Figure 10). In the figure, the numbers above each graphical bar indicate the mean ranking from largest (1) to least (11) gap between importance and preparedness for each stakeholder group.

All the stakeholder groups rated the ability to *deal with conflict* within their top three skill gaps. (Table 17). This may connect with the differing sense between employers and employees of the role of a new employee in the workplace. What is identified as ‘conflict’ could also be playing a role.

The top three preparedness skill gaps for employers are in the advanced skill clusters of professionalism and leadership identified in the 2011 soft skills study: *understanding role in the workplace and realistic career expectations, dealing with conflict, and accepting critique and direction in the workplace.*

Alumni and students identified two additional skills in the advanced skill clusters in their top three preparedness gaps: *building professional relationships and navigating change and ambiguity.*

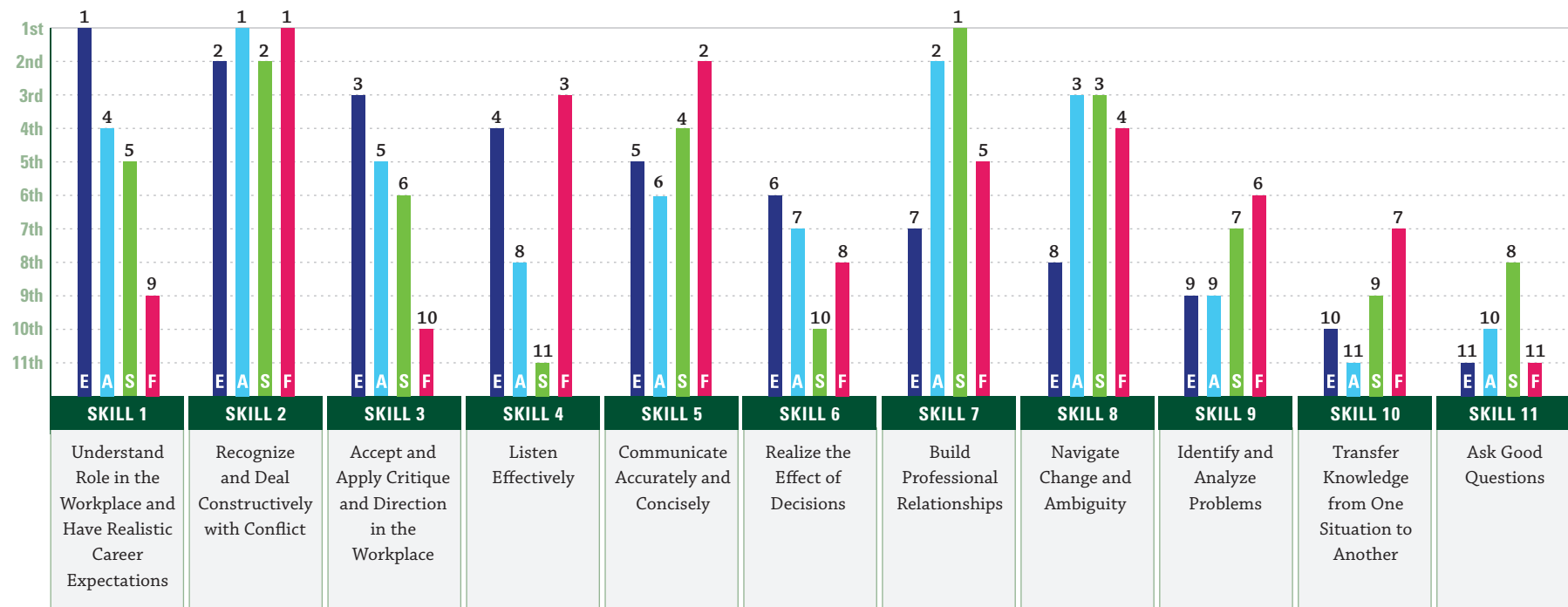


Figure 10: Mean Gap Rank by Stakeholder Group

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

E Employer **A** Alumni **S** Current Students **F** Faculty



Table 17: Preparedness Gap & Dealing with Conflict

Skill	Mean Gap Rank Order			
	Employer	Faculty	Alumni	Students
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	1	9	4	5
Recognize and Deal Constructively with Conflict	2	1	1	2
Accept and Apply Critique and Direction in the Workplace	3	10	5	6
Listen Effectively	4	3	8	11
Communicate Accurately and Concisely	5	2	6	4
Realize the Effect of Decisions	6	8	7	10
Build Professional Relationships	7	5	2	1
Navigate Change and Ambiguity	8	4	3	3
Identify and Analyze Problems	9	6	9	7
Transfer Knowledge from One Situation to Another	10	7	11	9
Ask Good Questions	11	11	10	8

Employers and students have very different views on what is the largest skill gap. For employers, the largest skill gap is *understanding role and expectation in the workplace*, (Table 18). whereas students rank *build professional relationships* as their number one area for improvement. Students and alumni are strikingly parallel in their thinking, at least regarding their thoughts on the biggest skills gaps. Both groups list the same skills, albeit in different order, in their top three. (Table 19). Besides *recognize and deal constructively with conflict*, students and alumni place *build professional relationships* and *navigate change and ambiguity* in their top three skills gaps.

Table 18: Preparedness Gap & Understanding Role

Skill	Mean Gap Rank Order	
	Employer	Students
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	1	5
Recognize and Deal Constructively with Conflict	2	2
Accept and Apply Critique and Direction in the Workplace	3	6
Listen Effectively	4	11
Communicate Accurately and Concisely	5	4
Realize the Effect of Decisions	6	10
Build Professional Relationships	7	1
Navigate Change and Ambiguity	8	3
Identify and Analyze Problems	9	7
Transfer Knowledge from One Situation to Another	10	9
Ask Good Questions	11	8



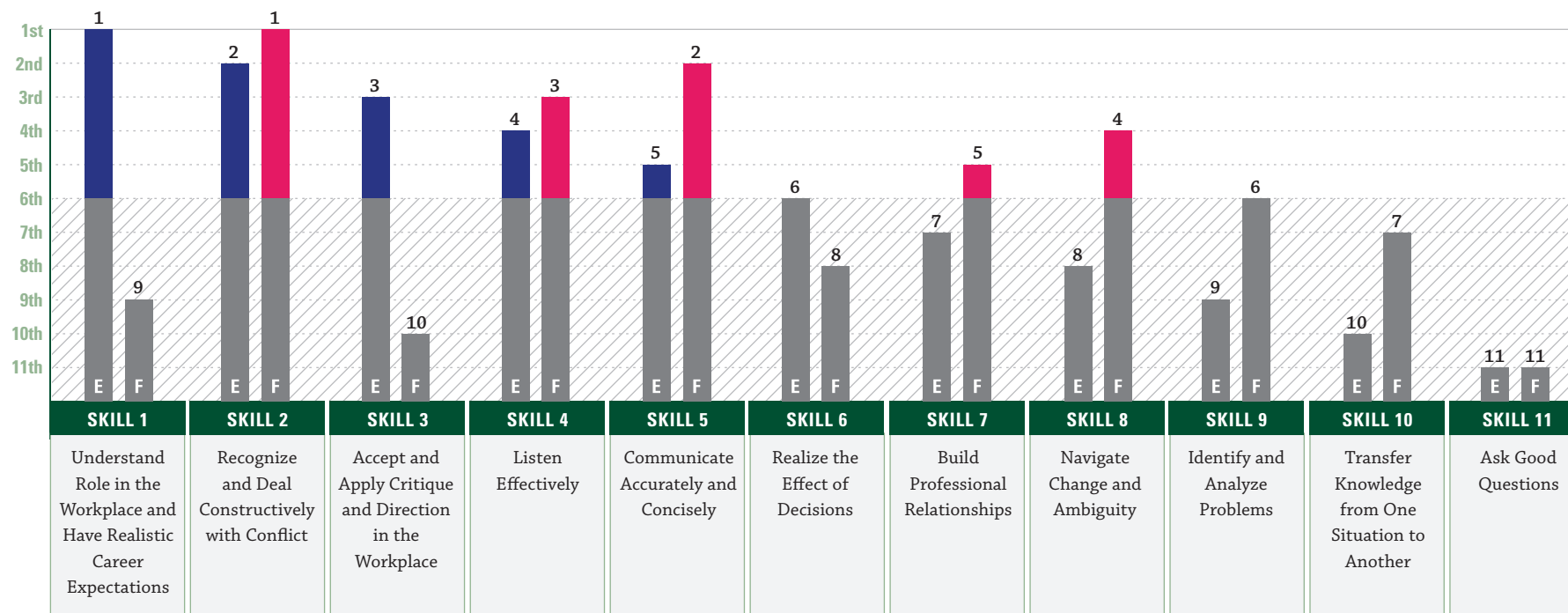


Figure 11: Top 5 Skill Gap Comparison of Employers and Faculty

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

E Employer **F** Faculty

Faculty evaluation of the preparedness gaps added two skills from the foundational skill clusters in their top three: *communicating accurately and concisely* and *listening effectively*.

There is a disconnect between the priorities of employers and faculty in which skills have the largest preparedness gap. The top three skill gaps for faculty made the top five skill gaps for employers, but of the top three skill gaps for employers, only one made the top five skill gaps for faculty. (Figure 11). The reason this is important is that faculty may teach to the skills they perceive to have the largest gaps from their perspective.

The largest preparedness gap for employers was for the skill *understanding role and expectations in the workplace*. This varied substantially from faculty for whom this skill placed number 9 of 11 for a gap. Similarly, the third largest gap for employers is *accepting critique and direction in the workplace* whereas faculty placed this one 10 of 11. (Table 20).



Table 19: Largest Preparedness Skill Gap by Alumni & Students

Skill	Mean Gap Rank Order	
	Alumni	Students
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	4	5
Recognize and Deal Constructively with Conflict	1	2
Accept and Apply Critique and Direction in the Workplace	5	6
Listen Effectively	8	11
Communicate Accurately and Concisely	6	4
Realize the Effect of Decisions	7	10
Build Professional Relationships	2	1
Navigate Change and Ambiguity	3	3
Identify and Analyze Problems	9	7
Transfer Knowledge from One Situation to Another	11	9
Ask Good Questions	10	8

Table 20: Largest Preparedness Gaps by Employers & Faculty

Skill	Mean Gap Rank Order	
	Employer	Faculty
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	1	9
Recognize and Deal Constructively with Conflict	2	1
Accept and Apply Critique and Direction in the Workplace	3	10
Listen Effectively	4	3
Communicate Accurately and Concisely	5	2
Realize the Effect of Decisions	6	8
Build Professional Relationships	7	5
Navigate Change and Ambiguity	8	4
Identify and Analyze Problems	9	6



Table 21: Alumni Mean Gap Score as Percentage Difference by Age Group
Born before 1946 comparisons

Skill	1-2	1-3	1-4
Build Professional Relationships	-0.11	-0.11	-0.10
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	-0.09	-0.12	-0.12
Identify and Analyze Problems	-0.03	-0.03	-0.01
Transfer Knowledge from One Situation to Another	-0.03	-0.02	-0.01
Accept and Apply Critique and Direction in the Workplace	-0.09	-0.10	-0.08
Realize the Effect of Decisions	-0.06	-0.05	-0.02
Communicate Accurately and Concisely	-0.04	-0.03	-0.03
Listen Effectively	-0.05	-0.05	0.00
Ask Good Questions	-0.03	-0.02	-0.01
Recognize and Deal Constructively with Conflict	-0.09	-0.10	-0.07
Navigate Change and Ambiguity	-0.07	-0.08	-0.06

Birth ranges: 1= before 1946, 2=1946-1964, 3=1965-1979, 4=1980-1995

Table 22: Employer Mean Gap Score as Percentage Difference by Age Group
Born before 1946 comparisons

Skill	1-2	1-3	1-4
Build Professional Relationships	-0.08	-0.12	-0.10
Understand Role/Structure in the Workplace and Have Realistic Work Expectations	-0.11	-0.18	-0.16
Identify and Analyze Problems	-0.08	-0.09	-0.09
Transfer Knowledge from One Situation to Another	-0.05	-0.06	-0.05
Accept and Apply Critique and Direction in the Workplace	-0.08	-0.12	-0.13
Realize the Effect of Decisions	-0.10	-0.12	-0.09
Communicate Accurately and Concisely	-0.09	-0.09	-0.07
Listen Effectively	-0.07	-0.09	-0.06
Ask Good Questions	-0.05	-0.05	-0.02
Recognize and Deal Constructively with Conflict	-0.10	-0.13	-0.10
Navigate Change and Ambiguity	-0.06	-0.08	-0.08

Birth ranges: 1= before 1946, 2=1946-1964, 3=1965-1979, 4=1980-1995

Preparedness Gap Internal Stakeholder Group Comparison by Generation

One of the early questions in the development of the study was if the preparedness gap was different across generational groups within a stakeholder group. A difference of 10% or more in mean gap score between generational groups was noted for discussion. The group born 1995-2000 was not included for internal comparisons in the alumni or employer stakeholder groups. The only preparedness gap differences of 10% or more were found within the alumni and employer groups, and specifically with those who were born before 1946. (Tables 21-22). It is important to note, in all the other comparisons, the difference was less than 10%.

For the alumni and employer groups, the internal differences were in the four skill areas of *building professional relationships, understanding role and realistic expectations, accepting critique and dealing with conflict*. In all the comparisons, those born before 1946 had a *smaller* preparedness gap, indicating less concern about new employees' preparedness when entering the workforce. The employer group internal comparison adds the skill of *realizing the effect of decisions*, again with a smaller preparedness gap for those born before 1946.



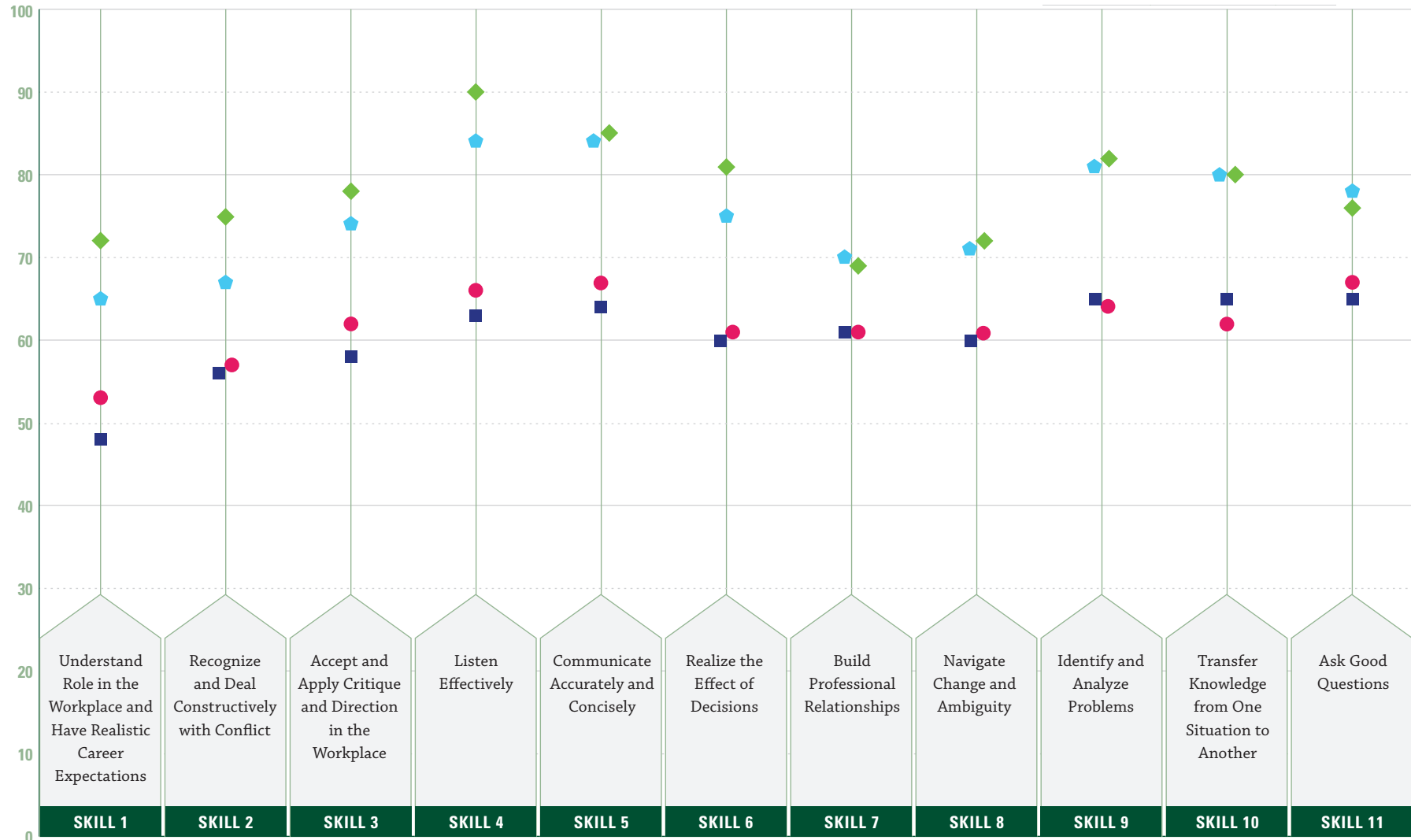
Relationship between Importance and Preparedness Gap

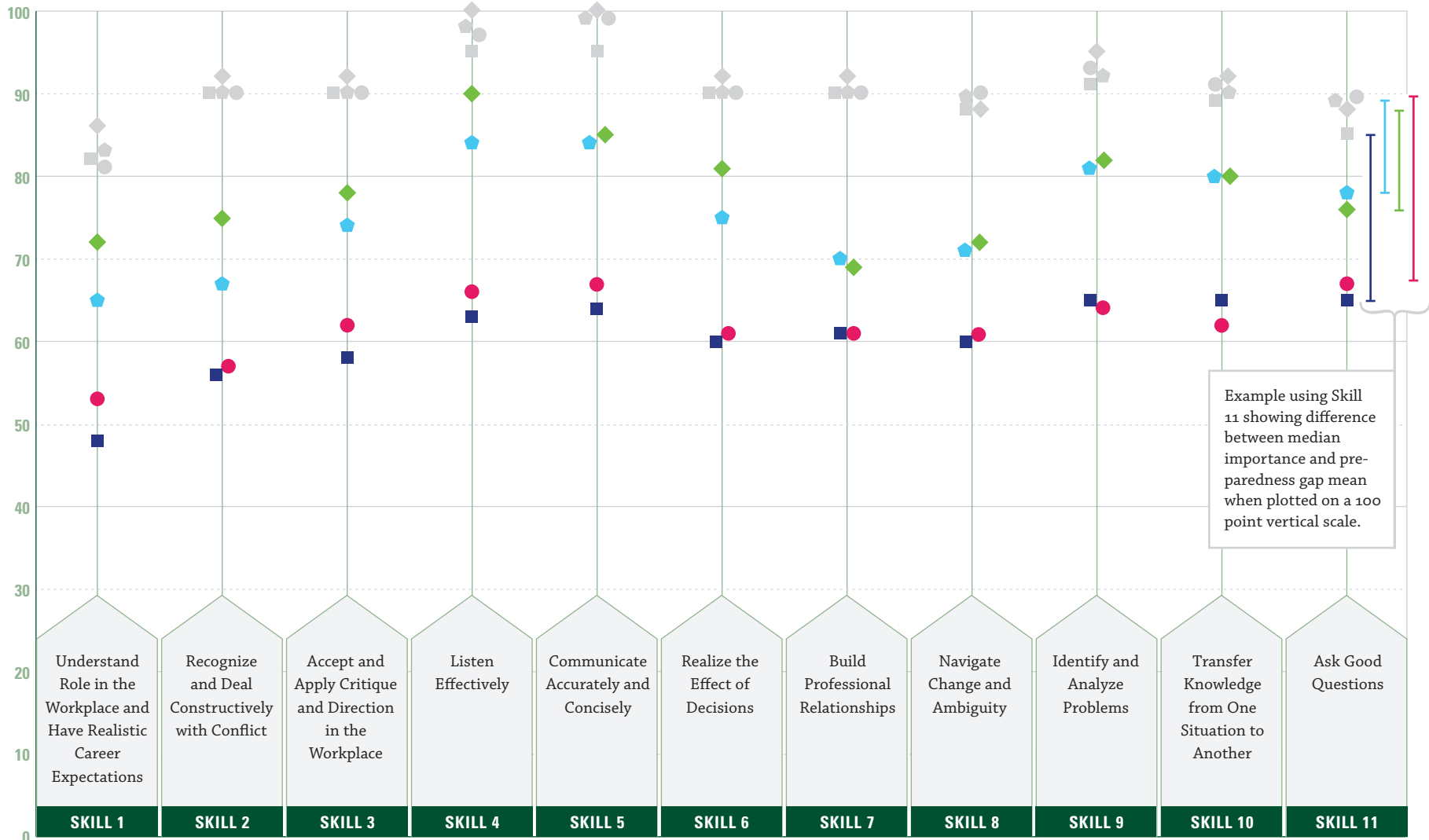
When the skills are arranged according to the employer gap rank order, from 1 representing the largest gap and 11 the least gap, the order of skills changes from importance ranking alone. *Understanding role in the workplace and realistic career expectations* moves from last in the

importance rating order, to the first spot in preparedness gap order. Of the top three skills in importance, *communicating accurately and concisely* moves to 5th in gap ranking, *listen effectively* moves to 4th in gap ranking and *identify and analyze problems* moves to 9th in gap ranking. (Figure 12).

Figure 12: Stakeholder Importance-Preparedness Mean Gap

Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap





Example using Skill 11 showing difference between median importance and preparedness gap mean when plotted on a 100 point vertical scale.

Plotting both the importance median (gray shapes) with the preparedness mean gap on the 100 point rating scale reveals shared patterns across stakeholders. Reading horizontally, employers (dark blue) and faculty (red) track together, while alumni (light blue) and students (green) track together.

Reading vertically, students and alumni are more optimistic (represented by a smaller preparedness gap) about their employability skills than employers and faculty. EG: The students and alumni are always plotted above the employers and faculty on the 100 vertical point scale. (Figure 13).

Figure 13: Relationship between Median Importance and Preparedness Mean Gap
Ordered from Highest to Lowest Employer Mean Importance-Preparedness Gap

■ Employer ◆ Alumni
◆ Current Students ● Faculty



Comparison of Importance and Preparedness Gap by Foundational and Advanced Employability Skills

For employers, employability skills leading the list for importance are foundational skills: *communicate accurately and concisely, listen effectively, and identify and analyze problems.*

These skills ranked 4th, 5th and 9th, respectively, in preparedness gap. (Figure 14).

For employers, at the top for preparedness gap are advanced skills: *understanding role and realistic career expectations, dealing constructively with conflict, and accept critique and direction in the workplace.*

These skills fell in the 6th, 7th and 11th spots respectively in order of importance. (Figure 15).

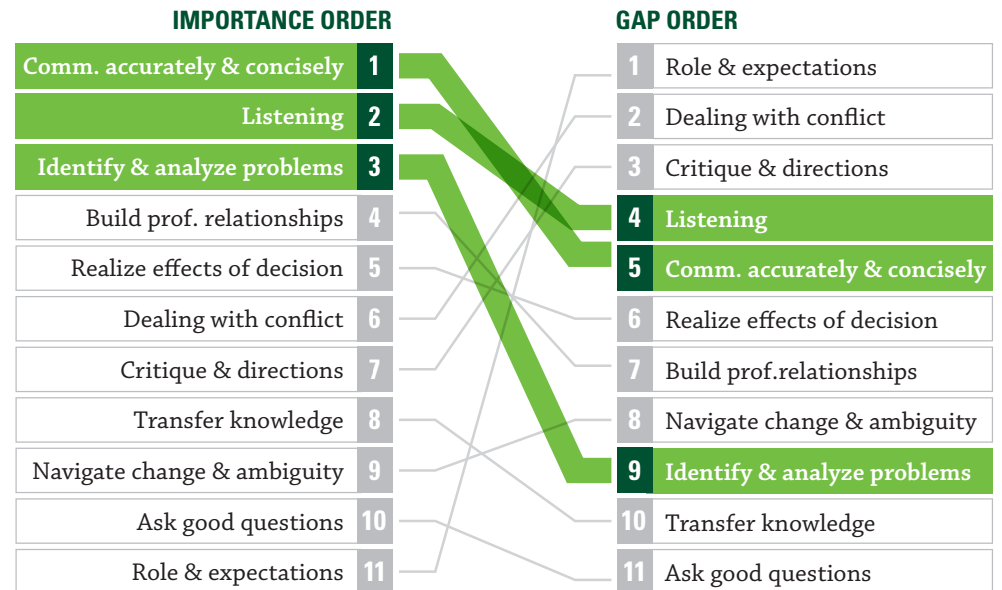
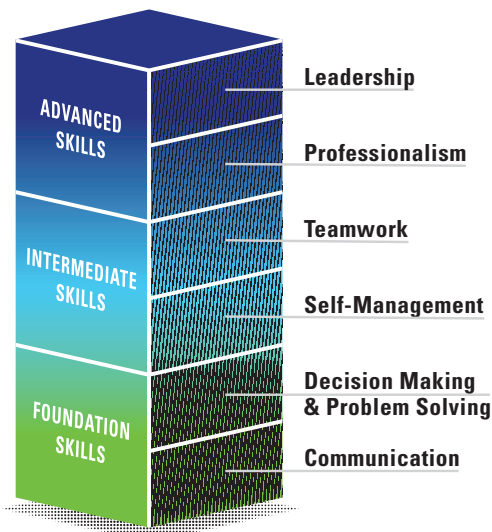


Figure 14: Top 3 Foundation Skills by Importance & Gap Order

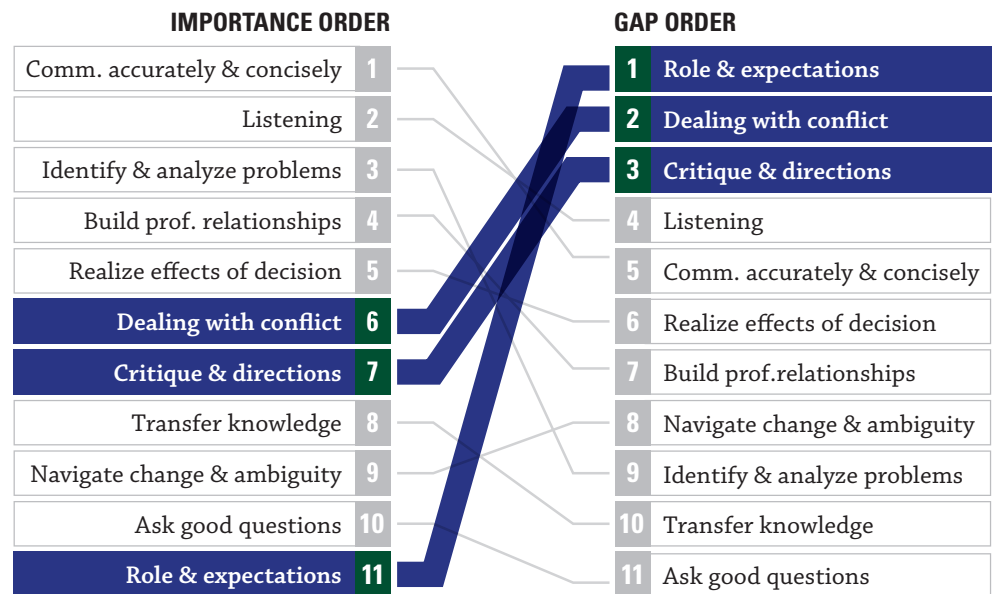


Figure 15: Top 3 Advanced Skills by Importance & Gap Order



Individual Skill Importance and Preparedness Gap

With the median importance (I) rating as the starting point on the graphic, the mean gap is represented by the colored bar, moving to the left on the 100-point scale, where 0 is not at all important/prepared and 100 is very important/prepared.

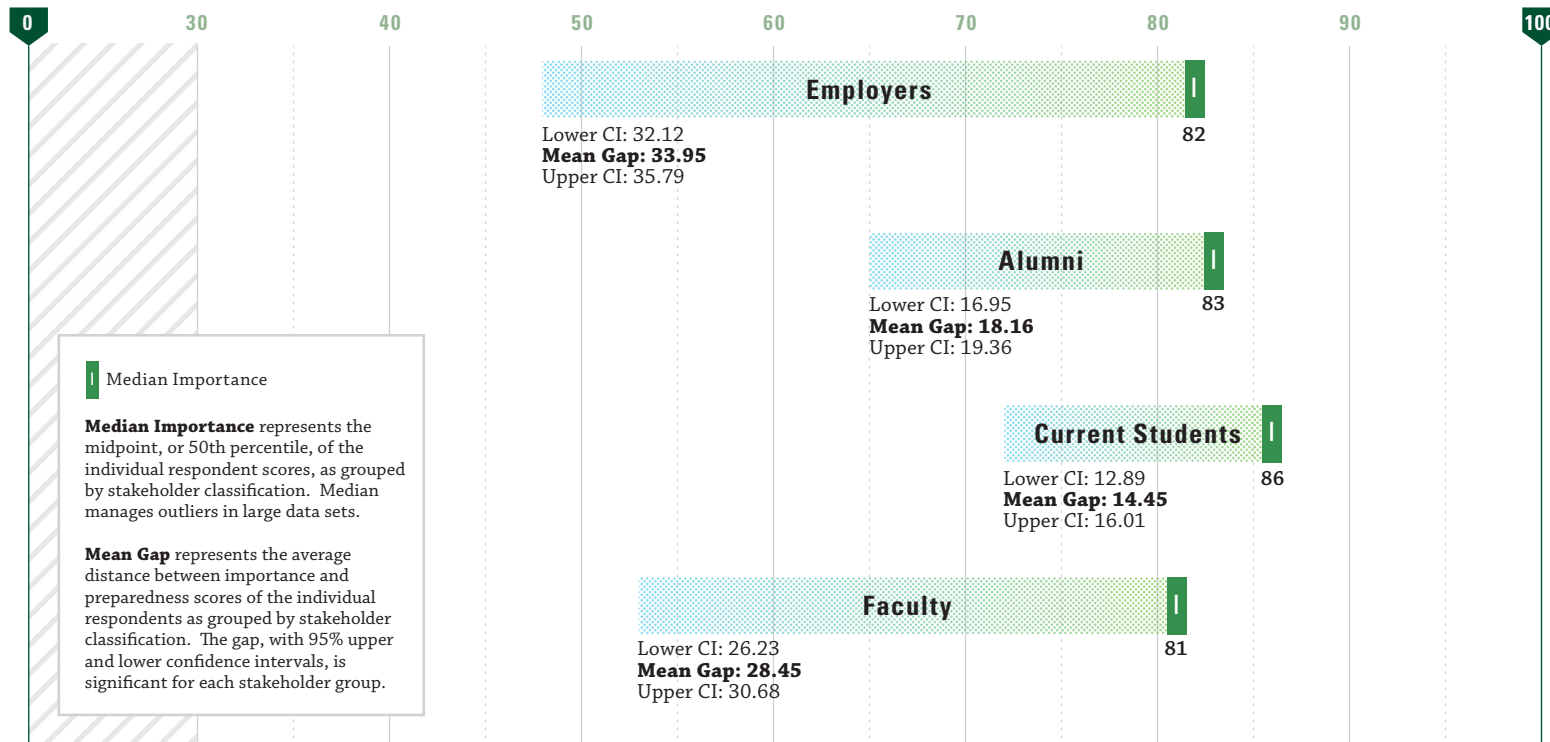


Figure 16: Preparedness Gap with Upper and Lower CI for Understand Role/ Structure and Realistic Career Expectations
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 1

PROFESSIONALISM

Understand Role/Structure in the Workplace and Have Realistic Career Expectations

Understanding role/structure in the workplace and realistic career expectations has the highest preparedness gap (33.95) for employers. Faculty rank this skill in the 9th spot, in terms of preparedness gap. (Figure 16).



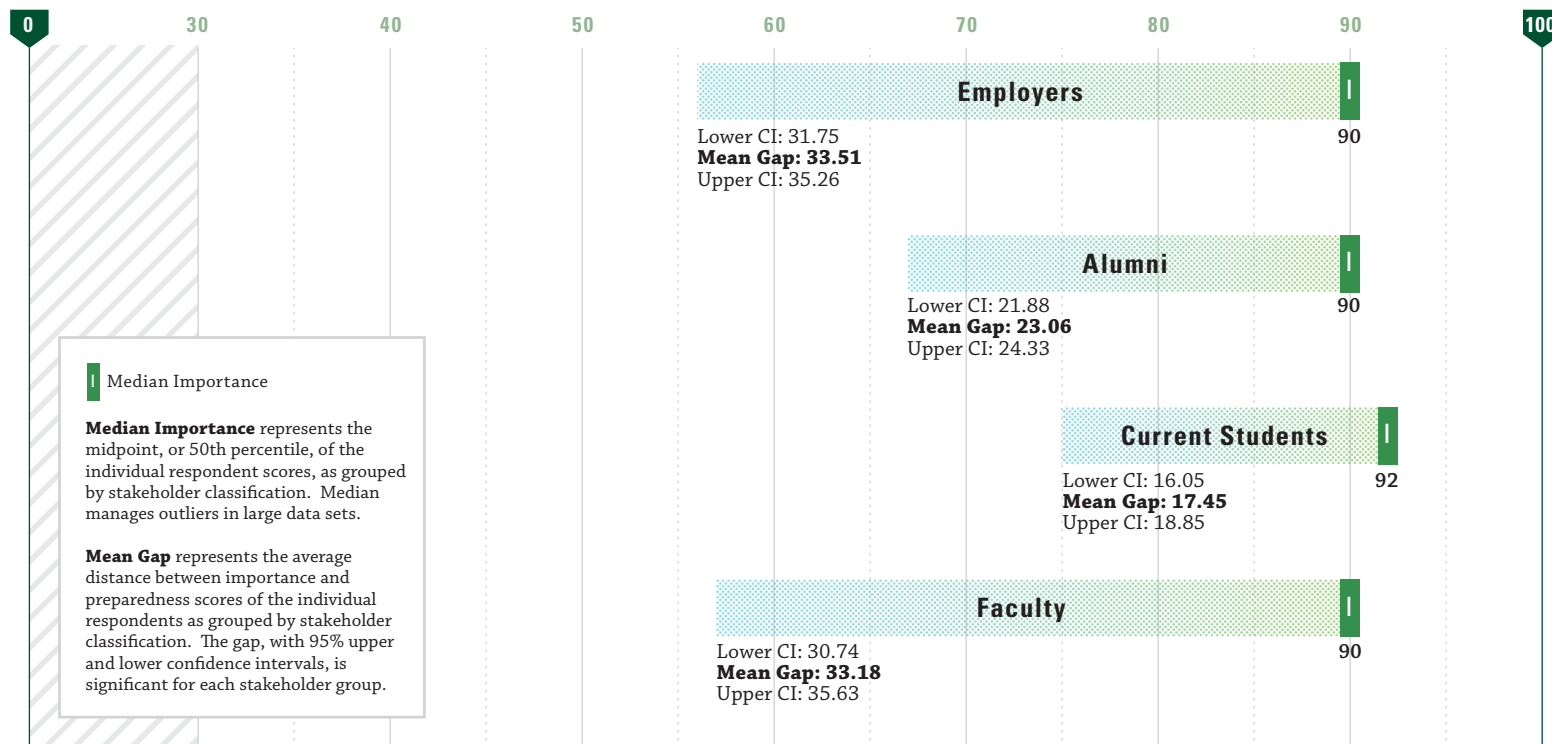


Figure 17: Preparedness Gap with Upper and Lower CI for Recognize and Deal Constructively with Conflict
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 2
PROFESSIONALISM

Recognize and Deal Constructively with Conflict

The preparedness gap for *dealing with conflict* (33.51) is only 0.44 below *understanding role and career expectations*. This could be considered a tie for the most important preparedness gap. From the faculty and alumni perspective, *dealing with conflict* had the largest preparedness gap. (Figure 17).

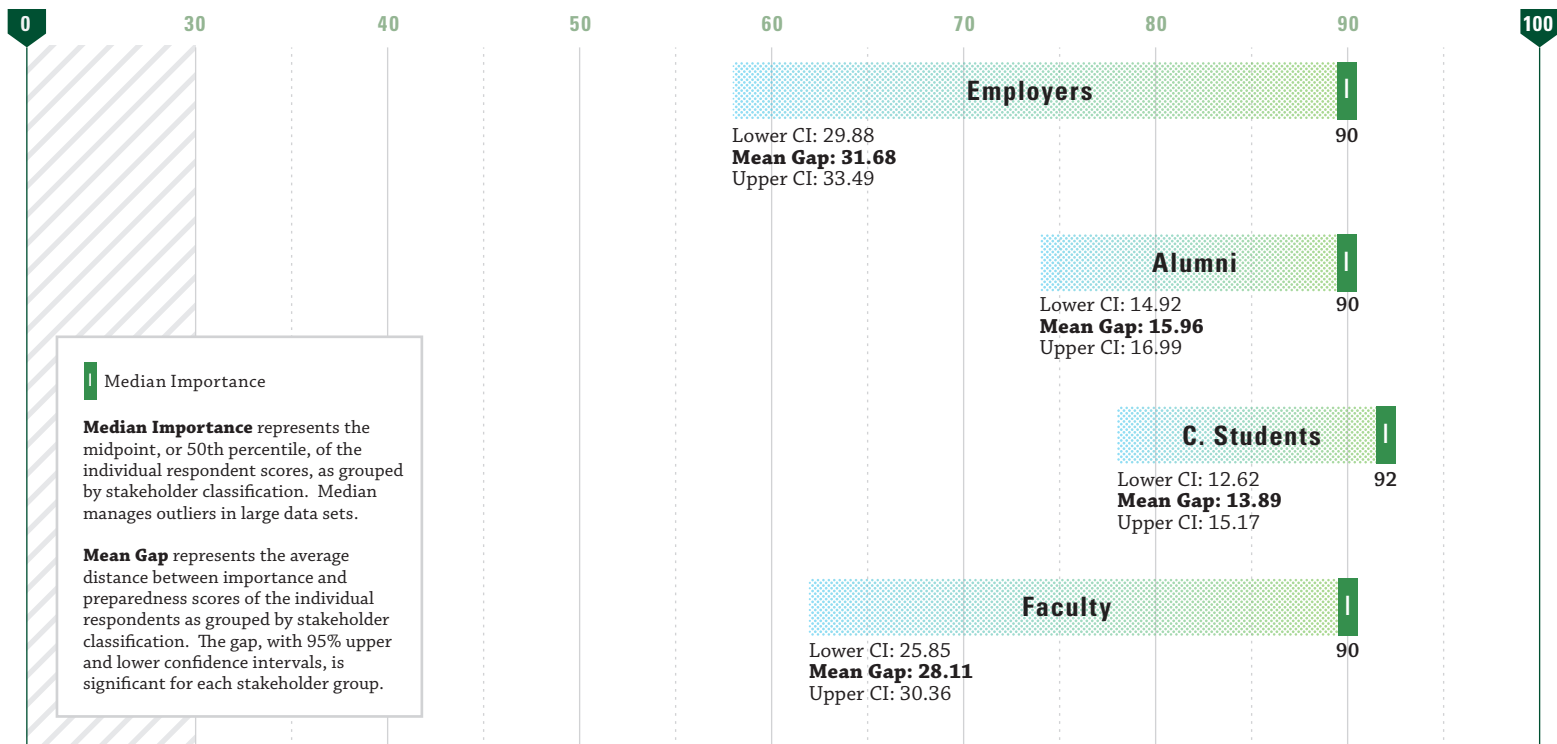


Figure 18: Preparedness Gap with Upper and Lower CI for Accept and Apply Critique and Direction in the Workplace
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 3
PROFESSIONALISM

Accept and Apply Critique and Direction in the Workplace

*Accept and apply critique and the direction in the workplace is the third largest gap identified by employers. This skill is in the middle of the list for alumni (5th spot) and students (6th spot). Faculty represent a different perspective with *accepting critique and direction* near the bottom (10th spot). (Figure 18).*



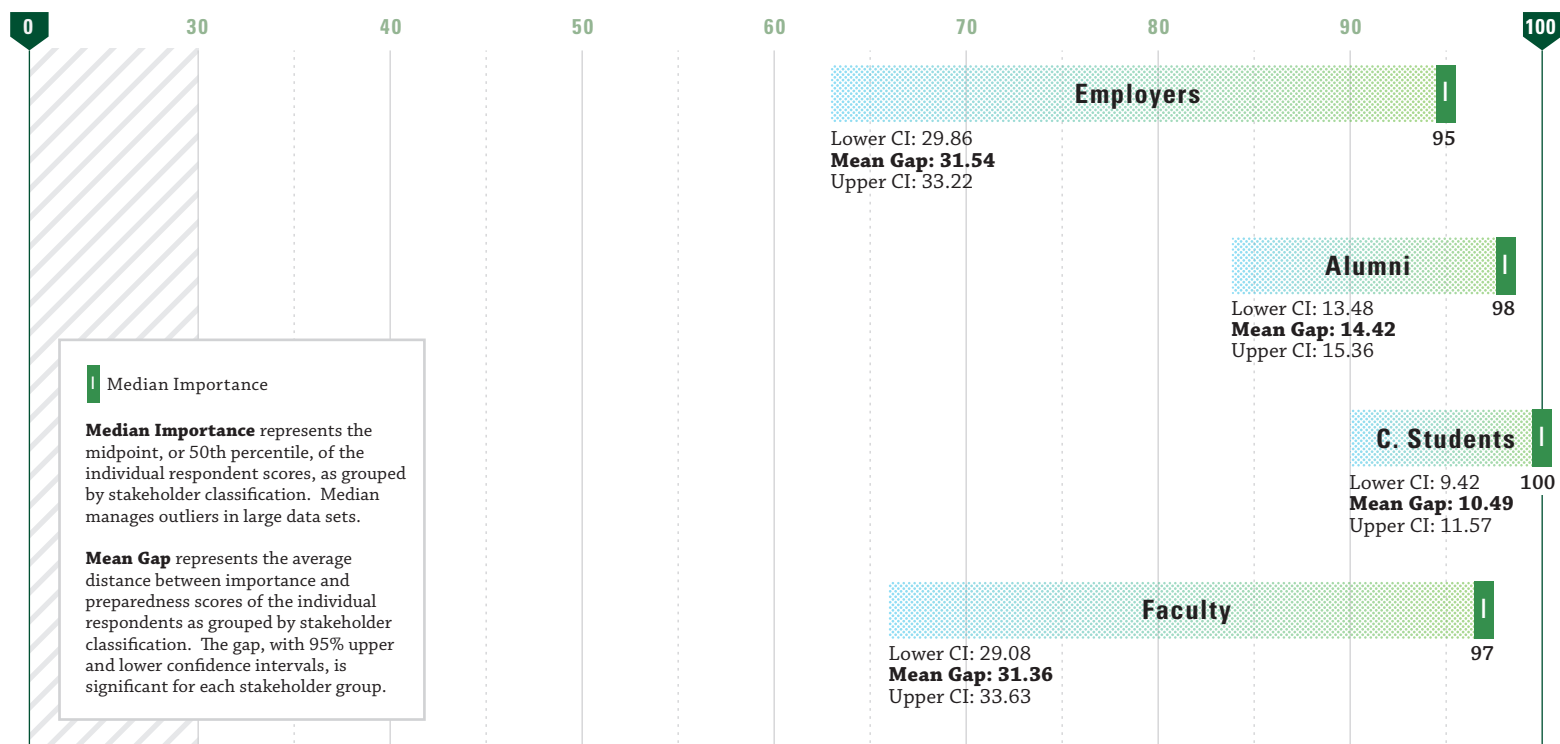


Figure 19: Preparedness Gap with Upper and Lower CI for Listen Effectively
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 4
COMMUNICATION

Listen Effectively

Listening effectively is the 4th largest preparedness gap for employers and 3rd for faculty. The students, however, feel more confident about their listening skills and *listening* fell at the bottom (11th) spot. (Figure 19).

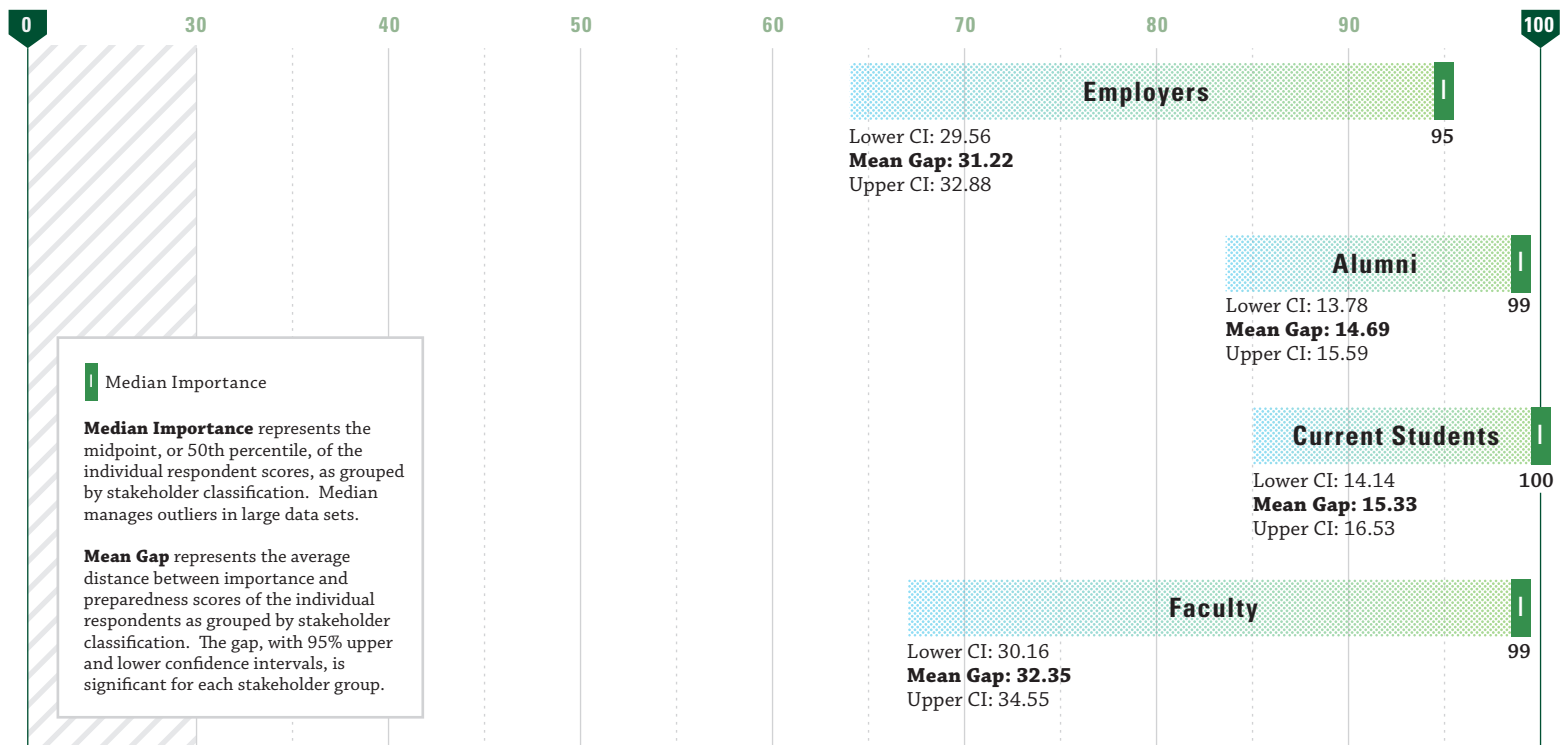


Figure 20: Preparedness Gap with Upper and Lower CI for Communicate Accurately and Concisely Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 5
COMMUNICATION

Communicate Accurately and Concisely

Communicate accurately and concisely is rated 5th in preparedness gap for employers. Alumni and students also rated this skill in the middle of list, 6th and 4th respectively. *Communicating accurately* is the 2nd largest gap from the faculty perspective. (Figure 20).



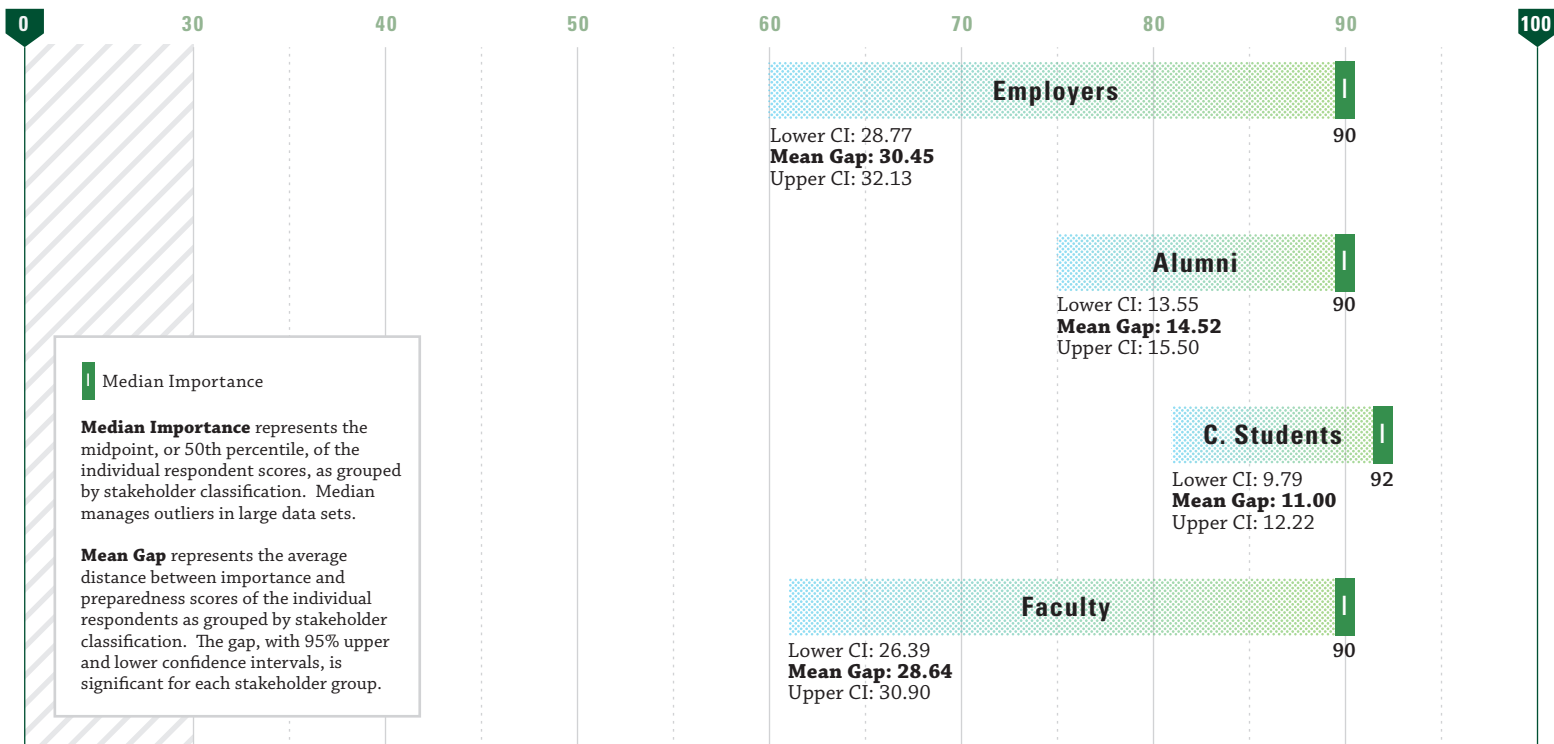


Figure 21: Preparedness Gap with Upper and Lower CI for Realize the Effect of Decisions
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 6
DECISION MAKING

Realize the Effect of Decisions

In the 6th spot for employers rating of preparedness gap is *realize the effect of decisions*. The skill gap decreased in perception with alumni placing it at the 7th spot, faculty at the 8th, and students at the 10th spot. (Figure 21).

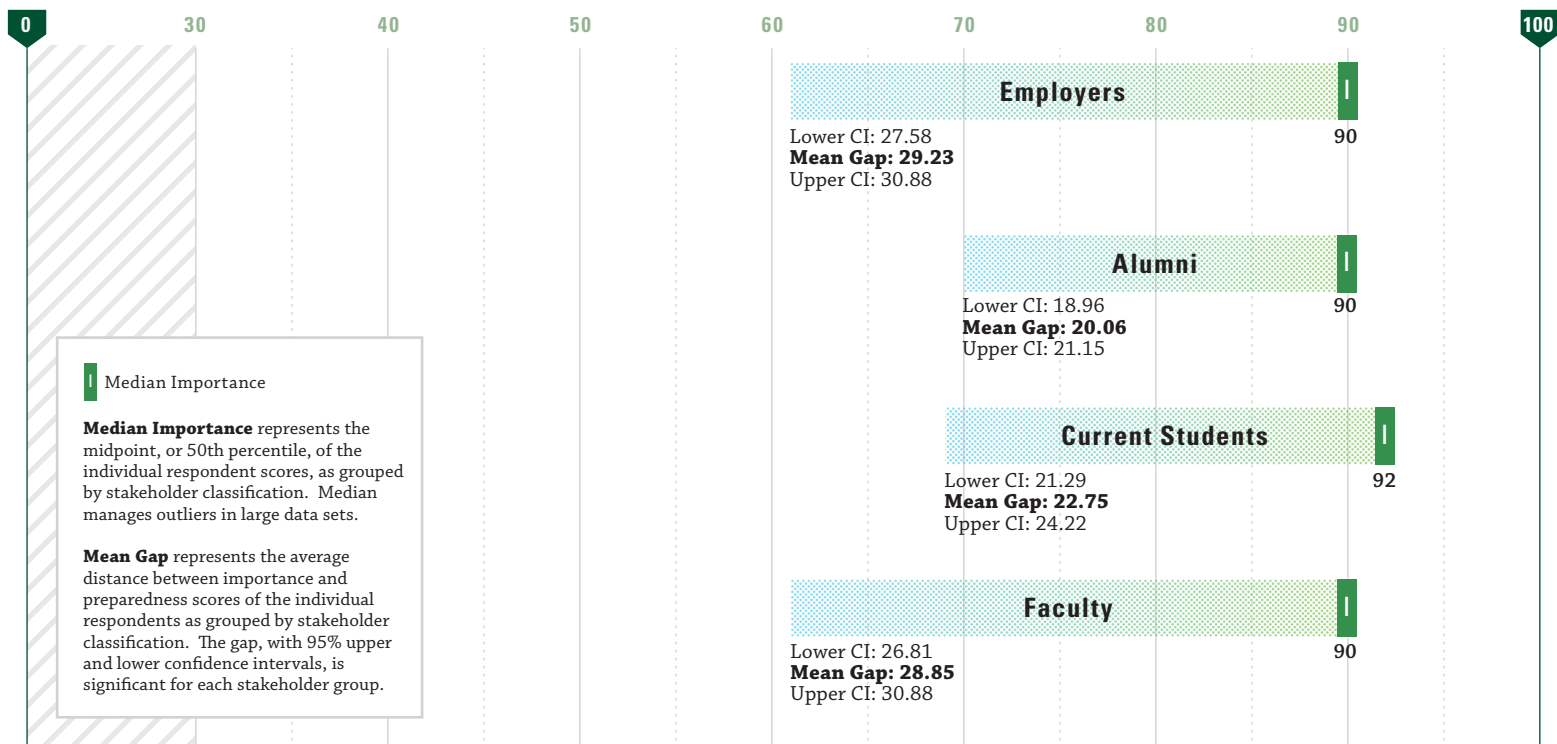


Figure 22: Preparedness Gap with Upper and Lower CI for Build Professional Relationships

Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 7
PROFESSIONALISM

Build Professional Relationships

Building professional relationships was the largest preparedness gap for the students, and 2nd largest gap for alumni. This contrasts with the employer perspective, with *professional relationships* placing 7th. (Figure 22).



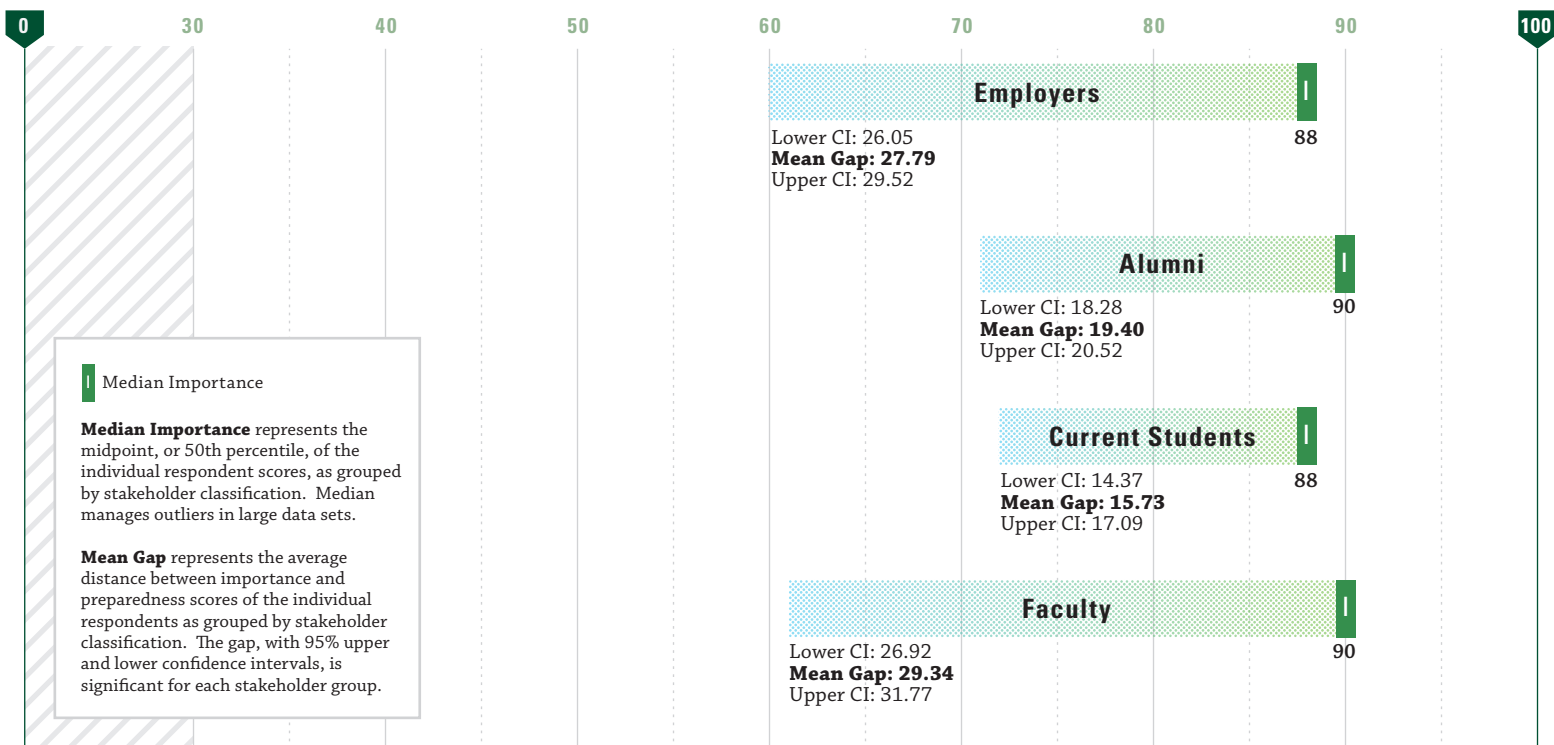


Figure 23: Preparedness Gap with Upper and Lower CI for Navigate Change and Ambiguity
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 8
PROFESSIONALISM

Navigate Change and Ambiguity

New employee preparedness to *navigating change and ambiguity* is viewed as the 8th, out of the 11 skills in preparedness gap, for employers. This contrasts with alumni and students, who ranked this skill gap as 3rd of 11, and faculty who ranked it 4th of 11. (Figure 23).



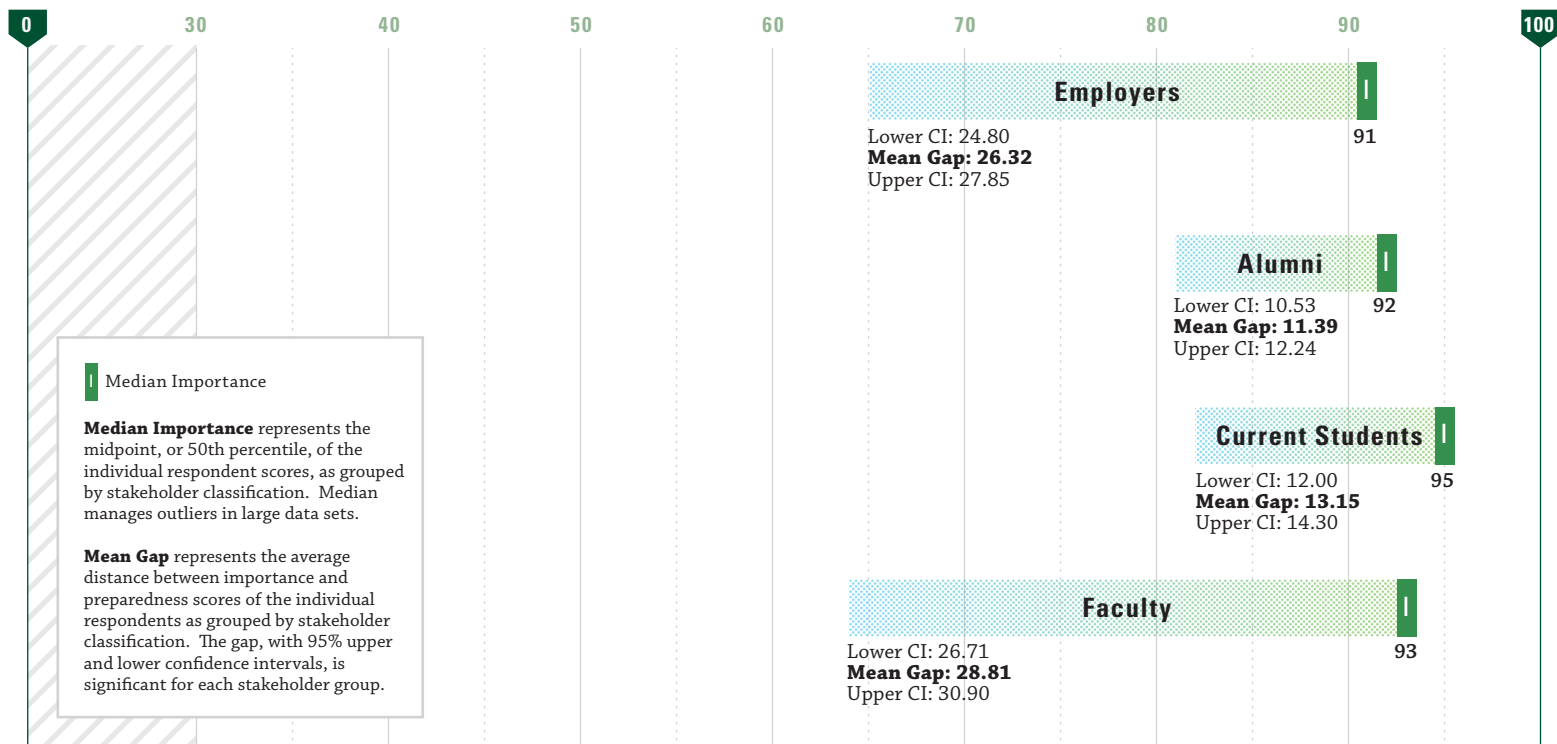


Figure 24: Preparedness Gap with Upper and Lower CI for Identify and Analyze Problems
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 9
DECISION MAKING

Identify and Analyze Problems

Identify and analyze problems is in the bottom half of the list (a smaller preparedness gap) for all the groups: 9th for employers and alumni, 6th for faculty and 7th for students. (Figure 24).



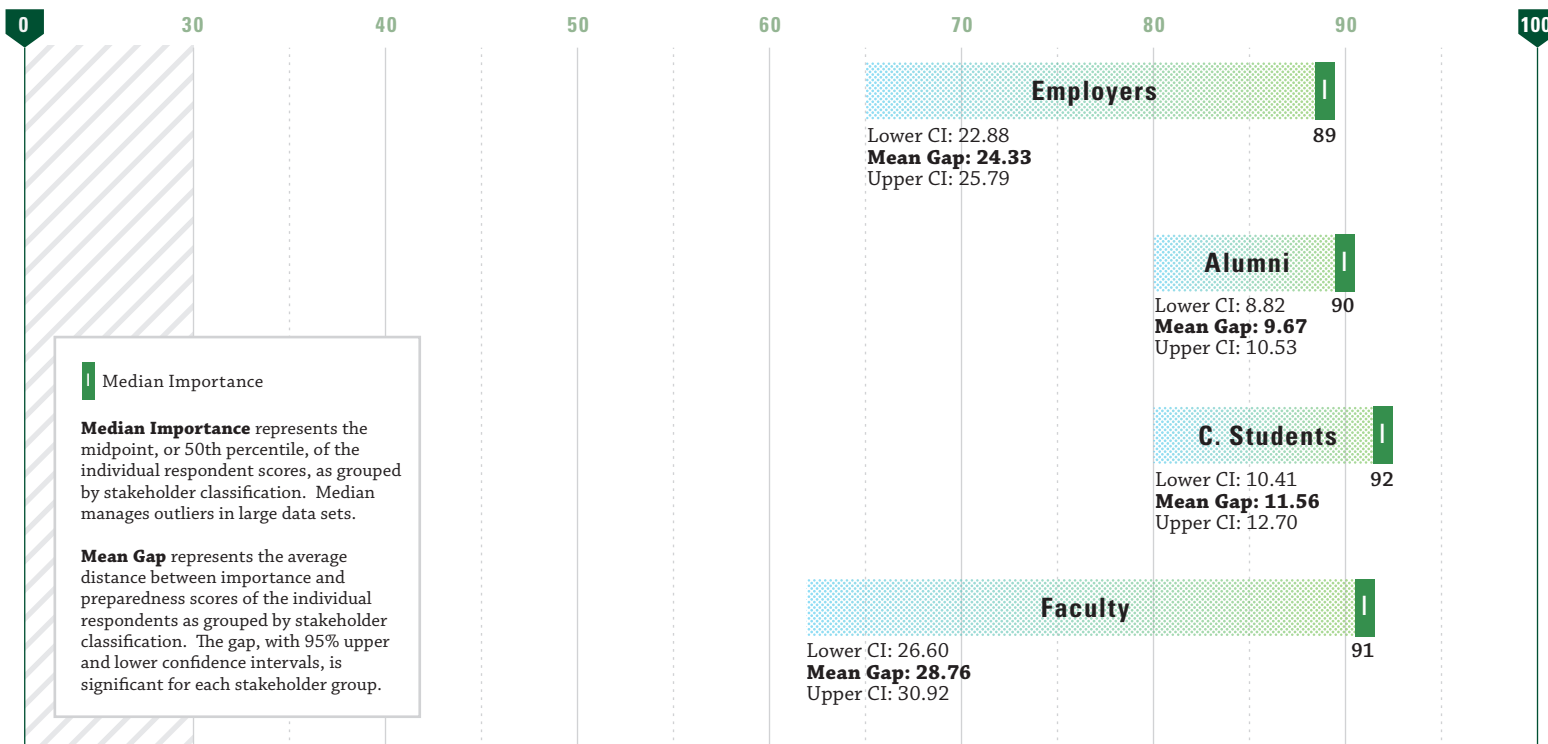


Figure 25: Preparedness Gap with Upper and Lower CI for Transfer Knowledge from One Situation to Another
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 10
DECISION MAKING

Transfer Knowledge from Situation to Another

Similar to skill 9, *identify and analyze problems, transferring knowledge from one situation to another* is in the bottom third of the gap ratings, landing in the 10th, 11th, 7th, and 9th spots respectively for employers, alumni, faculty and students. (Figure 25).

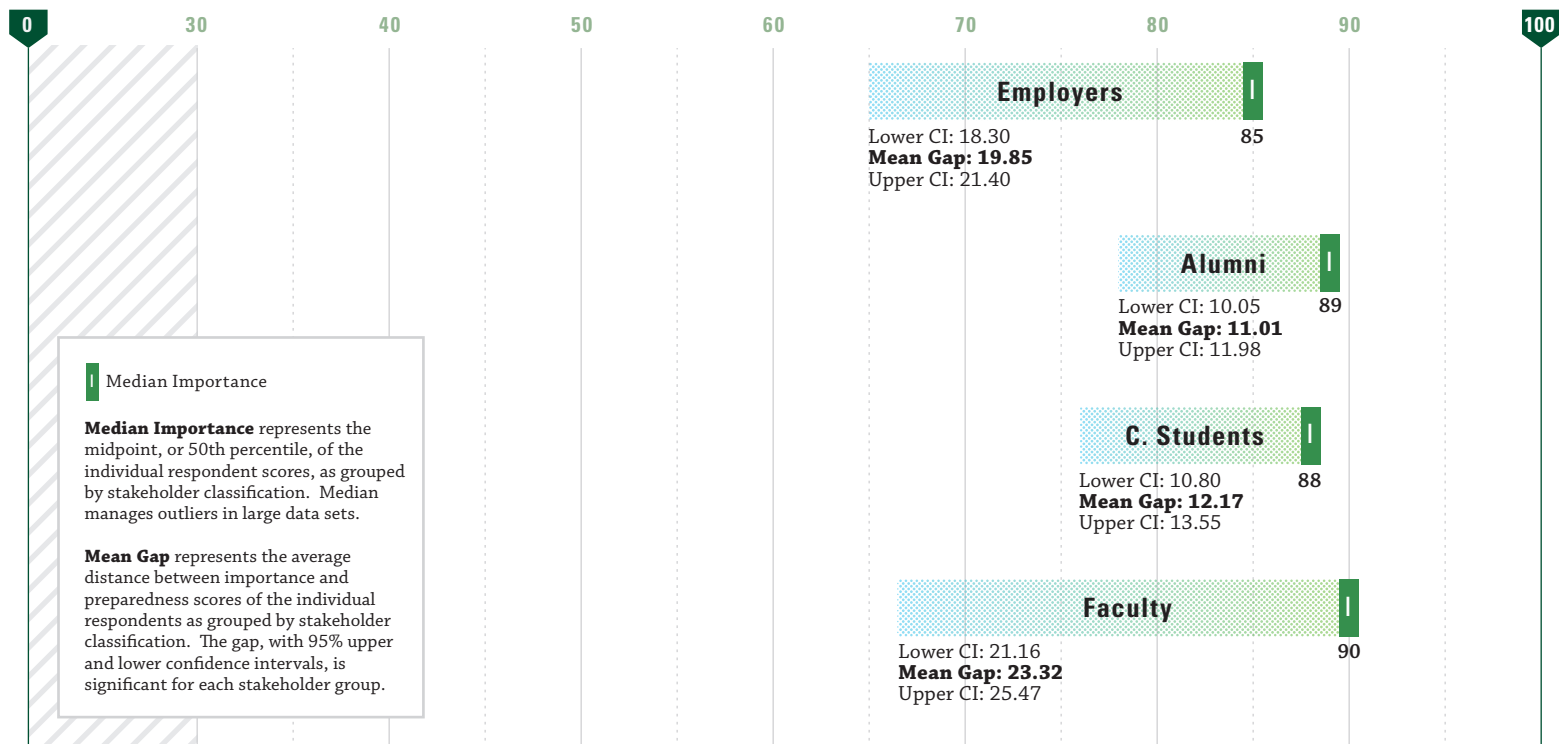


Figure 26: Preparedness Gap with Upper and Lower CI for Ask Good Questions
 Median Importance with Mean Importance-Preparedness Gap Confidence Intervals

SKILL 11

COMMUNICATION

Ask Good Questions

Asking good questions is in the 11th spot for preparedness gap from the employer perspective and 8th from the student perspective. It is worth noting that even though it is the smallest gap of the eleven skills focused on in this research, it still represents a significant gap between importance and preparedness. (Figure 26).



Activities that Promote Employability Skill Development

Employers and faculty identify the same top eight activities as important for developing employability skills outside the classroom. Employers are looking for these activities on resumes, and faculty feel these activities build employability skills. Activities identified as useful in building skills are: work, internships, career- or major-related student organization, volunteerism, research with a mentor, international travel of any kind, varsity and club or intramural sports, and judging or competitive events. (Figures 27-30 and Tables 23-26). While many students and alumni report engaging in these activities while they are in college, those who do not should be encouraged to join in such activities.

The faculty response to which activities would help students gain employability skills is in alignment with employers, alumni and students with one exception. For faculty, participating in judging or competitive events fell in the 7th spot, ousting sports. In comparison, judging or competitive events fell at the 8th spot for employers, 10th for alumni and 11th for students.



Table 23: Activities - Employer

Of the following, what are the top 5 activities you're looking for on a resume? - Industry Employers / Professionals

Activity	College Frequency	Order	Activity	College Frequency	Order
Work	1712	1	FFA	170	11
Internship	1637	2	4-H	103	12
Career- or major-related student organizations	1145	3	Religious Organizations or Campus Ministry	75	13
Volunteerism	810	4	Greek Life/Greek Organizations	67	14
Research with a mentor	694	5	Student Government	66	15
International travel of any kind	290	6	AFA	61	16
Sports - varsity, club, intramural	238	7	Activist Groups	59	17
Judging or Competitive Events	223	8	Performing Arts/Music	58	18
ROTC/Reserves/Military	216	9	MANNRS	33	19
Philanthropic organization	188	10	Total	7845	

(FFA, 4-H, AFA, MANNRS: These organizations may not exist on all campuses or have limited access for participation by many students. For this reason, individually they will have lower frequency ratings.)

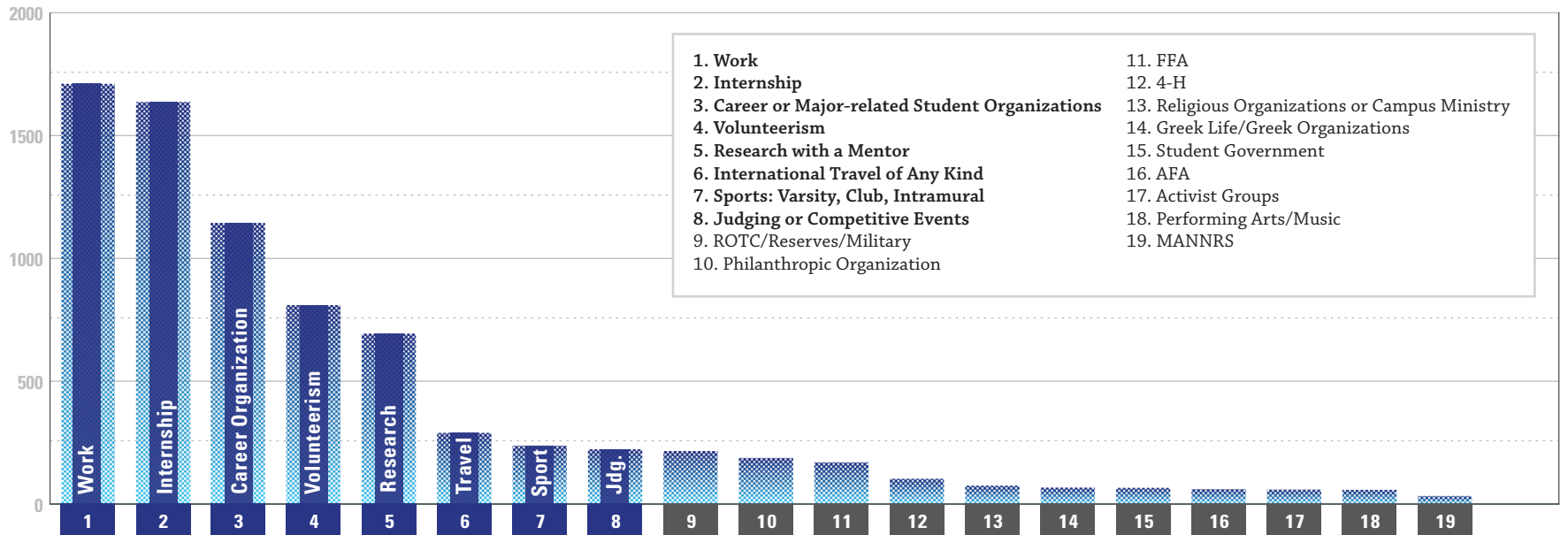


Figure 27: Employability Skill Building Activities - Employer

Employer top college activities looking for on a resume. Total Frequency of Activities Selected: 7845



Table 24: Activities - Faculty

Which of the following activities best help students develop these skills? (please select the top 5) - Faculty

Activity	College Frequency	Order	Activity	College Frequency	Order
Internship	677	1	Religious Organizations or Campus Ministry	58	11
Research with a mentor	582	2	Philanthropic organization	51	12
Work	546	3	Activist Groups	50	13
Career- or major-related student organizations	364	4	FFA	47	14
International travel of any kind	360	5	4-H	41	15
Volunteerism	323	6	Greek Life/Greek Organizations	34	16
Judging or Competitive Events	110	7	Performing Arts/Music	32	17
Sports - varsity, club, intramural	67	8	AFA	18	18
ROTC/Reserves/Military	65	9	MANNRS	16	19
Student Government	62	10	Total	3990	

(FFA, 4-H, AFA, MANNRS: These organizations may not exist on all campuses or have limited access for participation by many students. For this reason, individually they will have lower frequency ratings.)

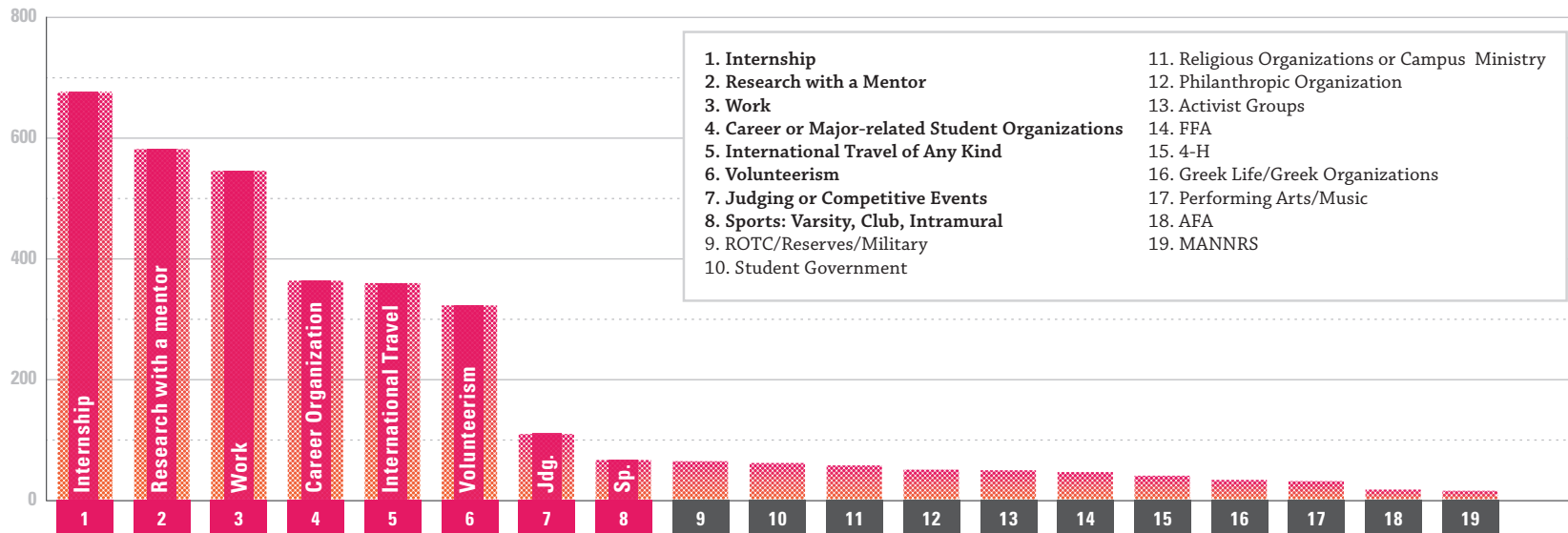


Figure 28: Employability Skill Building Activities - Faculty

Top college activities for developing employability skills.

Table 25: Activities - Alumni

Did you participate in any of the following activities in college? Please select all that apply. - Alumni

Activity	College Frequency	Order	Activity	College Frequency	Order
Work	3434	1	Student Government	526	11
Career- or major-related student organizations	2643	2	Philanthropic organization	510	12
Internship	2103	3	Performing Arts/Music	442	13
Research with a mentor	1774	4	Activist Groups	410	14
Volunteerism	1762	5	FFA	351	15
Sports - varsity, club, intramural	1689	6	ROTC/Reserves/Military	345	16
International Travel	1150	7	4H	235	17
Greek Life/Greek Organizations	1039	8	AFA	99	18
Religious Organizations or Campus Ministry	960	9	MANRRS	32	19
Judging or Competitive Events	812	10	Total	20316	

(FFA, 4-H, AFA, MANNRS: These organizations may not exist on all campuses or have limited access for participation by many students. For this reason, individually they will have lower frequency ratings.)

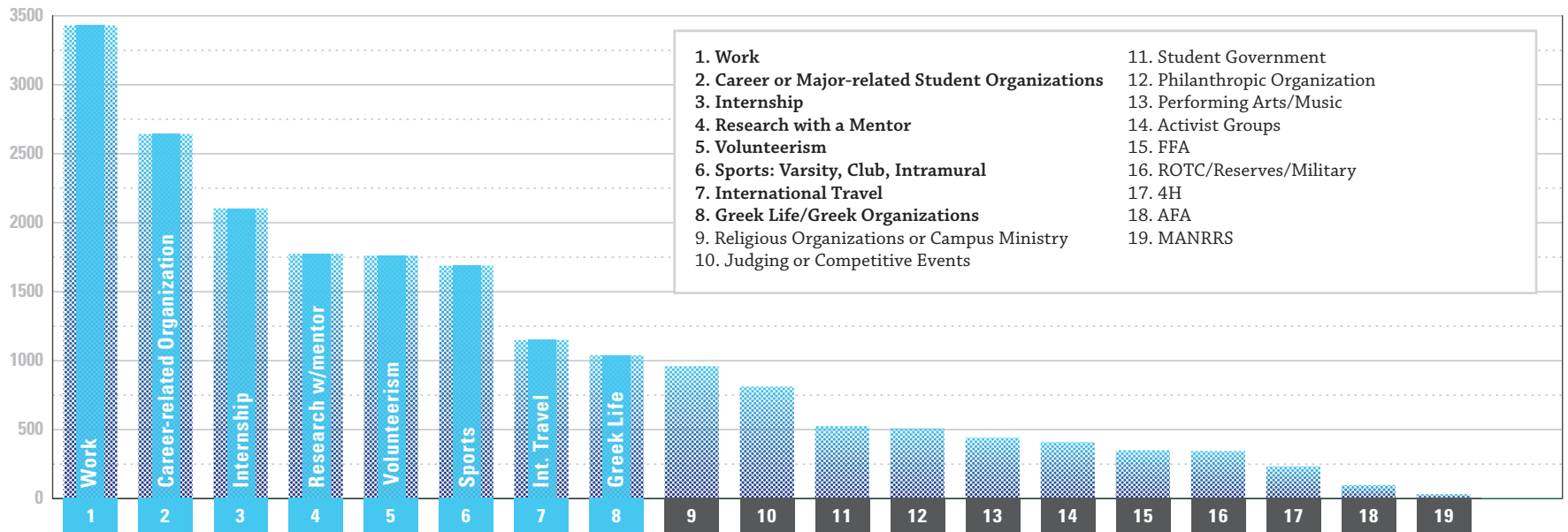


Figure 29: Activities Participated in During College - Alumni

Total Frequency of Activities Selected: 20,316



Table 26: Activities - Students

Did you participate in any of the following activities in college? Please select all that apply. - Current Students

Activity	College Frequency	Order	Activity	College Frequency	Order
Work	1733	1	Judging or Competitive Events	350	11
Career- or major-related student organizations	1452	2	Student Government	219	12
Volunteerism	1312	3	Activist Groups	215	13
Internship	1182	4	Performing Arts/Music	214	14
Research with a mentor	910	5	FFA	200	15
International Travel	777	6	AFA	125	16
Sports - varsity, club, intramural	685	7	4H	120	17
Religious Organizations or Campus Ministry	582	8	ROTC/Reserves/Military	47	18
Greek Life/Greek Organizations	499	9	MANRRS	32	19
Philanthropic organization	392	10	Total	11046	

(FFA, 4-H, AFA, MANNRS: These organizations may not exist on all campuses or have limited access for participation by many students. For this reason, individually they will have lower frequency ratings.)

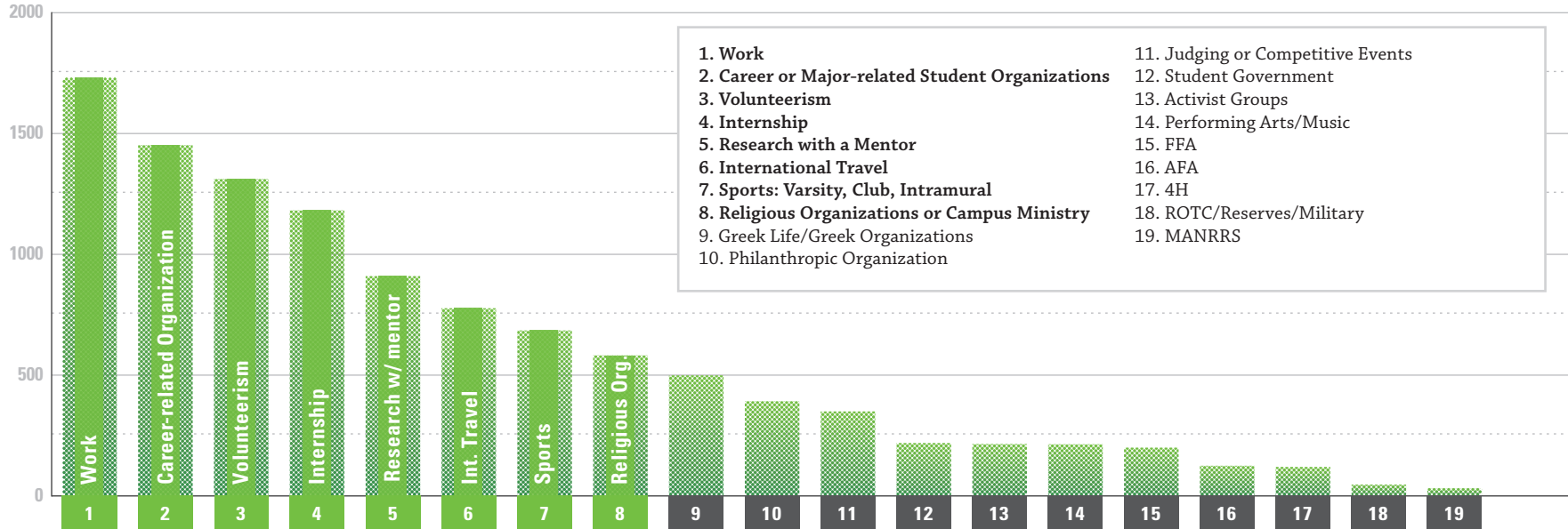


Figure 30: Activities Participated in During College - Students

Total Frequency of Activities Selected: 11,046



Conclusion

Much remains to be examined, particularly with respect to how to incorporate these results into formal and informal teaching settings. Further, more exploration and collaboration are needed to strengthen the relationships between academia and employers to improve the transition of new graduates to employment. Make no mistake, however, these skills could be invaluable to alumni as they navigate the working world during their first few years out of college. A smooth transition could improve an alum's view of their alma mater, particularly if the institution made clear the intention of teaching these skills while it was happening.

| APPENDICES

Three appendices are provided with greater detail on the literature used during development of this work.

1. Bibliography of 2011 employability skills literature used in the analysis to develop employability skill clusters and characteristics.
2. How the 2011 Employability Skills Report is Used by Others
3. Summary of Current Employability Skills Research

The two literature summaries (Appendix 2 & 3) were written as separate inquiries, resulting in overlap between the two documents.

VIEW THE EMPLOYABILITY SKILLS EXECUTIVE SUMMARY:

www.aplu.org/Employability-Skills-Executive-Summary

VIEW EMPLOYABILITY SKILLS NAVIGATING IN THE WORKPLACE:

www.aplu.org/Employability-Skills-Navigating-in-the-Workplace

VIEW EMPLOYABILITY SKILLS CRITICAL GROWTH AREAS:

www.aplu.org/Employability-Skills-Critical-Growth-Areas

VIEW THE 2011 REPORT:

www.aplu.org/Comparative-Analysis-of-Soft-Skills



APPENDIX 1:

Bibliography of 2011 Employability Skills Literature Used in the Analysis to Develop Employability Skill Clusters and Characteristics.

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APPENDIX 2:

How the 2011 Employability Skills Report is Used by Others

Since the 2011 study, the discussion and research on employability skills for employability of new grads has continued, with the APLU study findings being cited as a fundamental source to base further research. The report has 137 unique citations (identified through Google Scholar, 20 June 2020) and has been cited by international educators and researchers from Poland, United Kingdom, Spain, Australia, South Africa, China, Indonesia, and Croatia.

The report is often used in the literature review section, as a justification for the need of their research. Most research focused on a specific field and attempted to either further specify the skills necessary for that specific field, test teaching mechanisms aimed at developing all or some employability skills in students, and/or above all, to recommend curriculum changes to address employability skills. The majority of individual skill development research addresses APLU's identification of communication as a top skill desired by employers, but studies also focus on how to individually develop decision making/problem solving and leadership skills. Numerous studies testing teaching mechanisms look at several or all of the identified employability skills rather than just one.

Comprehensive Employability Skills Studies

A comprehensive study looking at employability skills research and citing the APLU study was the DiBenedetto & Myers 2016 literature review. This review is a general overview of current employability skills research, identifying the 21st century career vital skills most commonly cited. The researchers identified the APLU study as one of the nine seminal studies in current research to date. The goal of their work being to create a framework from which colleges and universities could work in building relevant curriculum to prepare students for the 21st century workforce. Their review identified the nine constructs of vital skills of employability as learning skills, life skills, career skills, social skills, knowledge competencies, incidental learning skills, dispositions, experiences and interdisciplinary skills.

Further Research on Employability-Skills Identification for Curriculum Analysis and Development

Many studies have used the APLU study as a starting point for conducting further employability skills identification research, usually seeking the employability-skills specific to their field. Many researchers have conducted their own survey of those within the profession to help identify field specific skills. Others have used the skills identified in the APLU study to make curriculum and program change recommendations within their field or to inventory and assess the current offerings in hopes for a starting place for improvement.

| AGRICULTURE

Moore et al. (2013) looked at students' perceptions of what they would attain from the agricultural leadership degree and found that students listed most of the employability skills listed in the APLU study. The researchers pointed to the APLU study to show the importance of these skills' identification by students. The research will be used to help develop an image of the importance of a degree in agricultural leadership to the outside world as well as to ensure that expectations are aligning with the current curriculum for the program.

Morgan et al. (2013) built off the Crawford et al. (2011) established skills to survey Agricultural Leadership faculty experts in order to develop and prioritize program objectives, course requirements, and establish the value of internships in the program.

Within agricultural communications, the APLU study's list of agricultural programs was used to collect data to analyze the course offerings of the different agricultural communications programs throughout the nation. They found a wide variety of offerings throughout the programs and noted that the research can be used to communicate the concepts of agricultural communications programs nationally.

To identify the professional development needs of agricultural communicators, Chester (2014) pointed to the APLU findings that students with good communication skills are likely to be hired over others regardless of major as reason to investigate employability skills training deficiencies in their field. The self-management skill of strategic planning was identified as the skill most needing training attention.

Looking to develop curriculum to develop global awareness in agricultural students, Sharp (2013) uses the APLU study

to show that colleges of agriculture have a responsibility to teach students employability skills to prepare them for the workforce. The research found that agricultural teachers feel underprepared to teach about global issues and calls for better teacher training to better develop employability skills (important for the global mindset) in students.

In order to determine the effectiveness of current curriculum at Virginia Tech College of Agriculture and Life Science, the Crawford et al. (2011) study was used as a basis to assess the current curriculum's ability to prepare students for career success, noting that problem solving and leadership skills were important for career success and that colleges must improve in teaching these skills (Rateau, 2011).

In an extremely specific use of the APLU findings, some studies have modeled further employability skills studies directly off the Crawford et al. (2011) model and findings. Moore (2015) used the APLU findings to assess the perceptions of the importance as well as perceived abilities specifically for University of Arizona College of Agriculture (UA CALS) students. Their research found a different ranking for employability skills importance than that of the APLU study and found that UA CALS students perceive their abilities in communication, team, and professional skills are high. From these findings, curriculum recommendations were also made. A follow-up study of UA CALS alumni based off the Crawford et al. (2011) identified employability skills for workforce readiness found that overall, UA CALS alumni were only slightly satisfied with their degree selection. Though they felt that their degree had prepared them for their careers in terms of the Crawford et al. (2011) identified employability skills, they believed that they could have used more guidance in finding internships and would have benefited from more work-related experience (Tanner, 2014).

In a more general sense for rural agricultural students, one researcher used the Crawford et al. (2011) findings as a reason to identify the attitudes of rural students towards university learning, pointing to the need for special attention being taken to employability skills learning for rural students. The research argues that introductory writing classes can be used as a way to “acculturate” rural students to the transformative nature of learning (Griffith, 2012).

| FORESTRY

In forestry, the results and recommendations of the APLU study were referred to as one of several studies supporting the need for regular curricula survey, analysis, and review to ensure relevance. Results of a field-specific survey found similar findings to that of Crawford et al. (2011) that students are well-prepared in the technical aspects of the job, but less prepared in the “human dimensions” of the jobs including conflict management, workplace communication, and client and public communication (Sample et al., 2015). A follow-up curricula review session used the Sample et al. (2015) results and pointed to the Crawford et al.’s (2011) data-driven evidence that people skills are a workplace necessity as reason to ensure these skills are being developed in their university courses. Recommendations for improving curricula include cultivating speaking, writing, and communication skills, and professionalism (Bullard, 2015).

| FISHERIES AND WILDLIFE

Students, faculty, and employers of the American Fisheries Society were surveyed in a fashion similar to that of the APLU study to determine the field-specific job skills and knowledge of academic topics deemed most important for workplace success. Pointed as being similar in findings to that of the Crawford et

al. (2011) study, they found that communication and people skills, including interpersonal communication skills, working in teams, human dimensions, and policy, were all deemed highly important and lacking in new hires. Recommendations for curriculum and employer responsibilities were made to foster these skills in students (McMullin et al., 2016).

Citing the Crawford et al. (2011) findings that students are not well trained in employability skills and that employers desire these skills in their new hires as a basis for further inquiry, Edge (2016) further investigated the Fisheries and Wildlife field to assess what is currently being taught and how to improve curricula based on the needs of employers. The researcher recommends increasing program flexibility, including at least two internships, accommodating study abroad, and incorporating essential and conservation-relevant concepts throughout the program as ways to improve employability skill development and better prepare students for the changing workforce.

| PLANT PATHOLOGY

The field of plant pathology builds upon the Crawford et al. (2011) findings to assess their own field-specific employability skill needs. Researchers use surveys of the American Phytopathological Society to find that the field recognizes the need for employability skills development, and suggests that future education should include employability skills, managerial, and leadership education. They further refer to the Crawford study to point to possible solutions to closing the education gap by utilizing guided, active and intentional learning in curriculum development in the university setting (Beckerman & Schneider, 2016).

| ENGINEERING

In engineering, Dietrich (2012) studied the differences in skills between practicing engineers and engineers who have attained a leadership role. One basis for Dietrich's study was the APLU study identifying communication and decision making/problem solving as two of the most important skills for new employees. The study found several differences between the two groups in terms of skill development. The goal is to use the research to develop better engineering curriculum and thus better 21st century engineers. Further citing Crawford et al. (2011) skills clusters as the most important skills for job readiness in the field of engineering, Pistrui et al. (2013) analyzed data from a national survey of 4,965 engineering undergraduate students, and 313 EMEs, and found that existing engineering curriculum was producing no measurable difference between freshmen and seniors' competencies in conflict management, flexibility, goal orientation, persuasion, futuristic thinking, leadership, and employee development/coaching. Recommendations were made to include cross-disciplined curriculum, rewards and recognitions for co/extra-curriculars and service learning, enhanced mentoring and industry exposure, and more faculty engagement (Pistrui et al., 2013).

| HOSPITALITY, RETAIL, TOURISM, AND MANAGEMENT

To aid curriculum development in the field of retail and tourism management, Wesley et al. (2017) conducted a study seeking to understand the perceptions of the importance of employability skills by students, faculty, and employers and found variations in the ranked importance of employability skills of the three groups. Most notably, they found that communication was the most important identified skill by

all three groups. Experiences were ranked least important by students and leadership was ranked the least important by faculty and employers.

Addressing the importance of employability skills as identified by Crawford et al. (2011), Asik-Dizdar (2015) identified the disconnect between practitioners and academics as a failure of management education in preparing students for the workforce. The researcher suggests clinical teaching, experiential learning, and job-shadowing as ways to improve management curriculum and better prepare students.

Testing Teaching Methods for Targeted Skills

The findings of the Crawford et al. (2011) studies have been used numerous times in a variety of fields to help improve the current curriculum and better prepare students for the future. While it has been used for curriculum analysis and recommendations, it has also been cited as a reason to test a particular curriculum for developing the said employability skills. In research testing particular employability skills teaching methods, some have focused on one skill of specific interest within the discipline or a specific course.

| SINGLE TARGETED SKILL: DECISION MAKING/PROBLEM-SOLVING

Based on the Crawford et al. (2011) findings on decision making/problem solving and critical thinking, Stedman & Adams (2014) investigated whether an online learning environment vs. classroom-learning environment changed critical thinking behavior in students, finding that the online learning environment did aid in employability skill development leading to better critical thinking.

Testing another teaching mechanism for decision making/problem solving, learning contracts, Miller-Foster et al. (2015) sought to find ways to teach global learning in agricultural students in the classroom. The researchers found that learning contracts were in fact an effective way to develop global learning skills. They point to creativity (within the cluster of decision making/problem solving) as a skill identified by Crawford et al. as an important personal development skill in developing their global learning skills.

| COMMUNICATION

Noting the importance of communication pointed to in the APLU student, Edmonds et al. (2016) looked at what factors influence this skill in agricultural students in order to develop more effective curriculum. Students identified experiences which forced them out of their comfort zones to communicate with professionals and observing others with both weak and strong communication skills as the biggest contributor to developing communication skills while at university. The researchers made recommendations to develop curriculum accordingly.

Also based on the identification by Crawford et al. (2011) of communication as the most important skill for career success, Ahrens et al. (2016) further explored ways to reduce communication and writing apprehension in agricultural students. The research suggested that small class sizes, limited group work, increased speaking opportunities, constructive criticism on writing, and practice in building communication skills are helpful teaching mechanisms for lowering communication and writing apprehension.

Leggette et al. (2015) used the findings of the study as a justification to further explore effective curriculum in writing (communication) in the field of agriculture. Their research explored

perspectives of writing as a way to develop critical thinking skills and knowledge creation for agriculture (Leggette et al., 2015) and to develop a model to be used in the classroom of how to write to develop employability skills (Leggette et al., 2015). The purpose of the research was to help develop more useful teaching mechanisms in the classroom and establish guidelines for the classroom.

| LEADERSHIP

Looking specifically at leadership (as this is a skill expected of University of New South Wales students), research has looked at whether service leadership courses make a difference in leadership skills, on the basis that leadership and other skills are skills that are highly desired by employers according to Crawford et al. (2011). Research found that an intensive service leadership course was effective in developing understanding and quality of service leadership in students (Shek et al. (2017) as well as promoting youth development and life satisfaction.

Also based on the Crawford et al. (2011) findings that employers want new hires that can see the “big picture” and think strategically, leadership coursework was assessed to see if it made a difference in hierarchical leadership thinking. A formal leadership course was found to help students lessen their hierarchical leadership beliefs (a scale rating of how much one believes a sole leader is responsible for the success or failure of a project rather than the team being responsible) and gain a better understanding of how leadership and success is a collaborative process of the system (Ho & Odom, 2015).

| CONFIDENCE

Although not listed within the seven skills clusters, Justice & Proctor (2016) point to the findings of the APLU study as a reason to investigate online interview simulations as a way to build confidence and preparedness in job interview skills. They found that online simulations are not an effective way to build confidence.

Multiple Skills and Experiences

While some studies have just looked at how well teaching mechanisms develop one skill, many have tested methods for teaching several of the APLU identified skills.

| EXTRA-CURRICULARS

Identifying the APLU study as one study pointing to the under-preparedness of students' employability skills for the workforce and its suggestion that universities must better prepare students, researchers assessed whether students believed extra-curricular participation had influenced their communication and leadership confidence. They found that extra-curricular participation was in fact perceived by students to have had an impact on communication and leadership confidence (Nerswick, 2012).

| INTERNSHIPS

Looking at specific techniques in engineering teaching, 10-week internships were assessed to determine if they helped develop the skills pointed to in the APLU study, among others. The Crawford et al. (2011) was pointed to as finding that employers believe students are underprepared for the workplace and that applied skills are necessary for

new hires along with technical skills. The study found that internships were found to improve engineering student's preparedness for the workforce and allowed them to develop real-world communication, critical thinking, decision making, leadership, and self-management skills and gave them applicable experiences. Mentors and students both reported students' professional growth and development through the internship (Brush et al., 2014).

Looking at internships' effects on animal health interns, Duncan et al. (2017) used the Crawford et al. (2011) findings as a reason to assess the expansion the self-perception of communication, leadership, and critical thinking skills through internships. These skills were chosen based on the Crawford et al. findings and their deemed relevance to the field. Results showed that internships were found to increase students' self-perceptions of the employability skills competencies (Duncan et al., 2017).

In agriculture, also based on the APLU identification of employability skills importance, Marsh et al. (2016) studied the changes of perceptions by students and mentors of employability skills competencies after completing an internship. They found that students and mentors perceived most of their employability skills improved through the completion of the internship, including written and oral communication. The study points to the value of internships for agricultural curriculum.

Similar to internships, to support experiential learning by turfgrass majors, Baldwin et al. (2017) cited the Crawford et al. (2011) identified skills as skills that students recognized as important for workforce success and easier learned outside of the classroom.

| INTERNATIONAL EXPERIENCES

Based on the Crawford et al. (2011) findings that communication, problem solving, teamwork, and leadership skills are valued by employers, White (2016) studied the effectiveness of international equine experience in developing these skills in students. The research found that current employers of those who participated in the international equine experiences believed that the graduated students were good team players, excellent public speakers, worked well in a diverse group, and had good problem-solving skills. White suggests that a better understanding of the connection of international experiences in developing employability skills is necessary to help employers understand the value of the experience.

| ACTIVE CLASSROOM ENGAGEMENT

Based on the findings that employers are looking for more employability skills along with the technical skills, Malliaris & Buder (2015) investigated the effectiveness of an undergraduate engaged learning Analytical Decision-Making Course that attempted to keep students active in class and develop oral presentation skills, written communication, teamwork, research, and analytical skills through an original student research project. The study found that students improved their oral and written presentation skills, team working skills, analytical skills, and their ability to accept criticism in a non-threatening way, as well as that student activity in the classroom additionally led to improvements in attendance.

For computer science majors, research looks to find ways to incorporate employability skills learning into the classroom based on the need identified by Crawford et al. (2011) among other studies. Bignaut et al. (2013) found that a situated learning environment assignment designed to promote professional, personal, and self-discipline skills enhanced students'

understanding of the challenges of the market and to reflect on other's needs, allowing computer science students an opportunity to develop the professional and personal skills necessary in the job market.

In hotel and restaurant management, the Crawford et al. (2011) study was used as a basis for developing an app to help students learn the APLU-identified seven skills clusters, among other skills. The goal is to help promote the development of 21st century skills in students using new, student-centric teaching methods. Students are given ambiguous direction and must solve a hospitality problem as a team. Then they must develop a client-based product based on the same variables that would be relevant in the workforce, exposing them to all the workplace necessary skills (Mayfield et al. 2014).

Also technologically forward, Castillo et al. (2017) use the APLU findings to assess video games' effectiveness as a classroom tool for developing employability skills. They find that video games have been shown to enhance persistence, as well develop the motivation-linked emotions of concentration and frustration, which they cite as interconnected to employability skills.

Recommendations Based on Teaching Experience

Experienced teachers have used the findings of the Crawford et al. (2011) study to shape their own curriculum and to make recommendations to other teachers on classroom techniques. In making recommendations for shaping classes to optimize learning, Marchant (2014) and Marchant & Morgan (2016) use classroom techniques to teach the important skills

identified to them as important by Crawford et al. They use group work, presentations, and executive summaries to develop teamwork and communication skills.

While not necessarily based on experience, but based on research by the agency, an opinion piece by the Department of Education in Tanzania cites the findings of the Crawford et al. (2011) as a reason to develop science curriculum to develop teamwork, leadership, decision making, self-management, and professionalism skills, or, life skills (Thanga, 2015).

Conclusion

Overall, the original APLU Employability Skills study by Crawford, Lang, Fink, Dalton, and Feilitz (2011) have been used in a variety of ways to progress employability skills research and lead to more effective university programs. The findings have been the basis for numerous studies looking to better prepare university students for the workplace. Although the research originally focused on the field of agriculture, and is still used within that field, several other fields have adopted the findings to apply to their own discipline, or used the model in a way to conduct similar research within the given specialty.

Most research conducted based on the original APLU findings has focused on how to improve curriculum to meet the needs of employers by incorporating employability skills training into coursework, rather than teaching a class specifically focused on one or two skills. Several teaching methodologies have been tested and found to develop employability skills in the classroom, focusing especially on communication, decision making/problem solving, and

leadership. While communication and decision making/problem solving tend to be mentioned as the top skills desired by employers and those that researchers are trying to develop, the majority of studies tried to develop or identify many of the skills identified in the original APLU study. Numerous teaching methodologies have been recommended as ways to improve current university program practices.

Though much research remains to further hone the best ways to teach employability skills to university students, the APLU research has thus far played a role in advancing knowledge and practice.

APPENDIX 3:

Summary of Current Employability Skills Research

Employability skills, or soft skills, are the nontechnical, off-the-paper, “people” skills used every day in the workforce to ensure the smooth operation of projects and offices. Several definitions and descriptions of employability skills have been used through the years, as these skills cover a range of competencies (Crawford et al., 2011). Since 2011, the discussion and research on employability skills has continued and evolved to focus on 21st century critical competencies for employability of new graduates. This review focuses on peer review journal articles on employability skills published between 2012 and 2018. A few extensive comprehensive studies have been conducted, followed by further research focusing on identifying and exploring deeper specifics on various employability skills, identifying the top employability skills necessary for particular fields and professions, and evaluating or recommending education mechanisms that encourage the teaching and learning of particular employability skills.

Recent Comprehensive Studies Identifying Necessary Employability Skills

Several separate comprehensive surveys have assessed the skills employers, faculty, and students believe are important for career success and what perceptions exist of student preparedness. The Association of Public Land-grant Universities (APLU) in 2011,

the Association of American Colleges and Universities in 2015 and annually the National Association of Colleges and Employers’ (NACE) Job Outlook Survey have used similar skills lists to survey stakeholders. All have recognized obvious gaps between student’s self-perceptions of readiness and employers’ opinions.

NACE’s survey of 4,213 college seniors and 201 employers identified eight “competencies” (professionalism/work ethic, oral/written communications, critical thinking/problem solving, teamwork/collaboration, leadership, digital technology, career management, and global/intercultural fluency), and found that exceptionally large disparities exist between seniors and employers’ perceptions of proficiency in professionalism, work ethic, oral and written communication, and critical thinking. Overall, a large majority of students rated themselves as proficient in almost every category (the exceptions being career management and global/intercultural fluency), while generally less than 50% of employers rated recent grads as proficient in almost every category (the exceptions being teamwork/collaboration and digital technology) (NACE, 2017; Bauer-Wolf, 2018).

The survey of students’ perceptions and employer’s skills valuations for new hires by Hart Research Associates (2015) for the Association of American Colleges and Universities listing 17 skills found that written and oral communication skills, teamwork skills, ethical decision-making, critical thinking, and the ability to apply knowledge in real-world settings ranked as the top five most important skills employers perceive necessary for career success. Again, large disparities were found in student and employers’ perceptions of preparedness, with students believing they were very prepared and employers disagreeing (Hart Research Associates, 2015; Jaschik, 2018).

A 2013 and 2016 internal Google survey found that the best predictors for success at Google were all employability skills, with technical (STEM) skills ranked as the least important quality. The top eight qualities included being a good coach, communicating and listening well, possessing insights into others (including other different values and points of view), having empathy toward and being supportive of one's colleagues, being a good critical thinker and problem solver, and being able to make connections across complex ideas. When asked about what skills successful teams possessed at Google, employability skills, including equality, generosity, curiosity toward the ideas of your teammates, empathy, and emotional intelligence, were all included, with emotional intelligence ranking number one (Strauss, 2017).

Regardless of ranking, a 2016 literature review of employability skills of the 21st century by DiBenedetto & Myers identified the nine constructs of vital skills of employability as learning skills, life skills, career skills, social skills, knowledge competencies, incidental learning skills, dispositions, experiences and interdisciplinary skills. The study used what the authors identified as the nine most relevant studies in current research to conduct its review, its goal being to create a framework from which colleges and universities could work in building relevant curriculum to prepare students for the 21st century workforce.

Field Specific Skill Identification and Perception

While a few broad surveys exist, many recent studies attempt to identify employability skills important for field-specific career success.

A survey of Fisheries professionals found results similar to the broader surveys. Employers, students, and university faculty ranked critical thinking and written and oral communication as the most important skills for career success, while employers rated recent graduates as less prepared in critical thinking skills, effective written communication skills, effective oral communication skills, and technical knowledge of fisheries/aquatic sciences for success than did academic respondents, with post-graduate entry-level hires being seen as more prepared than undergraduate entry-level hires (McMullin et al, 2016).

In engineering, a study of interns and mentors found that both groups ranked the top three skill sets (out of nine) for career success as critical thinking, the ability to exercise judgement and decision making, and teamwork and the top three knowledge areas (out of seven) for career success as written communication, oral/verbal communication, and analytical thinking, while computation skills ranked last for both (Brush et al., 2014). In practice, behavioral differences between entrepreneurially-minded engineers (EMEs) and traditional engineers found that EMEs tended to have a higher proficiency in employability skills such as leadership, conflict management, goal orientation, presenting, persuasion, employee development, creativity/innovation, personal effectiveness management, decision making, and self-management. EMEs were distinguished as engineers in a leadership role (Dietrich, 2012).

A national survey of forestry professionals and employers, students, faculty, and deans of recent graduates' workplace preparedness found that while employers thought students were well prepared for the technical aspects of the job, they were underprepared in both internal and external communication, ethical behavior, effective listening, and conflict management, which were all ranked high in importance for the job. Students consistently ranked their perceived preparedness level for all

competencies higher than faculty, who in turn ranked the students' preparedness higher than employers. A lack of diversity was cited as a major difficulty for both academia and employers (Sample, 2015).

In plant-pathology, scientists recognize that employability skills, especially communication and leadership, must be intentionally and actively incorporated in university education in order for the field to survive in the increasing multi-disciplinary world of research, and that the current system of informal leadership training is not sufficient. Additionally, nearly half of the students go into nonacademic positions, making it even more important that university gained skills are transferable to the workforce outside of academia (Beckerman & Schneider, 2016).

In agricultural communication, student's perceived employability skill importance in ranked descending order as professionalism, team skills, leadership, decision making/problem solving, experiences, communication, and lastly self-management and had high self-perceived abilities in communication, team and professionalism skills, and low perceptions of their self-management abilities (Moore, 2015). Understanding the students' perspective is important for identifying disconnects with employers and faculty.

In retail and tourism management, a study focused on the perceived importance of students, faculty, and industry leaders found that all three groups identified communication as the most important employability skill, and leadership as the least important for faculty and employers, while experiences was perceived least important for students, pointing to disparities in importance perception (Wesley et al., 2017).

Overall, all these large and field specific studies have pointed to essentially the same skill sets that are lacking in new graduates.

Students' Perceptions of Their Own Abilities

While employers tend to disagree, students continue to feel a high level of employment readiness from their college preparation including in the area of employability skills, including communication skills, decision-making/problem solving skills, self-management skills, teamwork skills, professionalism, experiences, and leadership (Tanner, 2014). These high perceptions of skills competencies have been found to be attributed to several different variables including self-confidence skills, academics, and personal circumstances (Álvarez-González et al., 2017) and can be influenced by several things including work-integrated learning, participation in extracurriculars, work experience, job shadowing, student government, and internships.

Students' perceptions of employability skills, such as career management competencies, are shown to be strengthened through work-integrated learning experiences such as job shadowing and work experience during their undergraduate degree in the United States, the UK, and Australia (Harris-Reeves & Mahoney, 2017; Jackson & Wilton, 2017). Students' participating in extra-curricular activities were found to believe that their participation in extra-curricular activities had a moderate to high impact on the improvement of their communication skills.

For students involved in Executive Boards, their position/ranking on their board correlated positively with their perception of the impact the participation had on their communication skills (Nerswick, 2012). Internships were found to increase students' self-perceptions of employability skills competencies (specifically communication, leadership, and critical thinking) (Duncan et al., 2017).

Skill Specific Deficiencies

In order to better hone curriculum foci, research has attempted to understand specific deficiencies in new graduate hires skills. Within the field of agricultural communication, it was found that the specific employability skill of self-management had the highest need in the realm of professional skill development. Within self-management, personal and strategic planning had the greatest need for skill development (Chester, 2014). Employers complain that in general, new graduate hires' writing tends to lack brevity and conciseness (Moore & Morton, 2017).

While different cultural backgrounds hold different views of what should be taught and learned in university, employers recognize the value of the broad knowledge base acquired during tertiary education, and do not expect (and would not want) universities to teach narrowly to the profession. A flexibility in skills (learned in higher education), and adaptability in the workforce are highly valuable to employers (Moore & Morton, 2017). Employers generally agree that having both field specific skills and knowledge and broad skills and knowledge was more important than having just one or the other, and that all majors should be expected to learn both (Hart Research Associates, 2015; Jaschik, 2018).

Tested Teaching or Curriculum Development for Employability Skills Development

With numerous gaps in perceptions and opinions of importance identified, a majority of current research has tested classroom or extra-curricular activities aimed at building employability skills in university students.

Teaching experience has shown that by increasing student engagement through in-class and out-of-class group projects, linking assessments to course learning outcomes and topic importance, and research that enforces classroom concepts, the classroom can act as an agent for building employability skills (Marchant & Morgan, 2016). By allowing students to work in student group projects, students develop essential communication and team-work skills (Marchant, 2014). Group projects should be crafted to include class presentations and papers or executive summaries that practice employment skills like teamwork and communication (Marchant & Morgan, 2016).

A study at the University of Chicago Loyola tested an engaged learning Analytical Decision-Making Course to keep students active in class and develop oral presentation skills, written communication, teamwork, research, and analytical skills. Students were required to work in groups to solve a problem involving complex data, present on the data and findings three times throughout the term as well as briefly during each class with each student presenting and peers giving constructive feedback, and give constructive criticism to their peers. They were also able to present at a symposium at the end of the term. The study found that students improved their oral and written presentation skills and team working skills, analytical skills, and ability to accept criticism in a non-threatening way. Attendance remained high throughout the semester which the researchers attributed to the engaged learning style (Malliaris & Guder, 2015).

Another study created a situated learning environment with a computer science assignment designed to promote professional, personal, and self-discipline skills. Students worked in teams to interview, review literature, and present on a market analysis. The situated learning environment assignment developed students' understanding of the challenges of the market and to reflect on other's needs, allowing computer science students

an opportunity to develop the professional and personal skills necessary in the job market (Blignaut et al., 2013).

For agricultural students, who are expected to understand the complex challenges of an increasingly global agricultural system, individualized learning contracts were found to be a useful tool. Students developed do-it-yourself projects through which they practiced and gained experience in employability skills, among other skill development (Miller-Foster et al., 2015).

Hands-on, experiential learning experiences were proven important in teaching turfgrass majors the employability skills and flexibility necessary outside of the technical skills of the field to become successful as turfgrass managers. Students valued the experience as giving them experience in networking, dealing with employees, leadership, time/staff management, and decision making, and agreed that those skills were more easily learned outside of the classroom (Baldwin, 2017).

International experiences, experiences ranked low as a desired experience by employers (Crawford et al., 2011), were also shown to improve communication, problem solving, and teamwork for undergraduate equine students (White, 2016).

A formal leadership course helped students lessen their hierarchical leadership beliefs (a scale rating of how much one believes a sole leader is responsible for the success or failure of a project rather than the team being responsible) and gain a better understanding of how leadership and success is a collaborative process of the system (Ho & Odom, 2015).

Outside of the classroom, some studies have looked at the impact of extra curriculars and experiential learning programs to enhance employability skill development. Service leadership courses in leadership training programs have shown improvements in youth development, life satisfaction, and service leadership beliefs and qualities, all related to the employability skill of

leadership (Shek, 2017). Research internships were found to improve both students' and mentors' competency perceptions of most targeted employability skills, including written and oral communication, while interns perceived themselves as improved in responsibility, professionalism, writing, oral communication, knowledge of project, progress on project, interest in project and interpersonal relationships (Marsh et al., 2016). Ten-week internships were found to improve engineering student's preparedness for the workforce and allowed them to develop real-world communication, critical thinking, decision making, leadership, and self-management skills and gave them applicable experiences. Mentors and students both reported students' professional growth and development through the internship (Brush et al., 2014).

More generally applicable, activities such as video games have been shown to enhance persistence, as well develop the motivation linked emotions of concentration and frustration, cited as interconnected to employability skills (Castillo et al, 2017).

Further Recommendations for Teaching Based on Field

While some classroom mechanisms have been tested, some thus far have just been recommended based off the deficiencies identified in employability skills. The comprehensive study done by APLU found that when asked about teaching and learning mechanisms, all participant groups ranked internships, co-curricular activities, experiential and active learning (collaborative, problem-based and cross-disciplinary learning) as the most valuable opportunities for learning (Crawford et al, 2011), pointing to a general consensus in

what learning environments are perceived to produce the desired outcomes. Recommendations across several fields and numerous studies include incorporating, encouraging, or mandating experiential and active learning, applied learning environments, co-curriculars, extracurriculars, service learning, workplace-based learning, job shadowing, formal leadership coursework, and above all, internships.

Given that students in agricultural leadership were found to believe that through completing their degree, they would obtain leadership skills, life skills, team, communication, self-management, and decision-making/problem solving skills (Moore et al., 2013) and based on an analysis of industry expectations, current course offerings, and educator objectives, curriculum recommendations include internships and applied learning environments (Morgan et al, 2013; Moore, 2015). An analysis of course offerings in agricultural communications programs nationwide found that of 172 courses offered, writing courses were the most regular (followed by introductory courses, internship courses, and writing for publication and design courses), setting the stage for further analyzing how programs are implementing employability skills education (Cannon et al., 2016).

A study of Agricultural Ambassadors to understand communication skill development showed that students developed skills through experiences such as observing both effective and ineffective communicators, interacting with industry professionals and campus leaders in a relaxed atmosphere. Ambassadors recommended curriculum promote students' attendance to university functions with professionals, opportunities to lead class discussions, and the creation of an environment where students feel comfortable making communication mistakes and are able to reflect on their communication skills in the classroom (Edmonds et al, 2016).

Other recommendations include developing programs to further develop necessary workplace competencies, such as extra/co-curriculars, include courses in experiential-based learning opportunities, in leadership, communications, team development, facilitation, and entrepreneurship and innovation (Moore, 2015).

In order to enhance new engineering graduates' skills to lead innovation and create economic strength in the United States, recommendations to change existing engineering curriculum have been made (Dietrich, 2012). Data from a national survey of 4,965 engineering undergraduate students, and 313 EMEs, found that the existing engineering curriculum was producing no measurable difference between freshmen and seniors' competencies in conflict management, flexibility, goal orientation, persuasion, futuristic thinking, leadership, and employee development/coaching (Pistrui & Dietrich, 2013). Recommendations were made to include cross-disciplined curriculum, rewards and recognitions for co-/extra-curriculars and service learning, enhanced mentoring and industry exposure, and more faculty engagement (Pistrui & Dietrich, 2013).

In Fisheries and Wildlife, based on a survey of professionals in the field, it is recommended that curriculum be developed through an on-going dialogue with professionals in the field and include increasing flexibility, integrating essential skills and conservation focus, meet professional certification requirements, accommodate study abroad and include at least two internships, mechanisms designed to develop employability, transferable skills (specifically teamwork, leadership, oral and written communications, critical thinking and problem solving, employability-management, and professionalism) while still teaching technical skills (Edge, 2016).

In forestry, survey results and curriculum discussions have prompted recommendations to focusing curriculum on

enhancing knowledge, skills, abilities, and behaviors important for working well with others, especially in the areas of communication, personal competencies (professionalism), and building relationships (Sample et al., 2015). Among numerous other recommendations for building curricula, co/extra-curricular actions and activities were recommended in order to encourage student development (Bullard, 2015).

In the field of management, a disconnect between academics and practitioners has led to management education focusing heavily on analytical skills, when employability skills are what are deemed necessary to succeed. Clinical teaching, experiential learning, and job shadowing are all seen as mechanisms for more appropriate skills teaching for students at the university (Asik-Dizdar, 2015).

Skill Specific Recommendations

Based on the need to better prepare students in effective writing and communication, research has been conducted to better understand how to develop students' writing skills. A model of how to develop writing skills has been created for the Agricultural Social Sciences (Leggette et al, 2015). Current perspectives on writing by faculty, students, and administrators view writing as a tool for evaluating problems, to convey thoughts and information, and writing as a way to understand complex information (Leggette et al, 2015). A study of communication and writing apprehension in agricultural communications students found that teachers can develop employability skills by lowering communication and writing apprehension in the classroom. Communication apprehension impedes student's abilities/willingness to take part in practicing communication skills in the classroom. To remedy the situation and allow for practice, students suggested small class sizes, limited group work, increased

speaking opportunities, constructive criticism on writing, and practice in building communication skills are helpful ways for lowering communication and writing apprehension (Ahrens et al., 2016).

Expectations should be taken into consideration in helping some employers and students understand the value of broad-based learning and in developing curriculum. Rural students in particular were found to have expectations that their academic experience would present them with matter-of-fact, discrete material and knowledge with which they could attain a high-paying job, as opposed to having an understanding of the transformative nature of learning and skill development. Based on these beliefs, it is recommended that writing skills are taught in a way that uses the process of "acculturation" to academic discourse for rural students (Griffith, 2012). For online vs face-to-face courses using active learning, self-perceived critical thinking styles can make a difference in student performance (Stedman & Adams, 2014), showing that self-perception can make a difference in student's learning of employability skills.

It is also recommended that teachers be trained better in employability skills in order to better teach employability skills and act as role models to their students (Edmonds et al, 2016). For example, while understanding a global system is deemed important in agriculture, and working in the global environment requires developed employability skills, a study of agricultural teachers found that teachers desired to, but felt underprepared to, teach about global issues, indicating that Agricultural Education programs are not appropriately preparing teachers to be successful in the workplace (Sharp, 2013).

Lifestyle changes for university students are also recommended to aid in employability skill development. A shift in university scheduling to more closely mirror that of the workday could also help students better prepare for the workforce (Bauer-Wolf, 2018).

Whose Responsibility Is It to Teach the Skills

Disparities have been found between academics' and employers' perceptions of who bears the responsibility of teaching student employability skills. In Portugal, where employment training was mandated to be part of university curriculum, both employers and academics place the main responsibility of teaching all employment skills on the university. Yet since the mandate of incorporating the employment skills into curriculum, employers have participated very little in educational institution's shaping process of curriculum, and while academics have generally positive perceptions of their efforts to incorporate employability skills into their curriculum, employers have generally negative perceptions of universities doing so (Sin & Amaral, 2017).

While employers see applied learning as an important education tool for colleges for teaching students the skills necessary for the workforce, they may not necessarily actively ensure that learning happens. (Hart Research Associates, 2015; Jaschik, 2018). In the field of Fisheries and Wildlife, it has been recommended that employers also take a role in educating new professionals in teamwork, field techniques, and communicating with stakeholders beyond what is learned in the classroom, and to actively take part in students' education and networking opportunities (McMullin

et al, 2016). Alternatively, while universities can incorporate teaching strategies in order to better prepare students for the workforce, employers too must understand and value the learning environment from which students come and incorporate appropriate recruitment, on-boarding, and training programs (Moore & Morton, 2017).

Conclusion

The need for universities to prepare graduates with employability skills is real and current. A 2017 survey of 200 campus career service centers including 3,370 employers from a diverse range of professions by the Career Services Network & Collegiate Employment Research Institute (2017) revealed that 82% of respondents had hired a new college grad in the last year and similar numbers planned to do so within a year. They generally viewed the college labor market as good to excellent, but still faced some challenges. In ranking the challenges of recruiting in the college labor market from 1 to 11, students lacking the right employability skills (cited as problem solving, interpersonal, communication, and teamwork) ranked as the biggest or second biggest challenge overall when comparing challenges by organization size. Competition from other employers as the other highest for all employers except for organizations with less than 50 employees.

To make the hiring process more effective and to quickly identify the skills employers want from their workforce, hiring software has been developed to select candidates based on employability skill competencies (including professionalism, interpersonal skills, problem solving and adaptability, personal value commitment, managing others, and leadership) and past work performance. The software argues that hiring managers tend to “go

with their gut” and rely on tools such as self-reported personality tests and general feedback rather than specific task performance (SkillSurvey, 2015).

The internet and bloggers have attempted to teach new hires how to successfully use employability skills at work. Career readiness blogs highlight how to be a “professional” at work and the other employability skills of communication, teamwork, self-management, decision-making, and problem solving that go with professionalism (Green, 2013).

New graduates face a lot of competition and increasingly challenging hiring expectations when entering the workforce. While this may drive some to pursue more profession-oriented college degrees, employability skills are highly desired by employers, resulting in a demand on universities to actively incorporate employability skills training into their curriculum. It is promising that those who incorporate a significant amount of employability skills learning into their education, such as humanities majors, tend to be largely satisfied with their jobs in the workforce (87% of undergraduate-level and 90% of graduate-level graduates reported satisfaction). They have also been found to feel “deeply interested” in their jobs at the same rate as other students and feel as though they use their best skills at work every day at a higher rate than engineering graduates. Career success by humanities graduates could be attributed to the skills taught in humanities programs such as critical thinking and communication (Jaschik, 2018), supporting the employer demanded idea that employability skills education must be incorporated into all university education in order to produce graduates ready for the 21st century workforce.

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