

Take this Job and Love It: Identity-Conscious Self-Reflection as a Tool to Support Individualized Career Exploration for Graduating Biomedical Engineering Students

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Introduction

Biomedical Engineering (BME) programs train students to design and develop devices and systems which enhance health and wellbeing. Typically, the rigorous BME curriculum focuses on mastery of subject matter and related skills, and is taught through lectures, labs, and project-based learning. This approach to teaching and learning prepares students to perform the technical skills required of a biomedical engineer, but it often comes up short in preparing students to make informed, individualized career decisions within the field of engineering.

In this paper, the authors describe an inclusive approach to career exploration for graduating engineers, designed to provide each student within a diverse classroom the opportunity to consider specific employment opportunities through the lens of their own identities. While applicable theories of career development have historically focused on the selection of an occupation, our approach focuses on the exploration of job opportunities within a specific field (engineering in this instance). Through an active learning exercise described in this paper, students use identity-conscious self-reflection to establish a holistic understanding of their values and practice identifying employment opportunities which align with those values as they get ready to seek employment as engineering graduates.

In addition to cultivating a highly individualized learning intervention, this approach supports long term career satisfaction and enhanced quality of life for all graduating BME students by empowering students to select workplaces that are compatible with their priorities for work interactions, work activities, and work environments. One of the key goals of the approach presented here is for others to implement it in their own programs.

Theoretical Foundation

Informed Career Planning

Career decision making can be either informed *or* uninformed. Uninformed career planning is fairly passive and dictated by chance or circumstance, while informed decision making requires individuals to take an active role in the process of selecting a future occupation [1]. With informed career planning, individuals consciously explore their personal characteristics, the rewards that they may accrue through their occupation, and the environmental variables that may influence their experience in the workplace [1].

Theory of Value-based Career Decision Making

The Theory of Value-based Career Decision Making is an approach to informed career planning. This theory states that each person has a unique set of core beliefs, which dictate that person's approach to the fulfillment of their needs [2]. As established by this theory, career satisfaction is dependent on alignment between a person's most highly prioritized values *and* their choice of occupation [1][3]. Value systems develop throughout a person's life and are composed of cultural values (i.e., values are shared among members of a group with a common socially constructed identity which include beliefs about human nature, such as time, group affiliation, individualism and self-expression), work values (i.e., values that a person believes should be

satisfied through the selection of a particular occupation which include altruism, achievement and responsibility), and life role values (i.e., values satisfied in life roles outside the context of work) [1][3].

The Theory of Value-based Career Decision Making recognizes that values shape how a person believes they should function in a given context *and* influences how they perceive the actions of others within that context. For these reasons, individuals use their system of values to classify aspects of an occupation as favorable or unfavorable and to determine whether that occupation, overall, is consistent with their values.

Using Awareness of Self to Prioritize Values

In order to use values as a foundation for decision making, a person must be able to name and prioritize those values. Because value systems are shaped by a combination of individual characteristics and lived experiences, self-understanding is crucial to understanding of the work, cultural, or life role values that a person relies upon in a career planning process [2].

The theory of self-concept provides a framework that can be used to identify the sources of many competing values that exist within each person. Self-concept consists of three interrelated components: the individual self, the relational self, and the collective self [4]. These three levels of self-coexist with each other, and any one of them may be jointly or independently used as a means of self-definition at any time [4]. Brewer and Gardner postulate that each of these three levels of self provides a different framework for evaluating the self (i.e. individual characteristics, role in a relationship, and group prototype) and creates distinct sources of motivation (i.e., self-interest, benefit to others, collective welfare, respectively) [5].

While work values and cultural values are regarded as “primary variables that influence occupational choice-making process,” life role values are highly relevant to long term career development [3]. Suppose a person’s work values include achievement and responsibility. In making a choice of occupation, they would rely on these values in considering whether they regard an occupation as favorable or unfavorable. Suppose then, that the same person is also a parent. While their work values, derived from their individual self-concept was most significant in their occupation choice, further career decisions like where to work or whether to take a promotion may be considered through the lens of this relational identity, in a way that prioritizes the values that support satisfaction of needs as a caregiver (i.e., work-life balance, flexibility, etc.)

Application of Theories: Identity-Conscious Exploration of Career Opportunities within a Given Occupation

It is well established that individuals experience higher career satisfaction when there is alignment between their highly prioritized values and their chosen profession. For graduating engineers like the ones who participated in this activity, though, the time for selecting an occupation has long passed. At this point in their education and career development process, the goal is not to help students decide *if* they want to be engineers, but rather to support them in figuring out *how* and *where* they are going to practice within their field.

Within a given occupation, career satisfaction is further impacted by alignment of prioritized values with the totality of the employee’s day to day work experience including specific job

responsibilities, compensation, benefits, and workplace culture [3][6][7]. Identity conscious exploration of specific career opportunities allows each student within a diverse classroom to accurately define and prioritize their full range of values. This foundational self-awareness empowers students to conduct a highly individualized job search, in which they are able to seek specific employment opportunities within the field of engineering that best align with their cultural values, their work values, and their life role values.

In addition to supporting job satisfaction in the short term, use of identity conscious career exploration in the classroom provides students with a set of foundational skills that can be used to holistically approach professional opportunities after graduation. These skills can be used long term, and at any point, to support both career satisfaction and improved quality of life for graduating BME students.

Module Design

Wentworth Institute is focused on delivering “high value learning” and “transformative experiences” to students. To support these goals, an engineering instructor partnered with a practitioner within the university’s Division of Diversity, Equity, and Inclusion (DEI) to design a learning module for students to conduct individualized, value-based, career exploration as they approach graduation. The learning module was implemented as part of Engineering in Biomedicine, a required weekly one-hour seminar course for senior students in BME, with 37 students enrolled in the Summer of 23 semester.

The course exposes BME students to the challenges, opportunities, and trends encountered by BME professionals, and practitioners in the “real world.” The course addresses current topics, emerging technologies, and careers in the biomedical engineering field through lectures and workshops given by practicing professionals from medical device, research and development organizations, hospitals and regulatory agencies, as well as from alumni from the program. Goals of the course are not merely to expose students to information about job possibilities, but rather, to enable students to apply their learned engineering skills in a way that contributes to the field and holistically supports their continued growth as individuals and as engineering professionals. As such, the course fully supports ABET’s goal of lifelong learning for engineers.

Module Delivery

The learning module was delivered in two parts. The activity template is shown in Appendix A. In the first part, prior to the lecture, students completed a freely available online self-guided work values inventory, and a self-reflection exercise. The second part was delivered as a one hour in-class lecture workshop. The module was designed with three objectives in mind:

Objective 1: Use identity conscious self-reflection to identify values and related workplace priorities.

Objective 2: Practice identifying the values and culture of a prospective employer.

Objective 3: Practice leveraging alignment between individual values and values of a prospective employer during the talent acquisition process.

Part 1: Pre-Workshop: Work Inventory and Self Reflection: Prior to the scheduled class time, students were asked to complete the online Next Steps Idaho “work values” inventory,

designed to identify the importance of various values to each individual [8]. The inventory is divided into the following four sections, each addressing the values listed below.

- *Core Values*: achievement, balance, independence, influence, integrity, honesty, power, respect, spirituality, and status
- *Work Environment*: Fast Paced, Flexible, High Earning, Learning, Location, Predictable, Quiet, Relaxed, Structured, and Time Freedom
- *Work Interactions*: Competition, Diversity, Friendships, Leadership, Management, Open Communication, Recognition, Mutual Support, Teamwork, and Trust
- *Work Activities*: Analytical, Challenging, Creative, Helping, Innovative, Physical Interaction with the public, Research, Risk Taking, and Varied

Students responded by rating values contained in each section as either “always important,” “somewhat important,” or “not important.” To conclude the self-assessment, students were then asked to comment further on the values that they rated as “always important,” using the rubric shown below:

- *Why is this value important to you?*
- *Is this value something that is important in your friendships, family relationships, and/or romantic relationships?*
- *Is there someone in your life who shares this value? Who are they? How do you feel about that person?*

This self-reflection exercise required students to identify value-based priorities which could be used during the in-class workshop to determine alignment between the student and the culture of a prospective employer. In answering the provided questions, students were prompted to name their values *and* to identify the source of their values.

Part 2: In-Lecture Workshop: During the one-hour class period, intended to build the skills, the DEI practitioner delivered a lecture-based instruction in the form of analysis of case studies involving social identity and value alignment, followed by small group discussions. Students revisited their pre-workshop reflection exercise as part of a simulated job search. With facilitation from the instructors, participants reviewed student-selected job postings as well as background information about employers to distill and identify a company’s values and culture. Based on review of a company’s job offerings and their corporate culture, students assessed how well a given employer aligned with their own values and priorities and discussed how they would approach an interview and job offer from that employer.

Thematic Analysis

Identification of Major Themes

Pursuant to established methods, the three authors conducted a traditional five-step process for thematic analysis, which included data acclimation and familiarity, line-by-line coding, initial theme identification, further theme expression, and review of themes based on the complete data set [9][10]. Each of the authors reviewed responses to written reflection questions, submitted by each of the 37 students enrolled in the course for the purpose of identifying common themes. Authors reviewed all responses using established thematic codes, combined similar themes, then consolidated data into theme sets. The three major themes uncovered were “importance of connection and collaboration in the workplace,” “importance of learning opportunities,” and “importance of work-life balance” and are summarized in Figure 1.

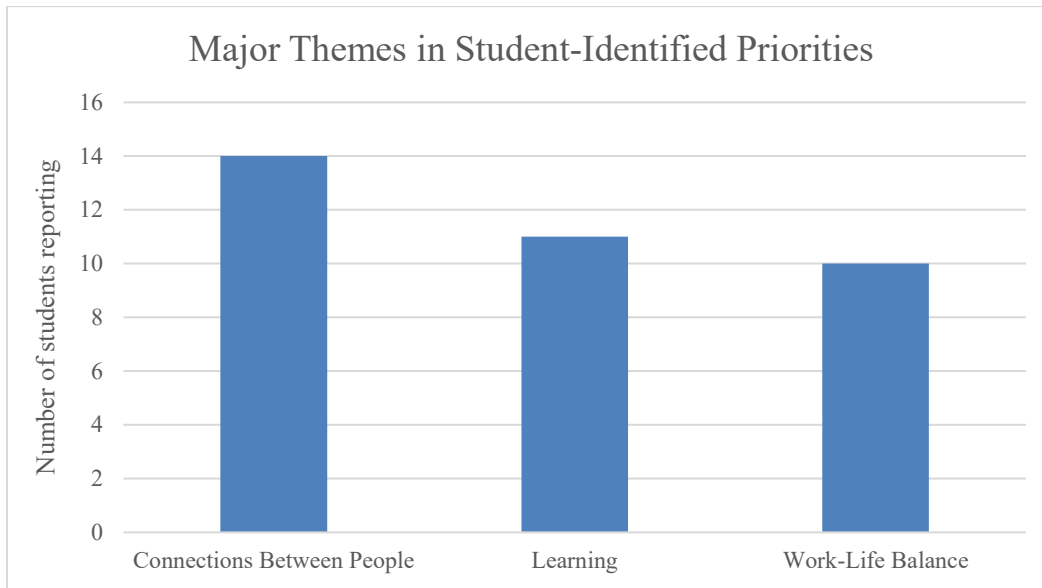


Figure 1: Authors identified three major themes from written reflections. The height of each bar represents the number of responses for each theme.

Identification of *Sub-Themes*

Based on established theories of identity, the authors next explored identity related sub-themes within the thematically grouped responses to assess how aspects of students' self-concept informed their identification of workplace priorities [3][4][5]. The sub-themes considered were the following:

- *Personal Characteristics (Individual Self)*: individual knowledge, skills, behaviors, and attitudes; includes moral and ethical frameworks
- *Relational-Identities (Relational Self)*: self-categorization based on interpersonal relationships and interdependence with specific others; includes self-identification as “coworker” and/or “colleague” in a professional context or “friend,” “sibling,” “parent,” etc. in a personal context
- *Categorical Social Identities (Collective Self)*: self-categorization, based on identification with “larger, more impersonal collectives or social categories;” includes identification with cultural identity and identification as a member of a company, business, organization, or field

Using the previously described thematic analysis method, the authors went back to review the data contained within the three major themes, and segmented them into theme sets, referred to here as “sub themes.” Figure 2 shows the sub-themes contained within each of the original three main themes and the relative contribution of the three sub-themes to each of the main themes.

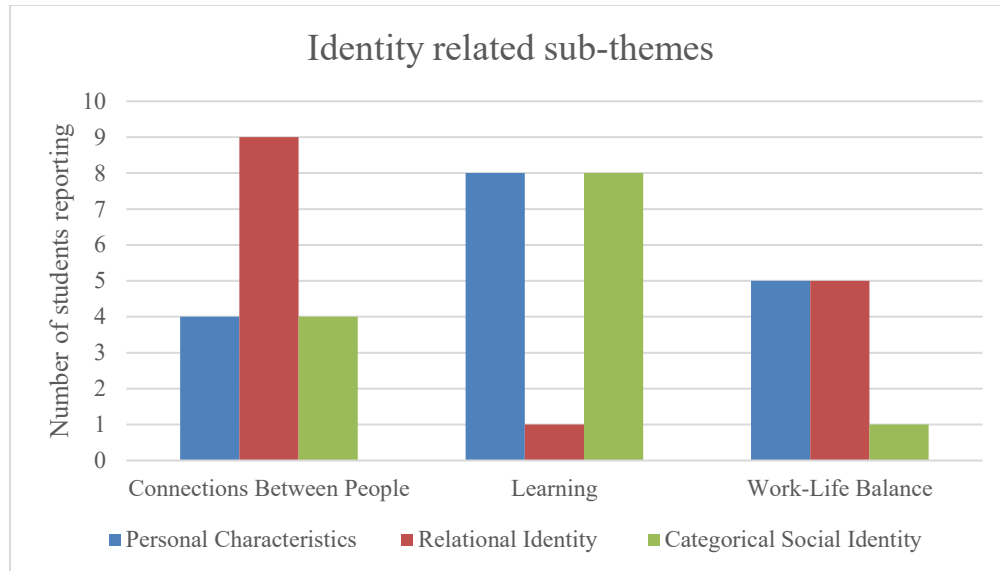


Figure 2: Authors identified sub-themes represented within thematically grouped written responses. The height of each bar represents the number of responses for each theme and sub-theme. Some written responses included reference to a combination of personal characteristics, relational identities, and categorical social identities.

Results

Theme 1: Importance of Communication and Connection in the Workplace

Dominant Sub Theme: Relational Identity

Students identified connection and/or communication with other employees as an important priority within their workplace experience. In characterizing connection and communication as a priority, students described a desire to build or preserve positive relationships with coworkers and colleagues. Further analysis of the related responses suggests that the students considered their relational identities within the workplace (i.e., as coworker, colleague, team member, etc.) when prioritizing this value.

Theme 2: Importance of Learning Opportunities in the Workplace

Dominant Sub themes: Personal Characteristics and Categorical Social Identity

Students identified opportunities for learning, research, and growth in knowledge as a workplace priority. Student responses suggest that selection of this priority was informed by both personal characteristics *and* anticipated membership with in a company or organization (ie: categorical identity). The sub-themes indicate that in addition to personal characteristics, the selection of this particular priority was shaped by anticipated identification (employee, member, etc.) with work related categorical social identities (ie: company, organization, etc.). They specifically referenced personal characteristics like interest in learning new things, dissatisfaction with boredom, and beliefs about personal achievement.

Theme 3: Importance of Work-life Balance

Dominant Sub themes: Personal Characteristics and Relational Identity

Students characterized “work-life balance” as a priority. The data suggests that categorical social identity, including affiliation with the organization, was not a significant consideration in prioritizing work-life balance. Rather, students considered work-life balance as related to or in

alignment with personal characteristics, including beliefs about work and knowledge of individual working style and/or related to their relational identities in non-workplace contexts (ie: friend, family member, etc). In writing about relational identities, students specifically described work-life balance as necessary for supporting and maintaining their personal relationships.

Discussion

Major Themes: Influence of Values on Priorities

The self-reflection activity seems to have been effective, and enlightening, in prompting students to identify and prioritize values. Major themes in articulated priorities mirrored values and concepts explored by students through their participation in the workplace inventory. For example, the theme of “connection and communication” as a priority is consistent with inventoried values of open communication, trust, friendships, and teamwork. Similarly, the theme of “work-life balance” is rooted in the values of “balance” and “flexibility.” The theme of “learning opportunities,” reflects enumerated values like “learning,” “research,” “innovation,” and achievement.”

Sub-Themes: Influence of Identities on Priorities

Written responses to the reflection questions suggest that the activity was also effective in prompting students to consider the identity-specific source of their values. Each of the three codes used to identify relevant sub-themes appeared multiple times throughout the data set, indicating that students considered each of the three levels of self when identifying priorities.

It is worth noting that not all aspects of identity had equal influence on or relevance to a given priority within the workplace context, as indicated by the different levels of the sub-themes within each major theme, in Figure 2. For example, of the responses that identified “work-life balance” as a priority, only one response considered a categorical social identity. Similarly, of the responses that identified “opportunities for learning” as a priority, only one considered aspects of relational identities as relevant to that priority.

Further Application

The module, as delivered, helped graduating Biomedical Engineering students in their career exploration. However, the module, with the inventory and related reflection exercise, can be readily applied to students at all levels in all engineering disciplines (and working professionals as well) to prompt meaningful reflection about needs and priorities across disciplines and at various points in a student's academic or professional career.

A next step is to implement this module earlier and across the curriculum in more courses, going as early as first-year courses. As a co-op university, students in our programs can benefit from applying these concepts to their choice of co-op employer and being able to recognize the values in employers in lower stakes settings, since co-op employment is short in duration and not long term and are good opportunities for students to test the concepts developed in this activity.

Next steps for this research may include implementation of of the outlined methodology into first-year programs in different institutions. Many universities have some form of an onboarding class for first-year engineers. Introducing or refining existing first-year programs to include a module or sequence on career aspirations and reflection on them fits the stated goals of such first-year programs. The results of this research could then be compared to reflections from

seniors at the same institution. Longitudinal analysis as students advance through their degree program, particularly as they enter and complete their co-op jobs.

Limitations

The focus of this paper has been on reporting on a first run through an approach for career exploration for biomedical engineering students. The plan is to repeat this activity with modifications in the next offering of the course in the Summer of 24 semester. Because this analysis is based solely on the written responses to reflection questions, submitted prior to the related in-lecture workshop, it cannot be used to assess the effectiveness of the module, as a whole. To close the loop, post-assessment data, gathered following the workshop, would be needed to understand the effectiveness of the module in satisfying the stated objectives. The plan is to deliver the module once again in the upcoming offering of the course, and post-activity data will be collected and folded into the analysis.

Another important limitation of the value-based approach described here, while extremely valuable, many entry level employees are not able to consider the full range of their values when accepting a job opportunity with an interested employer. It is not uncommon for students, particularly during their first job search, to accept any job opportunity right after graduation, due to financial, family, or other external circumstances and obligations. However, the skills developed here are life-long, and they can be implemented down the road, once the more experienced graduates are able to become more selective and have the flexibility to base their choice of employer and job more in alignment with their values.

Conclusions

Results of analysis of students' reflections from this activity reveal several identity-founded themes among students' responses about priorities, which suggest that providing students with a space in their curriculum to assess and recalibrate their values and goals, particularly as they near graduation and a major transition into post-graduate careers, is relevant, timely, and valuable. Self-awareness and the ability to leverage knowledge of self in an employment context adds value to the students' education and promotes long-term career satisfaction.

IRB Statement on Data Usage

The data utilized in this study was anonymized and aggregated and was deemed as "exempt" by our university's IRB committee.

References

- [1] Crace, R. K., and Brown, D. (2002). Life Values Inventory. Williamsburg, VA: Applied Psychology Resources. Available from <http://www.appliedpsychologyresources.com>
- [2] Brown, D. and Crace, R.K. (1996), Values in Life Role Choices and Outcomes: A Conceptual Model. *The Career Development Quarterly*, 44: 211-223. <https://doi.org/10.1002/j.2161-0045.1996.tb00252.x>
- [3] Brown, D. (2002). The role of work and cultural values in occupational choice, satisfaction, and success: A theoretical statement. *Journal of Counseling & Development*, 80(1), 48–56. <https://doi.org/10.1002/j.1556-6678.2002.tb00165.x>

- [4] Sedikides, C., Gaertner, L., and O'Mara, E. M. (2011). Individual self, relational self, collective self: Hierarchical ordering of the tripartite self. *Psychological Studies*, 56(1), 98–107. <https://doi.org/10.1007/s12646-011-0059-0>
- [5] Brewer, M. and Gardner, W. (1996) 'Who is this "we"? Levels of collective identity and self representations', *Journal of Personality and Social Psychology*, 71(1): 83-93.
- [6] Parker, K., and Menasce Horowitz, J. (2022, March 9). Majority of workers who quit a job in 2021 cite low pay, no opportunities for advancement, feeling disrespected.
- [7] Haley, K. J., Jaeger, A. J., & Levin, J. S. (2014). The influence of cultural social identity on Graduate Student Career Choice. *Journal of College Student Development*, 55(2), 101–119. <https://doi.org/10.1353/csd.2014.0017> <https://www.pewresearch.org/short-reads/2022/03/09/majority-of-workers-who-quit-a-job-in-2021-cite-low-pay-no-opportunities-for-advancement-feeling-disrespected/>
- [8] <https://nextsteps.idaho.gov/work-values/quiz>
- [9] Douglas, E.P., "Beyond the Interpretive: Finding Meaning in Qualitative Data," American Society for Engineering Education Annual Conference. 2017.
- [10] Braun, V., and Clarke, V. "Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*," 3(2). pp.77-101. 2006.

Appendix A*

Overview:

Think about the last time you interviewed for a job you really wanted. My guess is that you felt a little nervous, hopeful, optimistic, or even a little scared. My guess is that you talked to some of the folks in your life about this (Parents, grandparents, friends, mentors, teachers, etc), and that at least one of these people said something like, **“You’re interviewing them as much as they’re interviewing you.”**

In case you’re wondering, your parent/grandparent/friend/mentor/teacher was correct. In the same moment that a prospective employer is making a decision about your skills and qualifications, you are deciding the company offers what you need to feel valued, engaged, and supported. **The purpose of your search is not to just get a job, but to join a company whose culture aligns with your values, priorities, and needs.**

In this workshop, you will have the opportunity to

- Reflect on your values and identify your professional needs, as they relate to work environment, work interactions, and work activities;
- Practice identifying the values and culture of a company; *and*
- Discuss strategies for landing a position with an employer whose culture aligns with you values and priorities.

Prework:

Please complete this assignment prior to class on MM/DD/YY. Submit the written answers to your professor prior to class; bring a copy of this worksheet to discuss during the workshop.

- a. Complete the “Work Values Inventory.”
 - i. here: <https://nextsteps.idaho.gov/work-values/quiz>
- b. Your inventory will include four categories; core values, work environment, work interactions, and work activities. The inventory breaks the values in each category down to show how you rated them (always important, sort of important, or not important.”
 - i. For each category, list all of the values that you identified as “always important.”
 1. **Core Values:**
 2. **Work Environment:**
 3. **Work Interactions:**
 4. **Work Activities:**
 - ii. Using the above list, list the values in each category from “most important” to “least important.”
 1. **Core Values:**
 2. **Work Environment:**
 3. **Work Interactions:**
 4. **Work Activities:**

- c. Consider your top value in each category (core values, work environment, work interactions, and work activities) (1-2 sentences each)
 - i. Why is this value important to you?
 - ii. Is this value something that is important in your friendships, family relationships, and/or romantic relationships?
 - iii. Is there someone in your life who shares this value? Who are they? How do you feel about that person?

- d. Select 2-3 job postings for entry level positions in your field. Bring these job descriptions to class for use during the scheduled workshop.
 - i. Consider locating the job posting through LinkedIn, general online job sites (ie: Glassdoor, Indeed, etc.), listservs, and discipline specific job boards.
 - ii. Job postings generally list “required qualifications” or “minimum qualifications.” Choose a job for which your skills, qualifications, education, and experience meet the minimum qualifications listed for the position.

*Created by Catlin Wells