## The Future of Engineering Education
2024 Annual Conference & Exposition

Oregon Convention Center
Portland, OR . June 23 - 26, 2024

ASEE

Paper ID #43534

# Work in Progress: Leveraging Short, Curated Alumni Videos to Bridge the "Readiness Gap"

**Dr. Harly Ramsey, University of Southern California**

Harly Ramsey is an Associate Professor of Technical Communication Practice and the Associate Director of the Engineering in Society Program at the University of Southern California's Viterbi School of Engineering. She holds a Ph.D. in English, and her training in narrative theory, cultural studies, and rhetoric informs her teaching and scholarship. Her current research investigates students' perspectives on their transition to the workforce; she also studies student metacognition and self-regulation. She developed and continues to work on Engineering Moment, a co-curricular podcast project about the social role of engineering, and Vision Venture, a video series exploring students' engineering identities, agency, and purpose after graduation.

**Stephanie Nicole Bartholomew, University of Southern California**

Stephanie Bartholomew is a student at the University of Southern California, majoring in Chemical Engineering with a focus on Biological and Pharmaceutical applications. With a keen interest in the intersection of engineering and healthcare, she aspires to make a difference in the biotech and pharmaceutical industries. Beyond academics, Stephanie is deeply involved in campus leadership, serving on the board of the Grand Challenges Scholars Program, where they spearhead initiatives to unite engineering students in addressing critical global issues. Additionally, she dedicates time to mentorship as a peer mentor for the Center for Engineering Diversity, offering guidance and support to new students navigating college life.

# Work in Progress: Leveraging Short, Curated Alumni Videos to Bridge the "Readiness Gap"

## Abstract

This Work-in-Progress paper discusses preliminary data from a study of undergraduate engineering students who viewed curated videos of alumni offering advice on early career engineering and perspectives on post-graduation life. The study intends to investigate whether the videos can improve students' understanding of the realities of early career engineering and can promote their ability to visualize their future professional selves. The study includes a pre-survey, video viewing, a post-survey, and semi-structured interviews with some of the participants. This paper presents some data from the post-survey.

This paper focuses on the impact of the video series as a means of communication from the alumni speakers to the student viewers. The paper presents scholarship on the use of videos in education and other fields. As a medium, the video series can convey representational role modeling as it delivers content. Preliminary data from 121 participants suggest the videos' content was impactful and that the visual nature of videos can prompt strong reactions among students. The distribution of student ratings for the most and the least meaningful videos suggests that certain topics resonate with students, but this data needs to be explored further in light of the students' qualitative explanations for their selections and their demographic data. For instance, the video "Women in Engineering," ranked highly as a selection for both the most and least meaningful video. Students' ratings of the importance of speakers' perceived identities—including race, gender expression, socioeconomic background, and major within engineering—highlight the varying significance students placed on the qualities, and they will be analyzed further in future work. Overall, the preliminary data suggest that the curated video series resonates with students on multiple levels, including the meaningfulness of the alumni advice and the representation of the alumni themselves. The model of a curated video series is scalable and transferrable to other types of institutions and diverse student populations.

## Introduction

Recent scholarship documents a "misalignment" between engineering education and engineering practice; despite increased attention to elements of professionalism in engineering education and adoption of problem-based learning approaches, employers still find students lacking in non-technical, professional skills [1]. Additionally, studies have shown that engineering students underrate the need for professional skills in the workforce, even if curriculum is adapted to incorporate these skills [2]. Students are likely responding to a perceived higher value of technical skills [3], whether based on students' socialization within the culture of engineering education or incorrect expectations about their future careers [1] [4]. Both [1] and [2] note that a "positive attitude towards learning professional skills" is essential for student success. While engineering educators can adopt problem-based learning and promote professional skills, such as collaboration and communication, the very nature of grade-based and outcome-focused education diminishes student interest in relationships and processes which could bridge the professional/technical divide [5]. It is not only employers who observe this misalignment or

readiness gap: many early career engineers actively experience it. Research suggests that early career engineers who undervalued professionalism as students are dismayed when confronted with it as an intrinsic component of their engineering work and they continue to bracket it from their conception of engineering [5], [6]. How, then, can we encourage students to cultivate a positive attitude toward professional skills and a realistic expectation for their future work if they hold a binary view of technical competencies and professional skills and they dismiss the latter, feeling that professional skills are tacked on and subordinate to their technical education?

Perhaps if these early career engineers had developed a positive attitude toward professional skills as students, they would have been able to understand the entwined nature of technical competencies with professional skills and embrace the full nature of engineering work. One approach to help students cultivate this positive attitude and to develop this understanding is to have them hear about the nature of engineering work from successful early career engineers. Current students have a difficult time imagining the details of their first job and life after graduation, and a small-scale pilot study suggests that using videos of alumni who are positive, relatable, and vivid can help bridge this cognitive gap by fostering students' ability to imagine their future selves [7], [8].

This Work-in-Progress paper provides early data from a video-based study intended to help undergraduate engineering students more clearly imagine their potential professional futures and more accurately understand the nature of early career engineering. As part of the study, students viewed twelve short, curated videos of alumni sharing their perspectives on life after graduation and offering early career advice. As a visual medium, the video format may potentially increase the vividness of the alumni, as well as their relatedness through visually-read traits, and the alumni themselves are positive representations of successful and satisfied early career engineers. In this way, all three latent constructs of future selves were addressed—vividness, relatability, and positiveness. The larger study of which this Work-in-Progress is a portion will investigate whether the videos of alumni sharing their perspectives can promote a more accurate alignment of student expectations of engineering work with its true nature and can strengthen students' ability to imagine their future professional selves. This Work-in-Progress paper will focus on the usefulness of videos in terms of both content delivery and content presentation, considering the extent to which "the medium is the message" [9]. It is proposed that a series of short, thematically curated videos showing vivid, relatable, and positive alumni can be an effective medium for fostering students' ability to bridge the readiness gap.

**Literature Review**

Videos have been used productively in education, coaching, and behavioral modification programs for many years. The goal with videos here, however, is not to change or modify current behavior or help students learn particular lessons: rather, videos are used to help students strengthen their ability to imagine versions of their future selves and to more concretely understand the full nature of their future work. Imagining versions of their future selves can potentially help students imagine their working life in more specificity, which could potentially decrease stress and anxiety while students [7] and under-preparation and frustration when working in the field. Having multiple alumni is important because different students may connect differently with these identities and presentations. Short videos were chosen to isolate individual

themes and also to mirror the current mode of consumption of short videos, such as TikTok or Instagram reels.

*Videos in Education*
Videos are currently used for instructional delivery at an astonishing scale in MOOCs, on-demand videos for asynchronous learning, and in open educational resources [10]. In online learning environments, video-based instruction (VBI) strategies have been shown to support teaching presence, social presence and cognitive presence, facilitating a community of inquiry [11]. VBI has been shown to be particularly effective for students with disabilities or neurodiversity, particularly autism; this effectiveness is attributed to VBI's promotion of learning through both observation and vicarious reinforcement, which are key elements of Bandura's social learning theory [12]. Observation and reinforcement are heightened through the visual medium; observation and vicarious reinforcement also function as a form of enculturation, the value of which was noted by researchers in the context of teaching the value of professional skills in engineering education [13]. Additionally, video self-modeling has been explored in the context of academic improvement to reinforce positive behavior skills [14].

*Other Relevant Uses of Videos*
Just as educational uses of videos extend beyond information delivery to visual modeling, the inherent power of visual representation lends value in other arenas. Multiple studies document increased motivation and self-efficacy in sports training through the use of videos, for instance [15]. Motivation and self-efficacy are foundational concepts of Self Determination Theory [16] [17][18], and video's  potential to enhance them in sports may be transferrable to other types of self-development and growth. In higher education, role-model videos have been suggested to have a positive effect on the retention of students historically under-represented in STEM, particularly when the role models discuss their personal transitions to college or the work force [19] or navigating STEM education as an historically under-represented minority [20]. Emerging uses of video technology to help the viewer visualize a higher performing or more developed self include the use of computer-generated avatars [21], FeedForward videos that create perfect enactments of a goal by splicing together only positive aspects of ultimately unsuccessful attempts [21], [15], and Deepfakes [22]which are doctored videos making it seem the viewer is completing a goal. These high-tech, extreme possibilities speak to the potential power of visual representation in imagining oneself as a vivid, positive, and relatable future self.

**Study Methods**
The preliminary data presented here are part of an NSF-funded project with IRB approval. The project includes multiple rounds of the following protocol: an initial pre-survey; an intervention of students watching a series of videos; a post-survey after students watch the videos; and follow up semi-structured interviews with some of the participants.

*Participants*
Participants were recruited through emails sent by the Viterbi School of Engineering's student engagement office and the John Brooks Slaughter Center for Engineering Diversity. The invitation indicated that participants need to be undergraduate engineering majors (which includes computer science majors) and at least 18 years of age. The pre-survey received 263 responses, 208 of which were complete and met the criteria for participating in the study. These

students were invited to watch the videos on a university platform, and 124 students watched the videos and completed the post-survey.

*The Videos*
The series of videos include twelve short clips on topics related to life after graduation and navigating early career issues; the videos range from slightly over one minute to six and a half minutes. The total time of the videos is under forty-two minutes.

The videos present a variety of alumni speakers and deliver content on a range of areas of student curiosity. The video topics include: 1) trying out different things; 2) making use of resources; 3) what to look for in a job; 4) internships and growth opportunities; 5) networking; 6) does a dream job exist?; 7) tackling problems at work; 8) beyond the technical: soft skills; 9) work-life balance; 10) career pivots; 11) women in engineering; and 12) diversity in the workplace (see Figure 1). Most videos feature more than one speaker. The alumni are diverse and include multiple races and ethnicities, gender expressions, engineering majors (including computer science), and stated socio-economic backgrounds.

A week after completing the pre-survey, students were provided access to the videos through a university platform that confirmed their viewing activity. Students were given a week to watch the videos and told that the videos could be viewed in multiple viewings and in any order. Students were informed that they needed to watch at least 30 minutes of the videos to continue with the study.
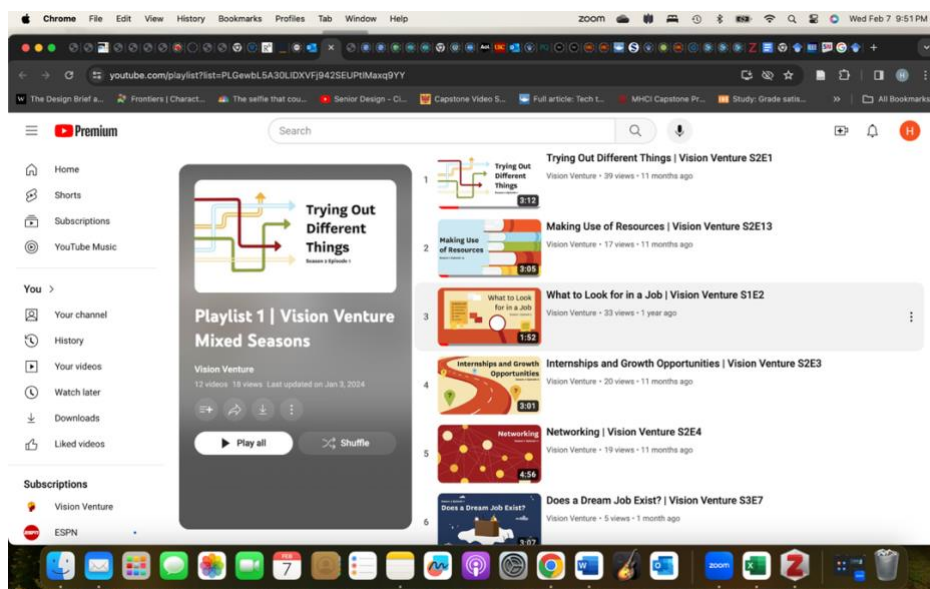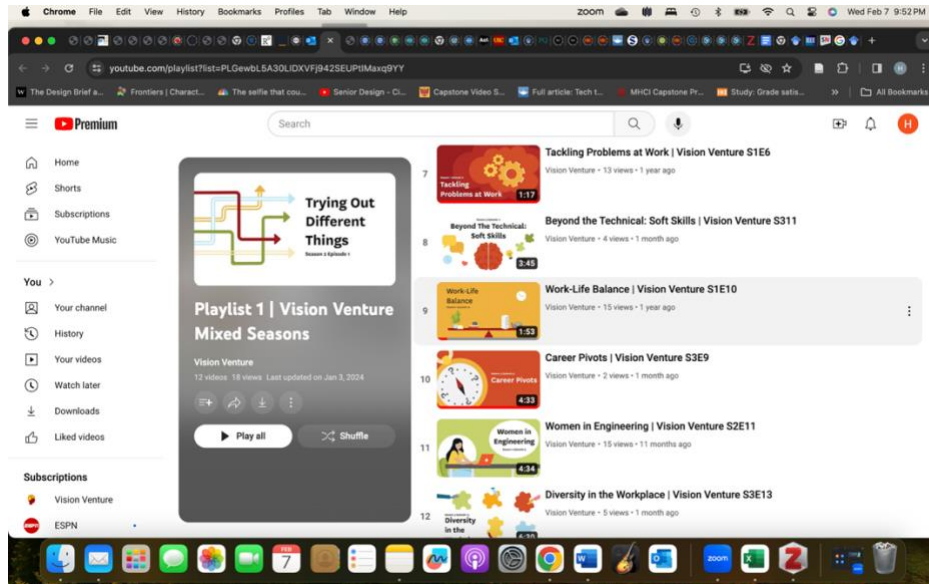
Figure 1. Screenshots of the video playlist; thumbnails indicate each video's topic and length

*The Survey*
A week after the viewing period, students who watched at least 30 minutes of the videos were emailed a link to the post-survey. The post-survey included questions concerning the students' perspectives on their future selves, their thoughts about engineering as a career, and their perceptions of the videos. In keeping with the narrow scope of this WIP paper, only data about the students' perceptions of the videos are presented and discussed below.

**Preliminary Findings**
Both the content and presentation of the material were addressed by specific survey questions: these questions ask which videos the students found most and least meaningful as well as students' opinions on the importance of the perceived identities of the speakers.

*Meaningfulness of Videos*
Students were asked directly which video they found most meaningful and which they found least meaningful.

Over half the students identified one of three videos as the most meaningful: Women in Engineering (24%), Does a Dream Job Exist (17%), and Beyond the Technical: Soft Skills (10%). Two other videos were each selected by 9% of the students as most meaningful: Work-Life Balance and Internships and Growth Opportunities. Overall, then, five videos were selected by over two-thirds of the respondents as most meaningful.
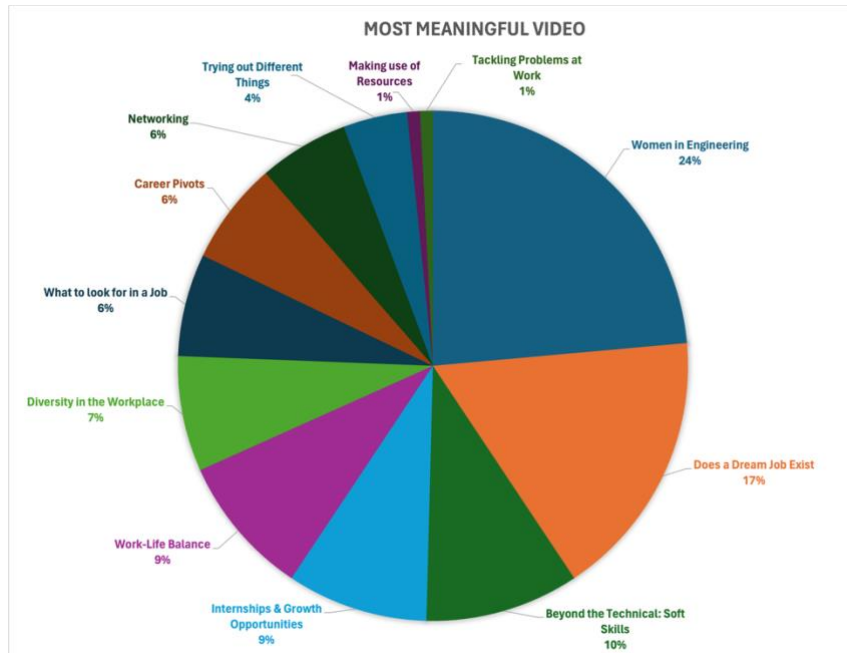
Figure 2. Pie chart distribution of videos selected as "most meaningful" to the students

Nearly half (48%) of the students identified one of four videos as the least meaningful: Trying Out Different Things (13%); Tackling Problems at Work (12%); Women in Engineering (12%); and Making Use of Resources (11%). These videos represent nearly half of those selected as least meaningful (see Figure 3), but the distribution of the top half of selections for least meaningful was more even than the distribution of those deemed most meaningful.
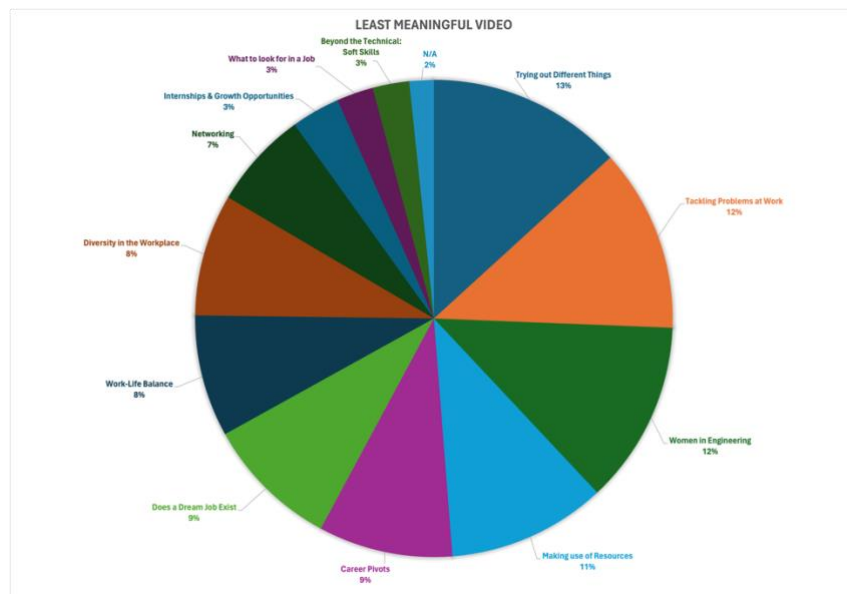


Figure 3. Pie chart distribution of videos selected as "least meaningful" to students

*Importance of Speakers' Perceived Identities*

Students were asked: "How important were aspects of the perceived identities of the various speakers to you, with 0 being 'not at all important' and 10 being 'very important'?" The qualities rated were: race, gender expression, major within engineering (including computer science), and socio-economic background. An "other" category was available to respondents, with the majority of respondents not listing a quality. Figure 4 shows the distribution of response frequency for each perceived quality.
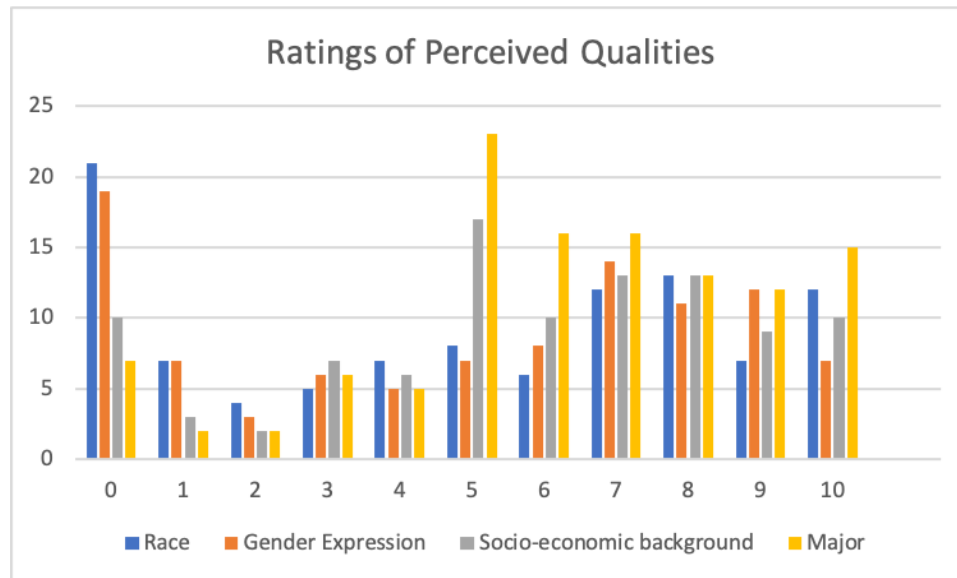


Figure 4. Distribution of student ratings of perceived qualities of the alumni speakers' identities (0 to 10 ratings on the x-axis and the percentage of respondents choosing that rating on the y-axis).

**Discussion**

While the distribution data of most and least meaningful videos suggest that certain topics resonated most with students, this data needs to be explored further in light of the students' qualitative explanations for the selections and their demographic data. For instance, the video "Women in Engineering" was overwhelmingly the most frequent selection for most meaningful video, and it was also in the top tier of selection frequency for least meaningful video (missing the top spot by 1%): qualitative data may illuminate reasons for this polarization as students were directly asked to explain the rationale for their selections, and their associated demographic data may be relevant. It is worth noting that while 90% of the students who met the threshold to continue with the survey watched all of the videos, among the 10% who did not watch all twelve videos there was no noticeable exclusion of any one video (for instance, if a student were averse to watching a video about women in engineering, that video could have been skipped).

The chart illustrating the ratings of speakers' perceived identities highlights the different significance students placed on various qualities. Approximately one-fifth of the students considered the speakers' race and gender expressions "not at all important," scoring them 0. Interestingly, among the four identities considered—race, gender expression, socio-economic

background, and academic major—race and gendered expression are the most visibly registered, so the strong statement of their unimportance needs further analysis in the context of the video medium. The survey asked students why they found a certain aspect of a speaker's identity important; however, students were not asked to explain why they found any aspects of a speaker's identity to be unimportant: this question may be added to future versions of the study. Students' demographic data will be compared to their evaluation of the importance of race and gender expression, and future work will study the connection between role models and identity as it explores the ability to construct salient future selves. The student ratings of the importance of the other two perceived identities—socioeconomic background and academic major—both spiked dramatically in the middle of the rating range, suggesting either neutrality or lack of interest in these qualities. The spiked middle ranges could indicate a default middle-rating; notably the middle range is not spiked in ratings of the race and gender expression qualities, which both have less pronounced spikes toward the positive end of the importance scale.

**Future Work and Conclusion**

Semi-structured follow-up interviews will be conducted with this first set of respondents; the post-survey about the videos includes some open-ended questions to supplement the closed-ended questions, and the interviews will prompt students to elaborate on their responses, providing more detailed and richer data. Additionally, student responses in the interviews may lead to revision of the survey questions. Changes are not expected for the pre-survey, however, which collects demographic data and establishes students' initial (pre-intervention) perspectives on engineering as a career. After the semi-structured interviews and any potential changes to the post-survey about the videos, approximately two hundred more students will be recruited for this study to increase the data set; this larger data set will be analyzed using a mixed methods approach. Future work on this project will include the presentation and analysis of data about students' initial expectations for their first job, the degree to which the video intervention affected students' ability to imagine their future selves, and the degree to which the video intervention affected students' perceptions about their first job and life after graduation.

This current Work-in Progress paper suggests that students find the video content compelling and that they have strong opinions about the value of representations of perceived identities; however, future work is needed to determine the efficacy of short curated videos in fostering students' ability to imagine salient future selves and to have a more realistic sense of the nature of early career engineering. Understanding the potential value of video interventions—in this case, of short, thematically curated video clips—is an initial step in providing a method of strengthening students' imaginative capacity to foster more salient visions of their future selves as well as potentially improving their expectations for the realities of early career engineering. Ultimately, it is hoped that these videos could be used by other institutions, or that the concept could be easily adapted to accommodate the needs of diverse types of institutions and student populations: the model is scalable [23], novel in the context of closing the readiness gap, and highly transferrable.

## References

[1] J. Trevelyan, "Transitioning to engineering practice," *Eur. J. Eng. Educ.*, vol. 44, no. 6, pp. 821–837, Nov. 2019, doi: 10.1080/03043797.2019.1681631.

[2] Z. S. Byrne, J. W. Weston, and K. Cave, "Development of a Scale for Measuring Students' Attitudes Towards Learning Professional (i.e., Soft) Skills," *Res. Sci. Educ.*, vol. 50, no. 4, pp. 1417–1433, Aug. 2020, doi: 10.1007/s11165-018-9738-3.

[3] R. P. Aleman and et al, "Mind the Gap: Exploring the Exploring the Perceived Gap Between Social and Technical Aspects of Engineering for Undergraduate Students," 2021.

[4] C. G. P. Berdanier, "A hard stop to the term 'soft skills,'" *J. Eng. Educ.*, vol. 111, no. 1, pp. 14–18, 2022, doi: 10.1002/jee.20442.

[5] P. Eshun and K. Beddoes, "Work in Progress: An Investigation of the Influence of Academic Culture on Engineering Graduates' Workforce Expectations and Subsequent Work Behaviors".

[6] K. Beddoes, "Accounting for Occupational Identity Work in the Attrition of Newcomer Civil Engineers: Theoretical Model," *J. Civ. Eng. Educ.*, vol. 149, no. 3, p. 04023001, Jul. 2023, doi: 10.1061/JCEECD.EIENG-1917.

[7] H. Ramsey, "Engineering Moment as a Pedagogical Approach: Using Narrative Theory to Promote Student Awareness of their Engineering Identities," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Feb. 07, 2024. [Online]. Available: https://peer.asee.org/engineering-moment-as-a-pedagogical-approach-using-narrative-theory-to-promote-student-awareness-of-their-engineering-identities

[8] H. Ramsey and Y.L.E. Wong, "Beyond the Vanishing Point: Using Future Self Theory and Student-Alumni Interviews to Expand Student Perspectives on Engineering Education and Engineering Work," presented at the 2022 ASEE Zone IV Conference, May 2022. Accessed: Feb. 07, 2024. [Online]. Available: https://peer.asee.org/beyond-the-vanishing-point-using-future-self-theory-and-student-alumni-interviews-to-expand-student-perspectives-on-engineering-education-and-engineering-work

[9] M. McLuhan, *Understanding Media: The Extensions of Man*. MIT Press, 1994.

[10] F. A. Salim and J. M. M. Ferreira, "Improving the learning effectiveness of educational videos," in *2023 IEEE Global Engineering Education Conference (EDUCON)*, May 2023, pp. 1–7. doi: 10.1109/EDUCON54358.2023.10125215.

[11] B. Lazarevic, J. Fuller, and J. Cain, "Facilitating Community of Inquiry Through Video-Enhanced Online Instruction: What are Learners' Impressions?," *TechTrends*, vol. 67, no. 4, pp. 611–625, Jul. 2023, doi: 10.1007/s11528-023-00864-8.

[12] E. Clinton, A. Galletta, and J. Zanton, "Overview and critical components of video-based instruction for students with disabilities," *Technol. Disabil.*, vol. 28, no. 3, pp. 91–100, Nov. 2016, doi: 10.3233/TAD-160447.

[13] D. M. Gilbuena, B. U. Sherrett, E. S. Gummer, A. B. Champagne, and M. D. Koretsky, "Feedback on Professional Skills as Enculturation into Communities of Practice," *J. Eng. Educ.*, vol. 104, no. 1, pp. 7–34, 2015, doi: 10.1002/jee.20061.

[14]    M. A. Prater, N. Carter, C. Hitchcock, and P. Dowrick, "Video self-modeling to improve academic performance: A literature review," *Psychol. Sch.*, vol. 49, no. 1, pp. 71–81, 2012, doi: 10.1002/pits.20617.

[15]    J. C. Ives, W. F. Straub, and G. A. Shelley, "Enhancing Athletic Performance Using Digital Video in Consulting," *J. Appl. Sport Psychol.*, vol. 14, no. 3, pp. 237–245, Jan. 2002, doi: 10.1080/10413200290103527.

[16]    R. M. Ryan and E. L. Deci, *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York: The Guilford Press, 2017.

[17]    R. M. Ryan and E. L. Deci, "Overview of Self-Determination Theory: An Organismic Dialectical Perspective," in *Handbook of self-determination research*, vol. 2, 2002, pp. 3–33.

[18]    D. N. Stone, E. L. Deci, and R. M. Ryan, "Beyond Talk: Creating Autonomous Motivation through Self-Determination Theory," *J. Gen. Manag.*, vol. 34, no. 3, pp. 75–91, 2009, doi: 10.1177/030630700903400305.

[19]    K. Trenshaw, D. Rushton, E. E. Miskioglu, and P. Asare, "Work-in-Progress: Emergent Themes from 'High Impact' Role Model and Mentor Narratives," in *2020 IEEE Frontiers in Education Conference (FIE)*, Uppsala, Sweden: IEEE, Oct. 2020, pp. 1–4. doi: 10.1109/FIE44824.2020.9274244.

[20]    K. Trenshaw, E. Miskioğlu, D. Rushton, and P. Asare, "What's in a Story? Comparative Analysis of Role Model and Mentor Narratives," in *2020 ASEE Virtual Annual Conference Content Access Proceedings*, Virtual On line: ASEE Conferences, Jun. 2020, p. 35506. doi: 10.18260/1-2--35506.

[21]    I. S. Fitton, J. Dalton, M. J. Proulx, and C. Lutteroth, "Dancing with the Avatars: Feedforward Learning from Self-Avatars," in *CHI Conference on Human Factors in Computing Systems Extended Abstracts*, New Orleans LA USA: ACM, Apr. 2022, pp. 1–8. doi: 10.1145/3491101.3519732.

[22]    C. Clarke *et al.*, "FakeForward: Using Deepfake Technology for Feedforward Learning," in *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, Hamburg Germany: ACM, Apr. 2023, pp. 1–17. doi: 10.1145/3544548.3581100.

[23]    J. Ware and S. Stein, "From 'Mentor' to 'Role Model': Scaling the Involvement of STEM Professionals through Role Model Videos".