

Practitioners' and Instructors' Considerations in Workforce Development Collaborations: Inputs for Graphical User Interface of a Technology-Driven Matching Platform

Anthony O. Yusuf, S.M.ASCE¹; Abiola A. Akanmu, Ph.D.²; Andrea N. Ofori-Boadu, Ph.D.³; Homero Murzi, Ph.D.⁴; and Sheryl Ball, Ph.D.⁵

¹Ph.D. Student, Myers-Lawson School of Construction, Virginia Tech, Blacksburg, VA (corresponding author). ORCID: <https://orcid.org/0000-0003-1574-788X>.

Email: anthonyy@vt.edu

²Associate Professor, Myers-Lawson School of Construction, Virginia Tech, Blacksburg, VA.

Email: abiola@vt.edu

³Associate Professor, Dept. of Built Environment, North Carolina A&T State Univ., Greensboro, NC. Email: andrea@ncat.edu

⁴Assistant Professor, Dept. of Engineering Education, Virginia Tech, Blacksburg, VA.

Email: hmurzi@vt.edu

⁵Professor, Dept. of Economics, Virginia Tech, Blacksburg, VA. Email: sball@vt.edu

ABSTRACT

The need to prepare students for the workplace, shortage of skilled labor, and fast-paced changes in the industry necessitate improvements in the pedagogical frameworks of educational communities. Practitioners are required to provide practical insights, rigor, and realism to complement academia pedagogic efforts in construction education. However, this is being plagued by several complexities. Leveraging advances in computational techniques, this paper presents the considerations of practitioners and instructors in workforce development collaborations as inputs for a graphical user interface of a technology-driven matching platform for connecting professional and educational communities. Practitioners' considerations are students and specific course-support related, while instructors' considerations are related to practitioner suitability, project, and company characteristics. The study contributes to human factors principles in user interface design as well as user-centered design principles by highlighting information requirements of a collaborative network of instructors and practitioners. The findings of this study also provide insights to enhance industry-academia collaborations.

INTRODUCTION

Industry-academia collaboration is well reported in literature, but the emphasis seems to be more on research, technology transfer, and consultation than workforce development (Chandrasekaran et al. 2015). While academia has a dual role of research and training, there is tendency to focus on one than the other (Afonso et al. 2012). Studies (Ahn et al. 2012; Ahmed et al. 2014) have shown changes in the skills and competence requirements of employers. Also, concerns have been noted about the inability of recent graduates to meet industry expectations (Christo-Baker et al. 2017). This has constituted gaps and mismatches between industry requirements and academia offerings (Afonso et al. 2012). To deal with this challenge, several modifications have been deemed important in the workforce development strategies of academia (Lu and Jacob 2022). For example, greater industry-academia collaborations have been considered a means to achieve an adequate blend of theoretical knowledge and

employability skills that industry now require (NASEM 2016). Such collaborations include teaching methods that allow involvement of industry practitioners in construction education. These include guest lectures, workshops, seminars, site visits, lab sessions, mentor, and judge for capstone (Back and Sanders 1998; Abudayyeh et al. 2000). These are crucial because they are under direct guidance of instructors who can guide the interaction of students with their communities of practice for optimal learning outcome (Anderson and Mourgues 2014). Hence, beyond institutional frameworks, joint effort is required by instructors and practitioners in these collaborations.

To achieve the integration of the two communities for workforce development, industry should no longer be seen as a “customer” that depends on academia products but as a “partner” in the production process (Rizvi and Aggarwal 2005). Although the two communities have been noted to have complementary roles in preparing the future workforce (Abudayyeh et al. 2000), achieving greater collaborations between the two communities requires certain considerations. For example, the two communities have been said to be different in terms of culture, interest, and motive for collaboration (Niedergassel and Leker 2011; Chandrasekaran et al. 2015). Also, mutual lack of understanding of expectations and working practices is a significant barrier in industry-academia collaborations (Bruneel et al. 2010). Therefore, understanding the factors the two parties would consider in workforce development collaborations is important to integrate the two discrete entities. This is very important in workforce development collaborations where instructors and industry practitioners need to work as a team with unity of purpose for maximal benefit of students (Anderson and Mourgues 2014).

Several mechanisms at academic departments and institution levels have been developed to strengthen industry-academia collaborations. These include industry advisory boards, on-campus recruitment, continuous professional development education (Abudayyeh et al. 2000), technology transfer offices, and industrial liaison offices (Bruneel et al. 2010). However, these arrangements do not have workforce development collaborations as primary focus, but rather tangential if at all. For workforce development, there is a need for a strong and direct connection between individual players, that is instructors and industry practitioners who could collaborate at micro levels. This would facilitate practitioners’ direct input in course instructions to prepare students for the industry. Therefore, to achieve this, advances in computing techniques are being leveraged to develop a technology-driven collaborative network of instructors and industry practitioners for workforce development collaborations.

BACKGROUND

Construction education is rich in practical components; hence instructors do connect with industry practitioners to complement classroom teaching with practical knowledge (Abudayyeh et al. 2000). This is important because preparing students for a rapidly changing industry is a challenge to construction programs. Hence, institutions are required to keep pace with changes in the industry (Irizarry and Adams 2006). Industry-academia collaborations provide opportunities for students to explore the practical aspects of their theoretical knowledge and interact with industry practitioners to glean from their insight and experience (Chandrasekaran et al. 2015; Lu and Jacob 2022). However, red tape, difficulty of access to industry practitioners, lack of proper organization and coordination as well as misfit of industry practitioners’ offerings are common challenges (Kaymaz and Eryigit 2011; Lu and Jacob 2022). To succeed in preparing the next

generation of construction professionals, a concerted effort must be made to achieve the highest level of industry involvement possible.

To ensure optimum learning outcome for students, there are several factors an instructor would consider in industry-academia collaboration. For example, availability of industry practitioners and areas of expertise are important in preparing guest lectures (Dalakas 2016). Also, for site visit, location/proximity of jobsite, class size, safety concern, project stage, and type of project executed are important factors to consider (Guhan 2015; Civjan 2020). On the other hand, workforce development collaborations with academia require an industry practitioner to consider time, and effort in preparation as well as availability to work with students, for example in the case of mentor capstone project (Anderson and Mourgues 2014). Therefore, to develop a technology-driven matching platform to connect professional and educational communities, this study adopts a systematic approach by investigating the information requirements of instructors and industry practitioners in workforce development collaborations. This would help to capture users' preferences to ensure usability and optimum user experience.

Theoretical Underpinning. Human factors principles in user interface design as postulated by Gould and Lewis (1985) informed the approach in the determination of inputs for the graphical user interface (GUI) of the proposed matching platform. The principle stipulates that every system intended for human use should be simple to use, easy to learn, and useful—that is, provide the features and functionalities that people require in the usage of the system. To ensure this, Gould and Lewis (1985) noted that systems should be designed with end-users in mind by early involvement of end-users to understand their behavioral and attitudinal characteristics as well as the nature of tasks expected to be accomplished with the system. Hartson and Pyla (2012) extended this theory by providing a methodical approach rooted in user-centered design principles to understand end-users of a system, and tasks to be performed with the system. This approach involves usage research which precedes system design. Usage research involves contextual enquiries and comprises usage research data elicitation and usage research data analysis which is to serve as benchmarks for the design process. These two principles are geared towards ensuring optimum user experience in human-computer interaction. Hence, the principles underpin this study with instructors and industry practitioners who are the end-users of the proposed matching platform as participants for the usage research. This informed the research question: what are the information requirements for matching instructors with industry practitioners for workforce development collaborations?

METHODOLOGY

Data Collection. Usage research data elicitation was conducted through a contextual enquiry. A quantitative approach based on primary data was deemed suitable due to the multifaceted nature of construction education and workforce development collaborations as well as spatial distribution of end-users of the proposed platform. Online questionnaire was the data collection instrument used. Structured questionnaires are effective data collection methods to capture respondents' beliefs, attitudes, and opinions (Silverman 2020). Two separate questionnaires were designed with closed-ended questions in accordance with the construct of reviewed literature. One for each category of end-user: instructors in various construction-related programs and industry practitioners across the United States. To ensure content validity, face validity and internal consistency, the questionnaires were evaluated by an expert

outside of the study and pilot studies were conducted. The results of the pilot study were used to refine the final surveys. After institutional review board approval, the questionnaires were administered online via Associated Schools of Construction contact list, Myers Lawson School of Construction industry contact list, LinkedIn and personalized emails to instructors and industry practitioners. Participants were informed about the aim of the study to identify information requirements for equitable matching of instructors with industry practitioners. Participants were asked questions about their demographics as well as that of their institution or organization. They were also asked to rank the importance of a set of factors they would consider in industry-academia workforce development collaborations. A 5-point Likert scale (i.e., 1: Not Important, 2: Slightly Important, 3: Moderately Important, 4: Important, and 5: Very Important) was used.

Data Analysis. A total of 1,509 participants viewed the instructors' survey. Only 301 responses were valid for analysis, which represents a response rate of about 20%. For the industry practitioners' survey, 841 participants viewed the survey but only 147 valid responses were received, representing a response rate of about 18%. The responses from both instructors and industry practitioners provided quantitative data for this study. Descriptive statistics in Microsoft Excel were used for data analysis. To determine the critical information requirements for the GUI, mean score and normalization index were used, similar to previous studies (Adabre and Chan 2019; Nnaji and Karakhan 2020). Normalization Index (NI) shows the relative importance of a factor by comparison with other factors in the same set. The index ranges from 0 to 1, a factor with $NI \geq 0.5$ is considered critical (Adabre and Chan 2019). The formula is $NI = [(\text{actual value} - \text{minimum value}) / (\text{maximum value} - \text{minimum value})]$.

RESULTS AND DISCUSSION

Figures 1 and 3 show the demographics of instructors and industry practitioners respectively who responded to the survey. The results show the wide coverage of the survey which enables the generalizing of the results for the GUI inputs of the matching platform. Figure 2 shows that there are 15 critical information requirements of instructors in industry-academia workforce development collaborations. Figure 4 reveals 13 critical information requirements of industry practitioners in industry-academia workforce development collaborations. More than 60% of the respondents in each category considered each of the information requirements at least moderately important (Figure 2 and Figure 4). The information requirements of instructors would help to determine the information to be supplied by practitioners on the matching platform to enhance the matching process and meet students' learning objectives. Similarly, the information requirements of practitioners provide insights into the information that instructors are to provide on the platform. This exchange of information would help ensure proper matching of suitable practitioners with instructors as well as help determine the inputs for the GUI of the matching platform. Options would be provided using a drop-down menu to ensure that users can easily supply every information required. Industry practitioners would be able to modify their preferences and availability from time to time. Instructors would also be able to change the details of their preferences, class size, students' learning outcome and how practitioners can contribute to students' learning. The elements and options of the platform are being carefully developed based on "recognition rather than recall" principle by making the components alike to users' prior experience on similar platforms.

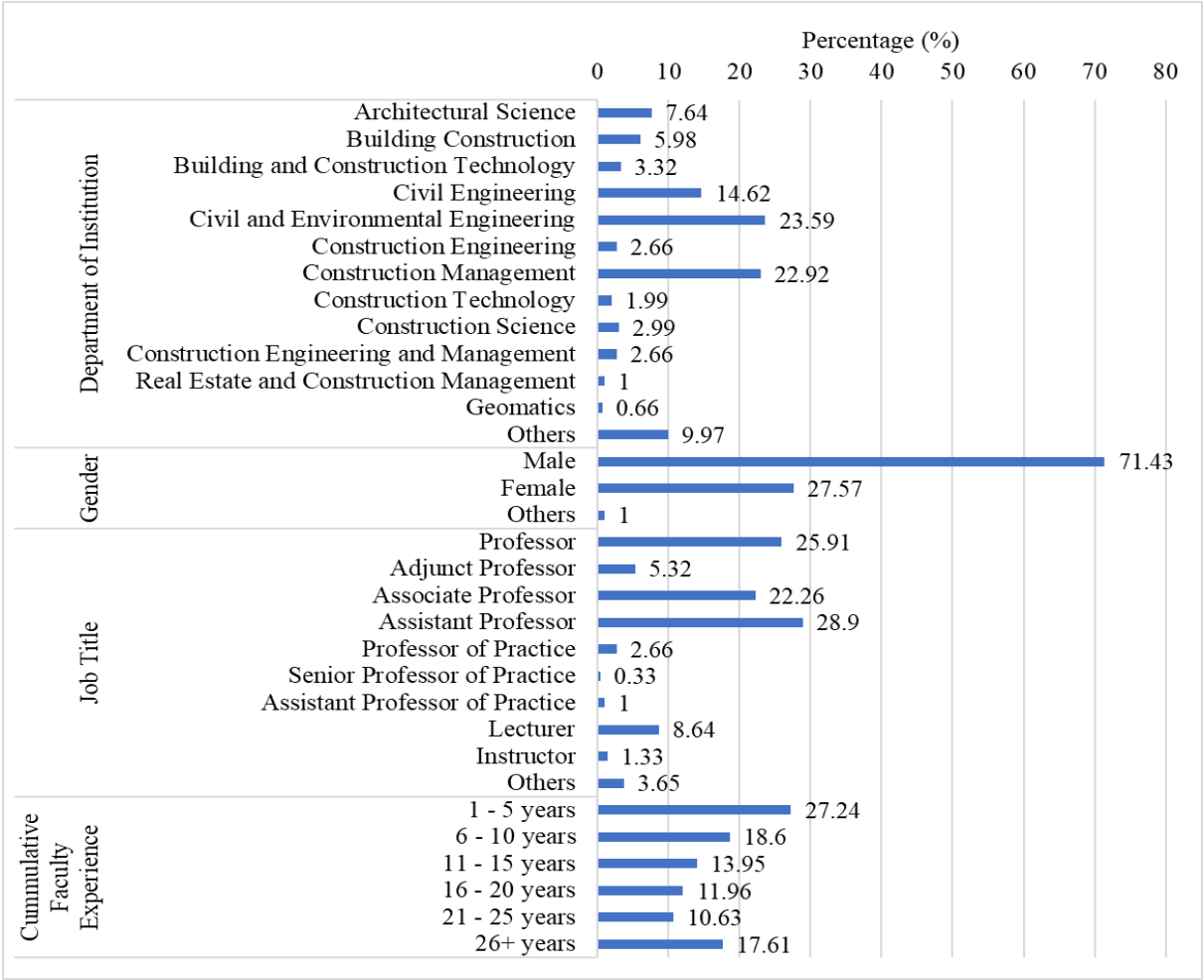


Figure 1. Demographics of instructors.

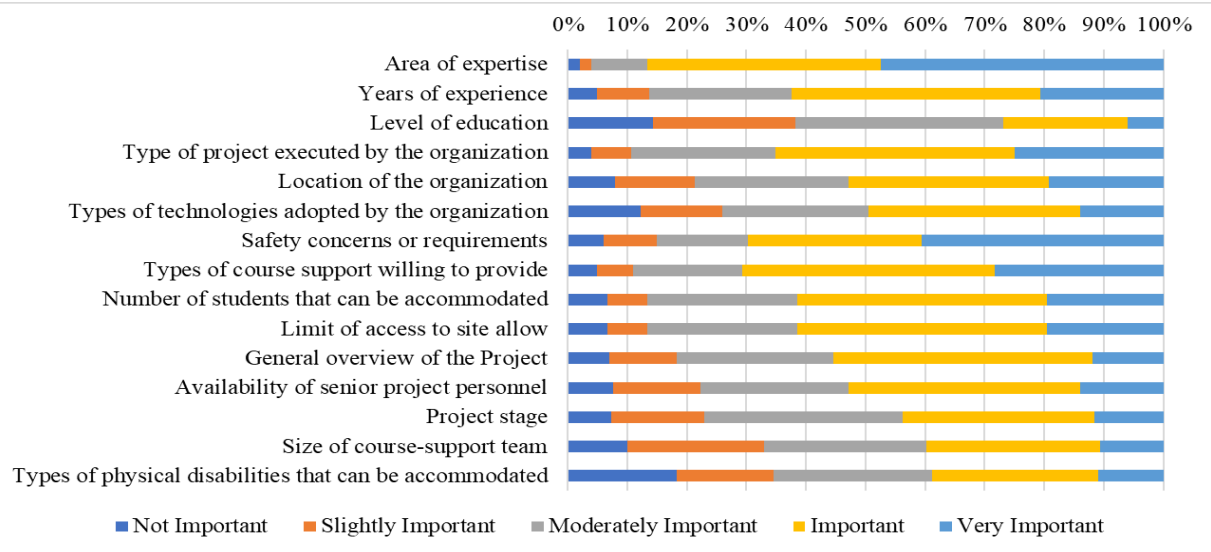


Figure 2. Instructors' information requirements in workforce development collaborations.

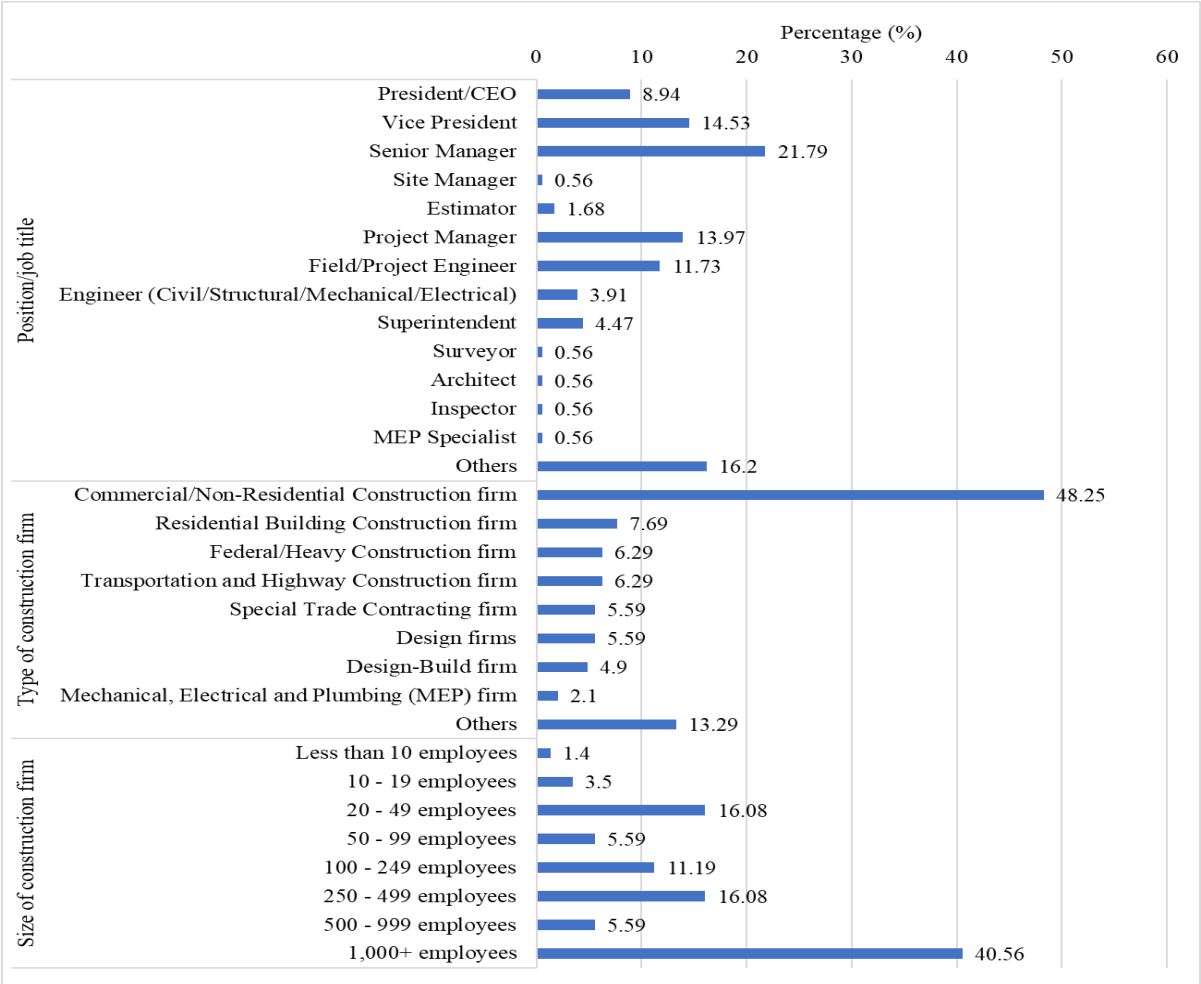


Figure 3. Demographics of industry practitioners.

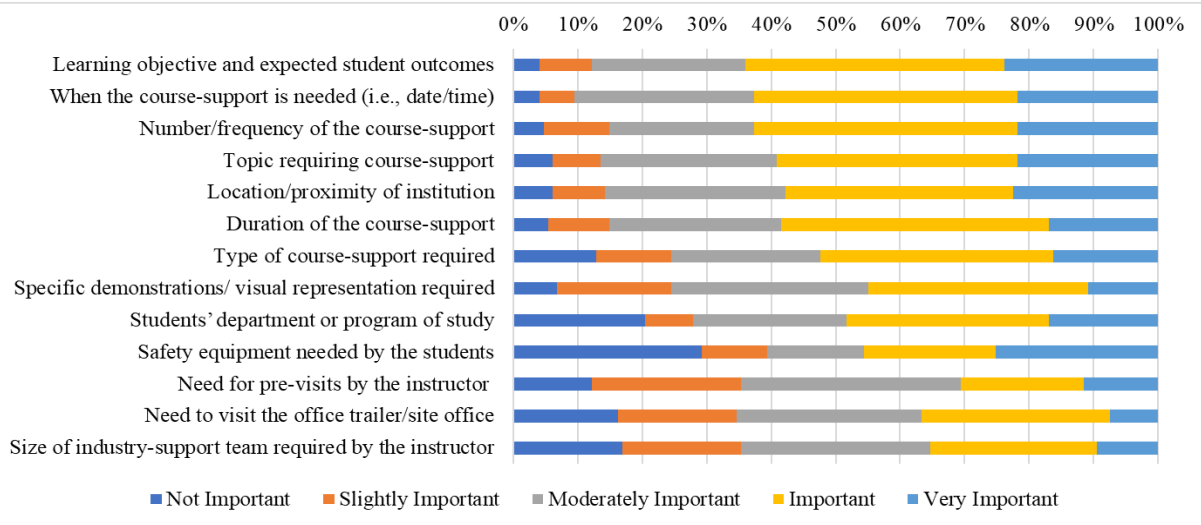


Figure 4. Practitioners' information requirements in workforce development collaborations.

CONCLUSION AND FUTURE WORK

This study adopts a scientific approach underpinned in human factors design principles for user interfaces and user-centered design principles to determine the inputs for the GUI of a technology-driven matching platform to connect instructors and industry practitioners for workforce development collaborations. An end-user driven design approach was adopted to ensure interactive and participatory design by gathering inputs from typical and potential users before the design process. The process adopted in the design and development of the matching platform would facilitate user acceptance and intention to use. This study contributes to methodical discussions and applications of human factors and user-centered principles in the design of user interfaces. The findings of this study present the inputs for the GUI of a matching platform for industry-academia workforce development collaborations. The findings also provide insights which could help facilitate industry-academia workforce development collaborations. After preliminary development, the platform would be subjected to user testing where instructors and industry practitioners would use the platform for its intended purpose. The activities of users and performance of the platform will be observed and evaluated during user testing. The feedback of the users would also be analyzed to improve the platform for greater usability and better user experience. This is to ensure empirical evaluation and iterative design. This would be conducted early in the design process to facilitate actual behavioral evaluation of ease of use and ease of learning to use.

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