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INSTRUCTOR-PRACTITIONER COLLABORATIONS VIA A WEB PLATFORM – DESIGN AND PRACTITIONERS' INTENTION-TO-USE

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Anthony Yusuf, Ph.D. Student
Virginia Polytechnic Institute and State University, Virginia, United States
anthonyy@vt.edu

Abiola Akanmu, Associate Professor
Virginia Polytechnic Institute and State University, Virginia, United States
abiola@vt.edu

Adedeji Afolabi, Research Associate
Virginia Polytechnic Institute and State University, Virginia, United States
adedeji@vt.edu

Sheryl Ball, Professor
Virginia Polytechnic Institute and State University, Virginia, United States
sball@vt.edu

Homero Murzi, Associate Professor
Virginia Polytechnic Institute and State University, Virginia, United States
hmurzi@vt.edu

Andrea Ofori-Boadu, Associate Professor
North Carolina Agricultural and Technical State University, North Carolina, United States
andreao@ncat.edu

SUMMARY: *The construction industry is rapidly changing due to the greater adoption of innovations and technology. This has necessitated changes in the competencies that the industry demands from new graduates. For academia to meet the changing needs of the industry, the inputs of practitioners are needed to complement academic pedagogical efforts. This study leverages the potential of Web 2.0 to develop a web platform called ConPEC to facilitate instructor-practitioner collaborations for enhancing student learning. ConPEC is aimed at providing instructors with equitable access to practitioners, increasing the participation of practitioners in instructors' pedagogical efforts, and enabling greater interaction of students with their communities of practice (CoP). These could facilitate achieving a proper blend of theory and practice in construction engineering education as well as ensure that students possess the competencies that the industry demands. This study demonstrates the efficacy of design principles in designing information systems. This study also demonstrates the usage of the Technology Acceptance Model (TAM) to explain and understand practitioners' acceptance of ConPEC. The findings reveal that practitioners perceived ConPEC to be useful, easy to use, and user-friendly. Practitioners' behavioral intention-to-use ConPEC is significantly influenced by attitude toward usage, perceived ease of use, and trust. Trust also significantly influenced perceived ease of use. However, perceived usefulness has no direct significant influence on practitioners' behavioral intention-to-use ConPEC. The study uncovers practitioners' acceptance behavior toward ConPEC which could be leveraged for further system development. The study also provides a framework that can be leveraged in diverse domains to develop similar initiatives aimed at addressing skill gaps in fresh graduates.*

KEYWORDS: *ConPEC, instructors, intention-to-use, practitioners, TAM, trust, web platform.*

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1. INTRODUCTION

The reality of a competence gap between new graduates and organizational requirements is evident across various industry sectors, including the construction industry (Wu et al, 2018, Jacobs et al, 2022). This gap results in significant resources being expended by organizations in training new graduates (Misra, 2020), and raises concerns among industry recruiters and employers (Christo-Baker et al, 2017, Jacobs et al, 2022). Some students perceive themselves as not job-ready due to a perceived lack of practical knowledge of the construction industry (Pereira et al, 2019), there is also pressure on higher education institutions to bridge the gap between industry expectations and academic curriculum (Misra, 2020, Tayeh and Issa, 2021). Therefore, there is a need for improvement in the pedagogical strategies of higher education through industry-academia collaborations (Abudayyeh et al, 2000, Jacobs et al, 2022, Manesh et al, 2020). Such collaborations could enhance students' competencies by fostering interaction with their communities of practice (CoP) (Gorman et al, 2001, Chandrasekaran et al, 2015).

However, it is essential to distinguish industry-academia collaboration from student interaction with their CoP. Various arrangements, such as on-campus recruiting and technology transfer offices, focus on fostering industry-academia interactions but may not directly contribute to student learning (Abudayyeh et al, 2000, Awasthy et al, 2020). Emphasizing research and technology transfer in these collaborations may overshadow the crucial aspect of student preparedness for the workplace (Afonso et al, 2010, Chandrasekaran et al, 2015). To address the skill gap in the construction industry, greater emphasis on instructor-practitioner collaborations, specifically aimed at student learning is required. Studies have highlighted the necessity for instructors and practitioners to work together to incorporate practitioners' insights into academic pedagogical efforts (Anderson and Mourgues, 2014, Jacobs et al, 2022, Lu and Jacobs, 2022).

Practitioners have shown a willingness to collaborate with instructors in preparing students for the industry (Edward Back and Sanders, 1998, Lu and Jacobs, 2022) but instructors may face challenges in accessing willing practitioners (Chandrasekaran et al, 2015). This is particularly true for those relying solely on personal contacts, social media, and professional organizations to reach practitioners (Gruzd et al, 2012, Lu and Jacobs, 2022). Unequal access to practitioners may result in disparities in the competence of construction engineering graduates (Chandrasekaran et al., 2015), especially for instructors with limited industry networks and those in smaller institutions. Leveraging the internet and web platforms can help overcome these challenges by connecting diverse individuals and communities for enhanced collaborations (Wellman, 2004). The recent surge in remote collaboration due to COVID-19 further emphasizes the potential of information technology in connecting practitioners and instructors for student development (Inada, 2023). Hence, web platforms, if designed with a user-centered approach, can serve as an effective means for facilitating instructor-practitioner connections. Researchers have advocated for user-centered design approaches to ensure that systems designed are useful, easy to use, and user-friendly (Wallach and Scholz, 2012, Lowdermilk, 2013).

Therefore, this study introduces ConPEC, a web platform that can connect practitioners and instructors. The study solely aims to demonstrate how the web platform was developed to foster instructor-practitioner collaborations. The study also explores practitioners' behavioral intention-to-use ConPEC through the Technology Acceptance Model (TAM) as an initial effort to evaluate the web platform. The paper provides insights into practitioners' acceptance of ConPEC as a collaborative tool, offering a benchmark for future efforts in different domains. The subsequent sections of the paper present a literature review on web platforms for connecting with practitioners or industry, the importance of evaluating user intention-to-use information systems, and theoretical underpinning.

2. BACKGROUND

2.1 Web platforms for connecting instructors (academia) with practitioners (industry)

Previous studies have explored the use of web-based platforms to facilitate connections between instructors (academia) and practitioners (industry) (Khan and Gogos, 2013, Albats et al, 2016, Spaulding et al, 2021). For example, Albats et al (2016) categorized web platforms for connecting industry and academia into five. These include education-focused, knowledge-, technology- and intellectual property-focused, crowdsourcing-focused, network-building-focused, and innovation marketing-focused. Education-focused web platforms, as highlighted by (Albats et al, 2016), primarily expose students to project-based learning (e.g., edusourced.com) or enable them to enroll in courses designed by industry professionals (e.g., coursera.org). However, these platforms do not operate under direct instructor supervision. Also, according to Albats et al (2016), network-building-focused web platform

include general social media platforms (e.g., Facebook and LinkedIn), web platforms for fostering an annual conference for industry and academia to discuss collaboration-related issues (such as uiin.org), those for instructors and practitioners to collaboration on project level (such as uidp.org) and those for mapping complementary knowledge, technology, expertise and common interests of business and research areas (such as bridgelight.co.uk and connect.innovateuk.org). However, none of these web platforms specifically target fostering instructors' access to practitioners for contributions to student learning. Similarly, Pavon-Marino and Izquierdo-Zaragoza (2015) developed a web platform called Net2Plan which is an open-source network planning tool to reduce the industry-academia gap in technology transfer. The study by Confalonieri and Janes (2022) presents a web platform for promoting technology transfer offers in an industry-friendly format. However, these studies are focused on a collaborative pattern of technology transfer which differs from student learning. Observations from various studies show that other disciplines have found use cases for instructor-practitioner collaboration via web-based platforms. For instance, Khan and Gogos (2013) presented a web platform for connecting graduate students of biotechnology with practitioners, where practitioners serve as mentors to students until the completion of their academic program. Spaulding et al (2021) also leveraged a web platform, diatom.org, to connect diverse personnel (students, practitioners, and scientists) in the field of diatom taxonomy. These studies have leveraged the affordances of information technology via web platforms to connect communities and individuals in various contexts. However, similar applications in connecting practitioners and instructors to achieve an adequate blend of theory and practice in preparing construction engineering students for the construction industry seem non-existent.

2.2 Importance of evaluating users' intention-to-use information systems

According to Brezavšček et al (2016), intention-to-use is "the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior". Behavioral intention-to-use is an important precursor to actual system usage (Mardiana et al, 2015). This is primarily significant because the success of information systems such as web-based platforms is dependent on user acceptance (Revythi and Tselios, 2019). Despite the benefits of information systems, there are instances where users do not accept its use and therefore the system fails to achieve the purpose for which it was intended (Díez and McIntosh, 2009). Hence, there is a surge in evaluating users' intention-to-use information systems (Mardiana et al, 2015). This becomes crucial in the case of practitioners such as construction professionals who have been noted to be reluctant to embrace information and communication technology (ICT) (Alaloul et al, 2020) of which information systems such as web platforms are subsets (Sorce and Issa, 2021). Prior studies have investigated users' intention-to-use information systems to understand user behavior and provide insights for further system development (Brezavšček et al, 2016, Teo and Zhou, 2014). These studies also provide insights into the parameters that influence acceptance and continual usage of technologies by end users. For example, Sorce and Issa (2021) investigated practitioners' intention-to-use ICT including web-based platforms. The study reveals that practitioners' adoption of ICT is influenced by their perception of ICT's usefulness, and this is supported by their perception of ICT's ease of use. Elshafey et al (2020) showed that intention-to-use building information modeling (BIM) and augmented reality (AR) by practitioners is significantly influenced by their perceived usefulness of BIM and AR which in turn is influenced by their perceived ease of use of BIM and AR. Similarly, Okoro et al (2023) tested a conceptual model of factors influencing the acceptance of immersive technology (ImT) by practitioners. The study revealed that practitioners' intention-to-use ImT is influenced by their attitude towards using ImT. Also, practitioners' perceived usefulness of ImT had a significant influence on their attitude toward using ImT and their intention-to-use ImT. Therefore, understanding end-users' intention-to-use information systems is crucial to understanding user behavior and providing insights for further development.

2.3 Theoretical underpinning

This study assessed practitioners' intention-to-use a web-based instructor-practitioner collaborative platform. To assess the intention-to-use, the study is underpinned by the Technology Acceptance Model (TAM). TAM is a theoretical framework to understand the acceptance of innovations and technologies at the individual level and it has been used in several domains (Seethamraju et al, 2018). Previous studies have gained significant input by measuring intention-to-use innovative platforms (Alharbi and Drew, 2014, Dhagarra et al, 2020, Kamal et al, 2020). For example, acceptance of technologies in healthcare service delivery (Dhagarra et al, 2020, Kamal et al, 2020), acceptance of educational technologies by students and faculty (Alharbi and Drew, 2014, Salloum et al, 2019), and acceptance of e-commerce platforms (Prakosa and Sumantika, 2021, Harsanto et al, 2023). TAM,

developed by Davis (1985) aimed to guide the acceptance of new information systems by proposed end-users. The proponent of TAM argued that the characteristics of a system (i.e., features and capabilities) are under the control of designers and developers and these affect end-users' acceptance and intention-to-use (Davis, 1985). TAM reveals that acceptance of information systems can be predicted by users' behavioral intention-to-use (BIU), attitude toward usage (ATU), perceived usefulness (PU), and perceived ease of use (PEOU). Davis (1985) defined PU as "the degree to which an individual believes that using a particular system would enhance his or her job performance", and PEOU as "the degree to which an individual believes that using a particular system would be free of physical and mental effort". TAM shows that BIU determines the actual use of an information system, hence it defines technology acceptance. The model also posits that ATU and PU have a direct influence on BIU, while both PEOU and PU have a direct influence on ATU. Also, PEOU has a direct influence on PU. Hence, the relationships between these constructs are hypothesized as:

H_1: Practitioners' perceived usefulness (PU) of ConPEC has a significant influence on their attitude towards using ConPEC (ATU).

H_2: Practitioners' perceived ease of use (PEOU) of ConPEC has a significant influence on their attitude towards using ConPEC (ATU).

H_3: Practitioners' perceived ease of use (PEOU) of ConPEC has a significant influence on their perceived usefulness (PU) of ConPEC.

H_4: Practitioners' attitude towards using (ATU) ConPEC has a significant influence on their behavioral intention-to-use (BIU) ConPEC

H_5: Practitioners perceived usefulness (PU) of ConPEC has a significant influence on their behavioral intention-to-use (BIU) ConPEC.

Previous studies have shown that PEOU also influences BIU (Ong et al, 2004, Alharbi and Drew, 2014). Hence this is hypothesized as:

H_6: Practitioners' perceived ease of use (PEOU) has a significant influence on their behavioral intention to use (BIU) ConPEC.

Davis (1985) explained that both PU and PEOU can be influenced by design features. A key consideration in web platforms is trust (Beldad et al, 2010). This is because the success of web platforms is influenced not only by the benefits of usage but also by users' level of trust during usage (Beldad et al, 2010, Wu et al, 2011). Trust is defined as "the attitude that an agent will help achieve an individual's goals in a situation characterized by uncertainty and vulnerability" (Sharp et al, 2023). Sultan et al (2003) revealed that the design features of web platforms account for 98% of the variance in web platform's trust. Online trust differs from offline trust because it results from users' interaction with an information system (Bart et al, 2005). Trust reveals satisfaction and it can affect the success of information systems (Urban et al, 2000, Beldad et al, 2010). Dhagarra et al (2020) showed that trust has a significant influence on BIU and PU. Similarly, Kasilinga (2020), showed that trust has a significant influence on ATU and BIU. Hence, given the position of existing literature (Davis, 1985, Dhagarra et al, 2020, Kasilingam, 2020), trust is incorporated into the original TAM by hypothesizing the following:

H_7: Trust (T) has a significant influence on users' behavioral intention-to-use (BIU)

H_8: Trust (T) has a significant influence on perceived usefulness (PU).

H_9: Trust (T) has a significant influence on perceived ease of use (PEOU)

H_{10}: Trust (T) has a significant influence on attitude towards usage (ATU).

Hypotheses H_1 to H_{10} result in the research model shown in Figure 1. The relationships are indicated by the arrows.

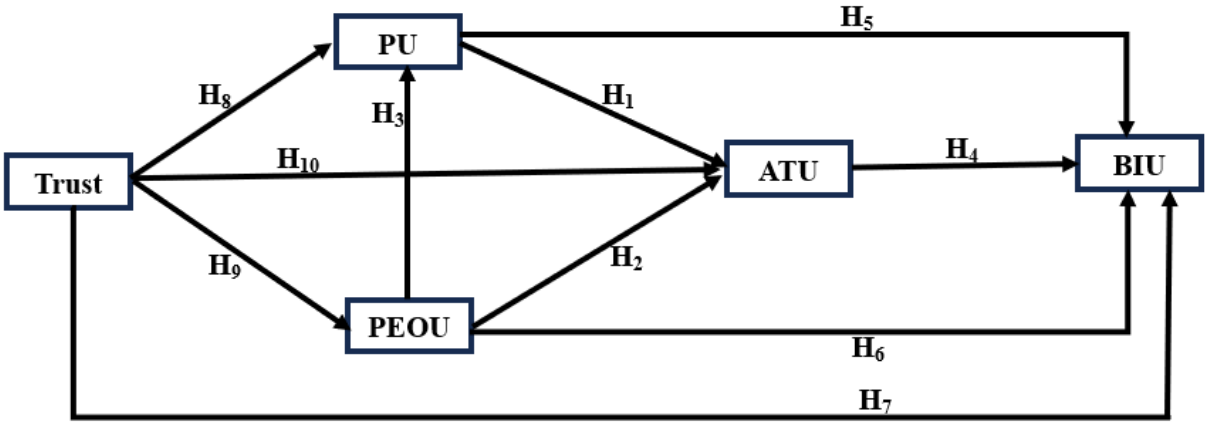
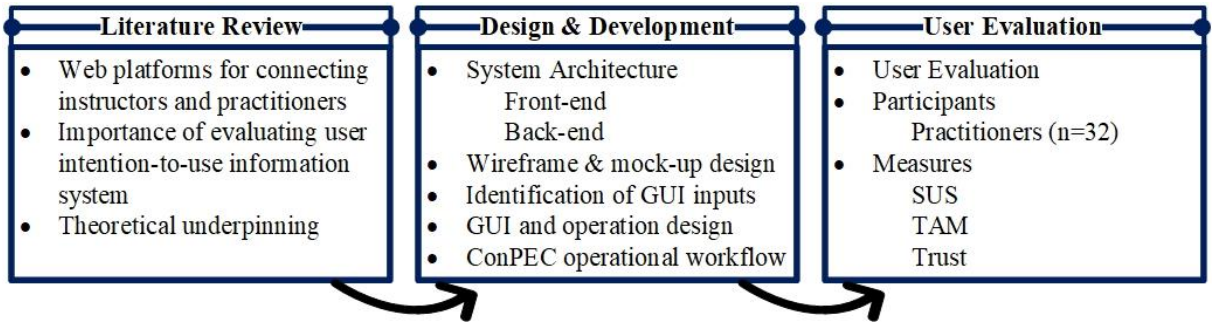


Figure 1: Research model showing the hypotheses. Source: Adapted from Davis (1985).

3. METHODOLOGY

3.1 Overview of Methodology

To improve instructors' access to practitioners and to facilitate greater participation of practitioners in preparing students for the industry, a web platform called ConPEC is designed to foster instructors-practitioner collaborations aimed at ensuring students are well-equipped for the workplace. The method adopted includes a review of extant studies (Section 2), design (Section 3.2), and practitioners' evaluation (Section 3.3) of the web platform. An overview of the methodology is shown in Figure 2. Section 3.2 presents the step-by-step procedure of the design process, followed by the evaluation of the web platform by potential users.



FIigure 2: Overview of methodology.

3.2 Design of ConPEC

Different aspects of the ConPEC design process were guided by various principles such as human factors principles in user interface design (Gould and Lewis, 1985), user-centered design principles (Hartson and Pyla, 2012), Jakob's law of internet user experience (Nielsen, 2000), and Nielsen's usability heuristics (Nielsen, 1994). These principles have been adjudged effective in designing user interfaces (Gonzalez-Holland et al, 2017, Yablonski, 2020). How these principles were applied in the various stages of the design process is explained in subsequent sections. Figure 3 shows an overview of the ConPEC system in terms of the frontend and the backend as well as the connection between the two components. With the aid of electronic devices such as smartphones and personal computers, Figure 3 shows how instructors get connected with practitioners who support their pedagogical efforts. Figure 3 also reveals how requests from instructors get communicated to practitioners and vice versa via the web platform on the frontend. The backend constitutes the servers, databases, programs, and matching algorithm by which the web platform operates. The backend is further discussed in section 3.2.1 while the frontend is discussed in detail in section 3.2.2.

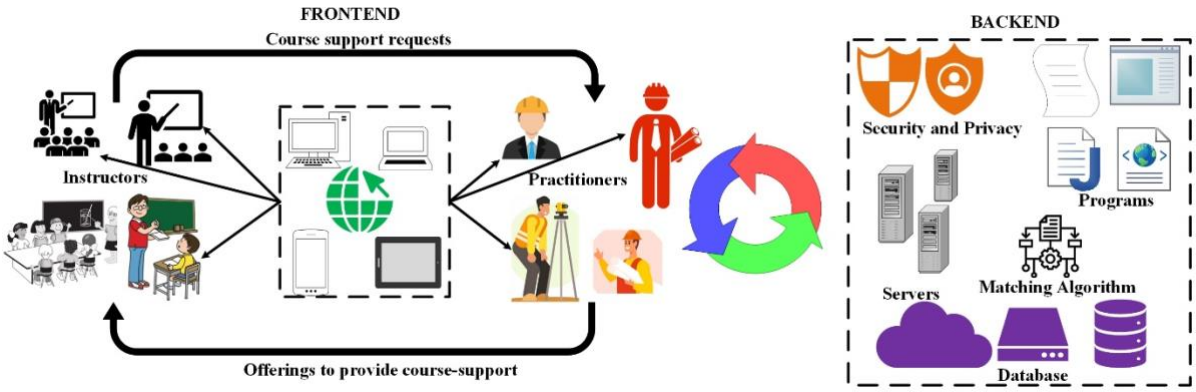


Figure 3: Overview of the ConPEC system.

3.2.1 ConPEC system architecture

Figure 4 shows the system architecture used in the design of the ConPEC system. The system architecture consists of two modules: the frontend and the backend as well as the interaction between the two. The frontend represents the components that users directly interact with. This sends requests to the server to retrieve specific resources or information. Frontend includes end-user devices such as personal computers and mobile devices with web browsers which provide user interface for users to interact with the web platform. The backend includes a server and database. MariaDB, which is an open-source Structured Query Language (SQL) database was chosen to manage and provide access to relational databases (i.e., the web application data) using SQL as the query language. Cloud Filestore is used to save all media content such as pictures, videos, and documents. The server represents a computer system that processes the requests received from the frontend and sends responses for display by retrieving the required resources or information from the database or Cloud Filestore. The components of the server are based on different functions and users of the platform. That is, the web platform has practitioners, instructors, and other personnel as administrators who constitute the users of the web platform. Hence, based on different roles on the web platform the server contents were grouped as shown in Figure 4. For example, "Practitioner Service" contains the codes that relate to practitioners' functions on the web platform. The "User Service" contains the codes for functions that are common to both practitioners and instructors (e.g., upload and feedback feature). "Admin Service" manages the functions that relate to administrators' roles. "Auth Service" controls the authentication functions that are used by practitioners, instructors, and administrators such as sign up, sign in, and password reset. Logging helps to ensure structured records of events and activities generated by the application system. It captures a wide range of information, including error messages, user interactions, and system events. This approach helps to group the codes, thereby ensuring code segregation for ease of understanding, maintenance, debugging, and troubleshooting purposes. The server hosts the web applications and the various services. The design process of the frontend and the composition of the backend are further explained in sections 3.2.2 to 3.2.4.

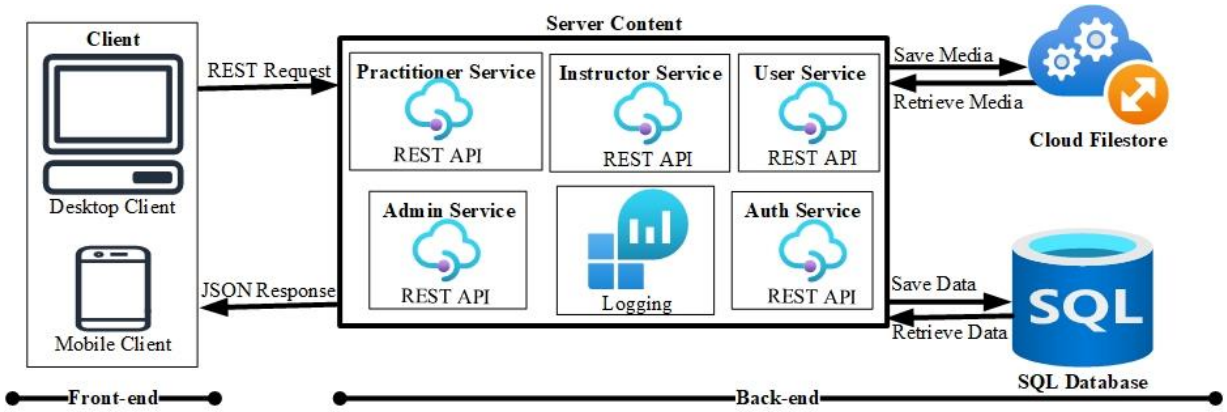


Figure 4: ConPEC system architecture.

3.2.2 Frontend of ConPEC

Wireframe and mock-ups: Schematic diagrams, preliminary layouts, and navigation workflows of the platform interface were designed using Microsoft Visio. This allows for appraising and evaluating the conceptual design. After some iterations of the interface conceptual design, the process to identify the specific elements of the front-end was then undertaken.

Identification of Graphical User Interface (GUI) inputs: The first step in human factors principles in user interface design is an early focus on users to understand their cognitive, behavioral, and attitudinal characteristics as well as the nature of the task to be accomplished by the proposed system (Gould and Lewis, 1985). To accomplish this, a review of extant studies was conducted, and the outcome led to the development of a survey (with well-structured closed-ended questions) which was validated with a focus group. This method has been considered suitable to elicit important information from potential users and to understand end-users of proposed systems (Gould and Lewis, 1985, Hartson and Pyla, 2012). The survey was reviewed by four instructors with at least five years of faculty experience and by an independent evaluator. Thereafter, a pilot survey was conducted with thirteen (13) practitioners. The outcome of this process was used to improve the survey before final deployment. The survey was administered online via QuestionPro to construction industry practitioners who are potential end-users of the web platform. The respondents were invited to participate in the survey via LinkedIn posts and direct email through personal contacts and industry relations. In the survey, respondents were required to select (multiple selections) the various ways they are willing to support instructors (e.g., facilitating seminars, workshops, guest lectures, laboratory sessions, serving as sponsor, mentor, and sponsor for students' term or classroom projects). The respondents were also asked to rank the parameters they would consider while deciding to meet the needs of instructors on a scale of 1 (Not Important) to 5 (Very Important). A total of 253 valid responses were received. The respondents (74.70% of male gender and 25.30% of female gender) were from different types and sizes of construction organizations across the United States with different expertise and varying years of experience. The survey results were validated with a focus group comprising seven (7) practitioners (5 of male gender and 2 of female gender). The outcomes of the survey and focus group provide insights into the design needs of users from which the inputs of the GUI of the ConPEC interface were inferred (Yusuf et al., 2024). The Mean Normalization Index (MNI) was used to identify the critical parameters that practitioners would consider while deciding to provide support to instructors. Parameters with MNI ≥ 0.5 were considered critical. The selection of the parameters was also validated with responses from the focus group. The details of this process are provided by Yusuf et al. (2024). These parameters constitute the GUI inputs of the web platform. This is because Hartson and Pyla (2012) argued that end-users are not designers and might be oblivious to what is required or needed to get their task done, hence the onus is on designers to deduce design needs and GUI inputs by understanding users' cognitive, behavioral, and attitudinal characteristics (Gould and Lewis, 1985). The final GUI inputs identified from the survey and focus group are shown in Figure 5. These GUI inputs represent the information that should be made available on the web platform for practitioners to decide and effectively meet the requests of instructors.

GUI design and operational workflow: After the identification of the inputs for the GUI, the interface design and operational workflow such as navigation, workflow pattern, usage procedure, and choice of visual elements were guided by Jakob's law of internet user experience (Nielsen, 2000), and Nielsen's usability heuristics (Nielsen, 1994). Usability heuristics are axioms to guide the design of user interfaces. These include prompt feedback mechanism, usage of terminologies and schema familiar to users, adequate user control, adherence to industry conventions, error recognition and prevention mechanism, ensuring recognition rather than recall, flexibility, aesthetics, and minimalist design. According to Nielsen (2000), Jakob's law of internet user experience posits that "users spend most of their time on other sites. This means that users prefer your site to work the same way as all the other sites they already know". Therefore, in user interface design, Jakob's law advocates for using patterns and workflows that users are accustomed to. This is aimed at ensuring that new web platforms would be easier to use and learn and not require a different schema. Hence, the heuristics and principles were leveraged in the usage and naming of icons, arrangement, and location of contents as well as overall operational procedure.

3.2.3 Backend of ConPEC

ConPEC was designed using JavaScript programming language. JavaScript was chosen because it is versatile, fast, easy to use, interoperable, and widely adopted. Because data on ConPEC are of a structured nature, Maria DB, which is a relational database, was chosen for database management. Apache Web Server and Node.js were used as the server. Apache receives requests from the frontend and redirects to Node.js. Node.js enables server-side JavaScript development i.e., it enables developers to use JavaScript to provide server-side code. Therefore, the

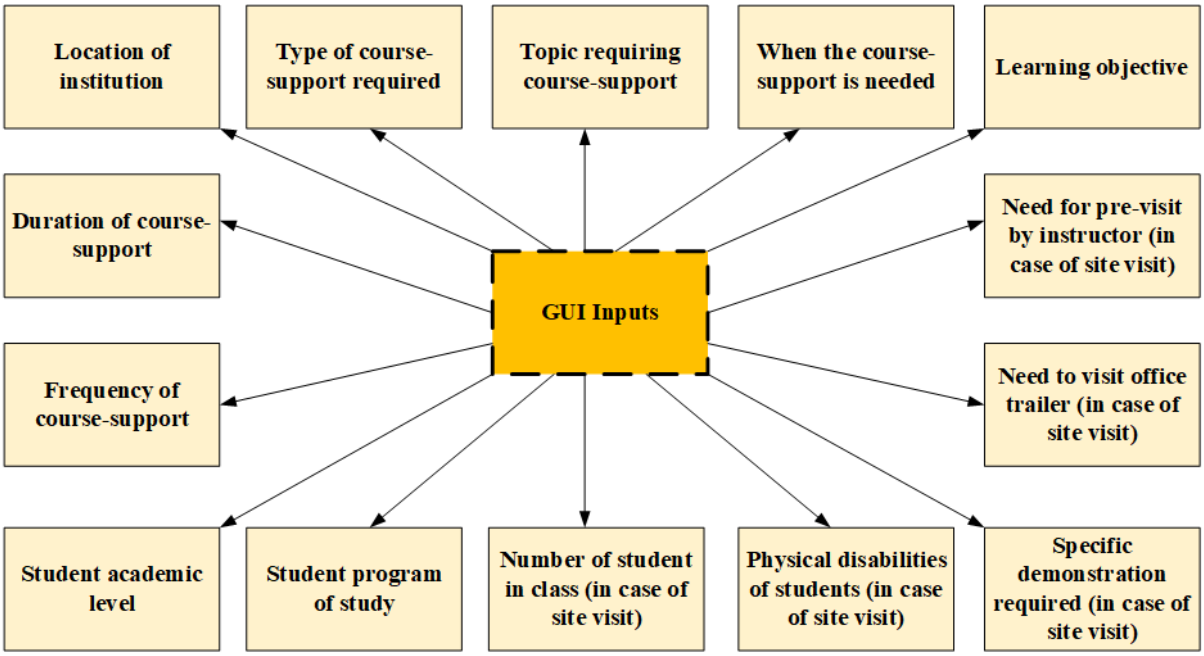


Figure 5: ConPEC GUI inputs.

language for both the frontend and backend are the same. The frontend communicates with the backend using Representational State Transfer Application Programming Interface (REST API) while the backend responds with JavaScript Object Notation (JSON) (See Figure 4).

3.2.4 ConPEC operational workflow

Given the description of the frontend design provided in section 3.2.2, ConPEC operates in similar ways to other existing web platforms that are known to potential end users. To use the web platform, users are required to register with and verify their work or company email address. Upon verification of email address, users can log in for the first time. After first login, users will be required to complete their profile, and then indicate the types of support (for example, serving as guest lecturers, facilitating site visits, workshops, and seminar sessions, serving as student mentors, judges, and sponsors for term or classroom projects) they are willing to provide to instructors as well as their preferences (if any). The preferences include student academic level, student academic program, location of the institution, and mode of engagement with students (in person and or virtual). Based on practitioners' profiles and the type of support they are willing to provide to instructors, practitioners get recommended to instructors when instructors submit requests on the web platform. ConPEC has a matching algorithm to match the requests of instructors with the profile and preferences of practitioners to produce recommendations. Any practitioner selected by an instructor from the recommendation list will receive the details of the instructor's request. Practitioners will be notified via their email and on the platform if they have any requests from instructors. The selected practitioner will receive the details of the request such as the type of support requested, time and date, topic, venue, student academic department, and class size. Practitioners are at liberty to accept or decline the request from instructors. Practitioners can also send messages to the instructor when accepting or declining the request. Upon acceptance of the instructor's request, the practitioner and instructor would be connected to finetune and coordinate other details of the request. Therefore, the summary of usage procedure in sequential order is to sign up, verify email, log in, complete profile, indicate availability, and respond to requests from instructors.

3.3 Evaluation of ConPEC

3.3.1 Overview of evaluation methodology

As suggested by Gould and Lewis (1985) in human factor principles for interface design, potential end-users were recruited as participants to evaluate the web platform. The participants were introduced to the experimental procedure and ConPEC operational process. All the participants interacted with the web platform in a real case

scenario as described in section 3.2.4 above. The participants took part in the experiment under identical conditions. An overview of the evaluation methodology is shown in Figure 6.

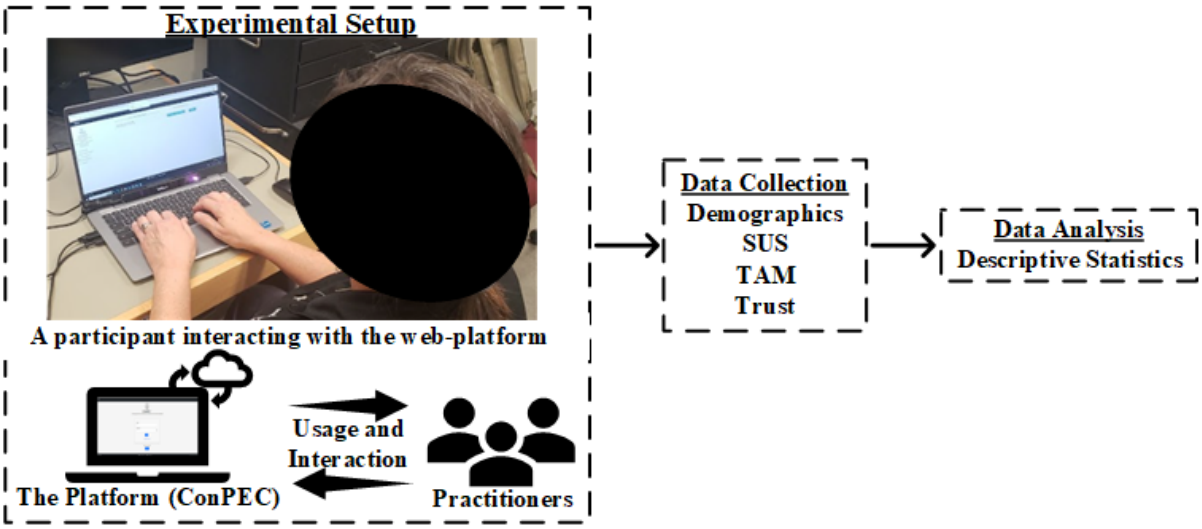


Figure 6: Overview of evaluation methodology.

3.3.2 Experimental procedure and data collection

Thirty-two (32) construction industry practitioners participated in the assessment of the ConPEC platform. The participants had diverse expertise and were from different types and sizes of construction organizations. Twenty-six (26) participants were of male gender, and six (6) were of female gender. Similar sample sizes have been used in prior studies (Arrue et al, 2019, Li et al, 2021). All the participants gave their consent by signing an informed consent form approved by the Virginia Tech Institutional Review Board. The participants interacted with the web-based platform on a computer in a real context scenario. After this, the participants completed the demographic, trust scale (Jian et al, 2000), system usability scale (SUS) (Brooke, 1996), and TAM (Davis, 1985) questionnaires. SUS and TAM questionnaires were on a 5-point Likert scale (1-strongly disagree, 5-strongly agree). The Trust questionnaire was on a 7-point Likert scale (1-not at all, and 7-extremely).

3.3.3 Data analysis

Cronbach Alpha values of 0.83, 0.90, 0.85, 0.70, 0.84, and 0.70 for PEOU, PU, ATT, BIU, Trust, and SUS constructs, respectively, revealed the reliability of the instrument (Taber, 2018). The means scores of each statement item in the questionnaires (TAM, SUS, and Trust) were calculated. Similar to previous studies (Alharbi and Drew, 2014, Mohamed et al, 2011), Spearman's correlation analysis was used to test the hypotheses (H_1 to H_{10}) by examining the relationship between the variables and their significance. This provides a basis to accept or reject the null hypotheses. The overall SUS score was also calculated. All the analyses were done using Microsoft Excel (v. 2309) and Statistical Package for the Social Sciences (v. 20).

4. RESULTS

4.1 ConPEC interface

Samples of the practitioners' interface on the ConPEC platform were presented using screenshots. Figure 7 represents the user profile that practitioners will be required to complete after their first login. The interface captures the basic personal and company information of the practitioners.

Figure 8 shows an example of a practitioner's home page. All the navigation tabs are shown on the left. The home page shows the requests from instructors that are specifically directed to the practitioners as well as other requests generally submitted on the web platform by instructors. Practitioners can view details of these requests, and accept, or decline to provide them.

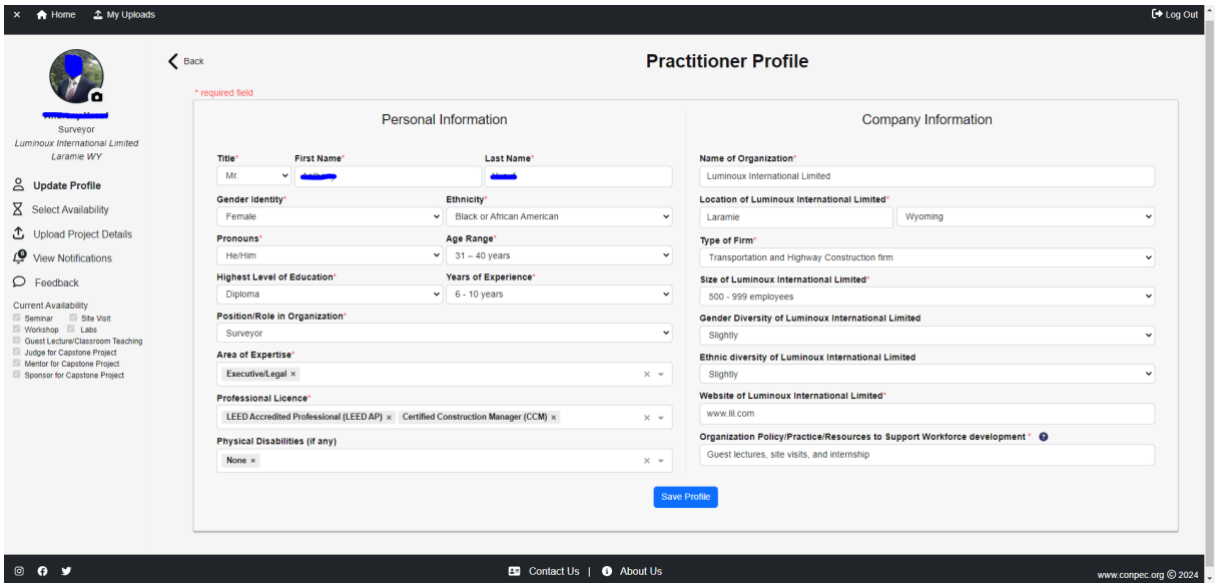


Figure 7: User profile of practitioners on the ConPEC platform.

The uniqueness of the ConPEC platform allows practitioners to indicate how they can support instructors in ensuring that students are equipped with the corresponding practical insights of their theoretical knowledge. Figure 9 represents the "Select Availability" page where practitioners indicate their offerings and preferences. The offerings refer to the type of course support that practitioners are willing to provide to instructors. The preferences are factors that may influence the type of course support that practitioners have decided to provide to instructors. For instance, the section labeled "1" in Figure 9 allows practitioners to define the type of support they are willing to provide to instructors. The section labeled "2" allows practitioners to indicate the subject areas or topics they are willing to speak on. In section 3, practitioners specify their preferences in terms of the location of the institution, student academic level, academic program as well as a mode of interaction or engagement with students. Similarly, for practitioners who are available for site visits, section 4 is where practitioners provide additional information to help instructors while preparing for visits to their job sites.

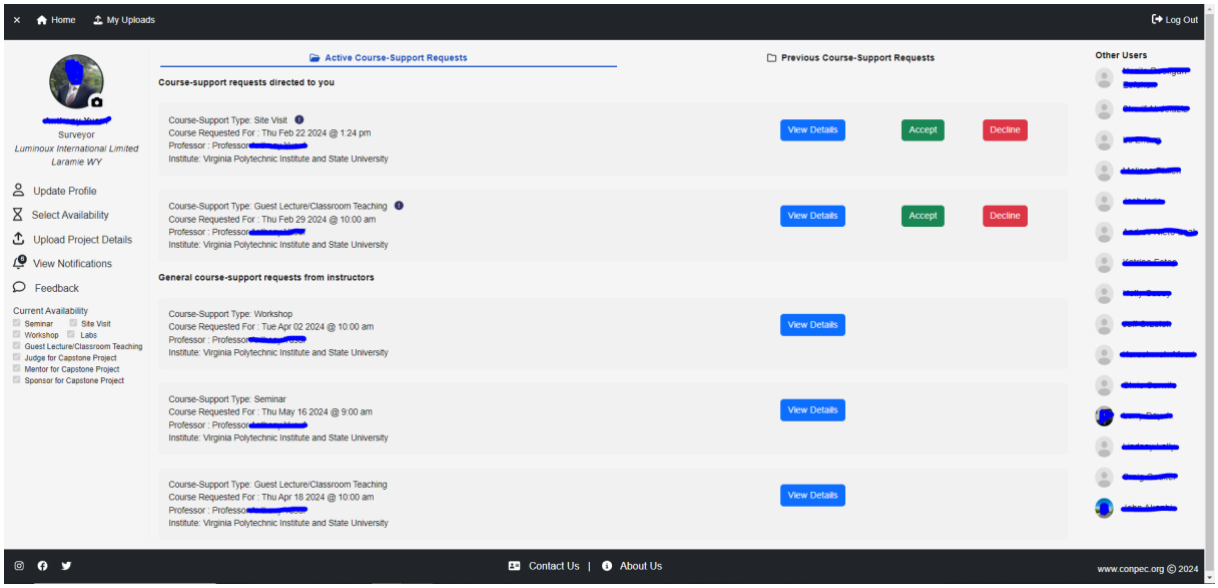


Figure 8: Home page of practitioners on the ConPEC platform.

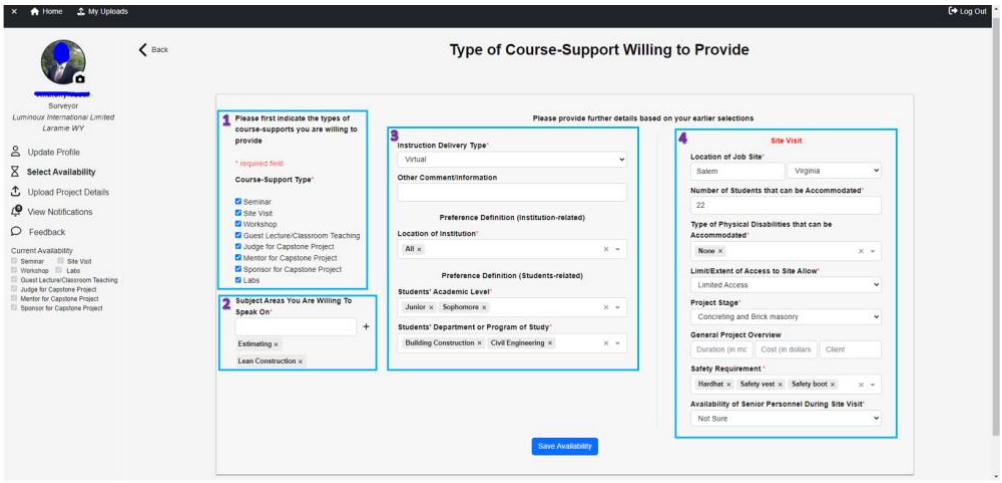


Figure 9: Select Availability page.

4.2 Usability evaluation results

4.2.1 Descriptive statistics

System Usability Scale (SUS) of the ConPEC platform: All the positive statements in the SUS rating had mean scores (MS) ≥ 3.75 as shown in Table 1. This indicates that the participants had a high level of agreement with the statements. The negative statements had low mean scores which was ≤ 1.19, hence the participants had low agreement with the statements. Participants perceived ConPEC to be very easy to use (MS = 4.72) and agreed that most people would learn to use ConPEC very quickly (MS = 4.69). The participants were very confident using ConPEC (MS = 4.47), they considered the various functions of ConPEC well integrated (MS = 4.41) and would like to use ConPEC frequently (MS = 3.75). From these ratings, the participants largely agreed on the ease of use, ease of learning to use, acceptance, and confidence in ConPEC as a tool to connect them with instructors. This is further supported by the corresponding low ratings of the negative statements. The positive and negative statements had standard deviations of less than one (1) which shows that the opinions of the participants regarding the statements were very similar. The mean SUS score from all participants regarding the ConPEC platform was 88.70%.

Table 1: System Usability Scale (SUS) of the ConPEC platform.

S/N	SUS Statements	MS	Std. Deviation	Rank
	Positive Statements			
SUS 1	I thought the platform was easy to use.	4.72	0.457	1
SUS 2	I would imagine that most people would learn to use this platform very quickly.	4.69	0.471	2
SUS 3	I felt very confident using the platform.	4.47	0.621	3
SUS 4	I found the various functions in this platform to be well integrated.	4.41	0.499	4
SUS 5	I think I would like to use this platform frequently.	3.75	0.916	5
	Negative Statements			
SUS 6	I needed to learn a lot of things before I could get going with this platform.	1.41	0.615	6
SUS 7	I found the platform unnecessarily complex.	1.41	0.665	7
SUS 8	I thought there was too much inconsistency in this platform.	1.31	0.535	8
SUS 9	I found the platform very cumbersome to use.	1.25	0.440	9
SUS 10	I think that I would need the support of a technical person to be able to use this platform.	1.19	0.592	10

Trust scale of the ConPEC platform: As shown in Table 2, the participants had a considerably high level of agreement with the positive statements (MS ≥ 4.91) and a low level of agreement (MS ≤ 1.03) with the negative statements using the Trust scale. Hence, using the trust scale, the study shows that practitioners expressed high confidence in the ConPEC platform (MS = 5.97) and agreed that ConPEC has integrity (MS = 5.66). They considered ConPEC to be reliable (MS = 5.59) and dependable (MS = 5.56). The participants agreed that they can trust ConPEC (MS = 5.53), they are familiar with it (MS = 5.47), and it provides security (MS = 4.91). The low mean scores of the negative statements further reinforce this.

Table 2: Trust scale of the ConPEC platform.

S/N	Trust Statements	Mean Score	Std. Deviation	Rank
	Positive Statements			
T1	I am confident in the platform.	5.97	0.861	1
T2	The platform has integrity.	5.66	1.096	2
T3	The platform is reliable.	5.59	0.979	3
T4	The platform is dependable.	5.56	1.014	4
T5	I can trust the platform.	5.53	1.077	5
T6	I am familiar with the platform.	5.47	1.016	6
T7	The platform provides security.	4.91	1.445	7
	Negative Statements			
T8	The platform behaves in an underhanded manner.	1.19	0.896	8
T9	I am wary of the platform.	1.09	0.296	9
T10	The platform is deceptive.	1.06	0.246	10
T11	I am suspicious of the platform's intent, actions, or outputs.	1.06	0.246	10
T12	The platform will have harmful or injurious outcomes.	1.03	0.177	12

Technology Acceptance Model (TAM): The ConPEC platform was assessed using the Technology Acceptance Model (TAM). The mean scores of all the statement items in the TAM questionnaire were ≥ 3.88 as shown in Table 3 which is greater than the midpoint on the scale. Also, the standard deviations were less than unity. This shows that there is a narrow dispersion around the mean score and that the opinions of the participants were very similar.

Perceived Ease of Use (PEOU): As shown in Table 3, ConPEC was perceived to be very easy to use. All the statements for the PEOU construct of the TAM questionnaire have mean scores (MS) ≥ 4.38. The practitioners believed that it would be easy for them to learn to use ConPEC (MS = 4.84) and get ConPEC to do what they want to do (MS= 4.75). Interaction with ConPEC was considered clear and understandable (MS = 4.75) and becoming skillful at using ConPEC was considered easy (MS = 4.72). The practitioners considered ConPEC to be easy to use for connecting with instructors (MS = 4.50) and flexible to interact with (MS = 4.38).

Perceived Usefulness (PU): In Table 3, the perceived usefulness of the ConPEC platform to practitioners was assessed. The practitioners agreed that ConPEC is a useful tool for connecting with instructors. This is shown by the mean scores of all the statements of the PU construct in the TAM questionnaire being ≥ 4.41. The ConPEC platform was considered able to make practitioners' connection with instructors easier (MS = 4.72), more effective (MS = 4.59), and faster (MS = 4.50). The practitioners regarded the ConPEC platform as a useful tool for connecting with instructors to support their pedagogical efforts (MS = 4.63). The practitioners affirmed that the ConPEC platform has the potential to increase their performance (MS = 4.47) and productivity (MS = 4.41) in meeting instructors' course support needs.

Table 3: Technology Acceptance Model (TAM).

S/N	Statements	Mean	Std. Deviation	Rank
	Perceived Ease of Use			
PEOU 1	Learning to operate the platform would be easy for me.	4.84	0.369	1
PEOU 2	I would find it easy to get the platform to do what I want it to do.	4.75	0.508	2
PEOU 3	My interaction with the platform would be clear and understandable.	4.75	0.508	2
PEOU 4	It would be easy for me to become skillful at using the platform to connect with instructors.	4.72	0.523	4
PEOU 5	I would find the platform easy to use in connecting with instructors.	4.50	0.718	5
PEOU 6	I would find the platform to be flexible to interact with.	4.38	0.660	6
	Perceived Usefulness			
PU 1	Using the platform would make it easier to connect with instructors to provide course-support.	4.72	0.523	1
PU 2	I would find the platform useful in connecting with instructors to provide course-support.	4.63	0.609	2
PU 3	Using the platform would enhance the effectiveness of connecting with instructors to provide course-support.	4.59	0.615	3
PU 4	Using the platform would enable me to quickly connect with instructors to provide course-support.	4.50	0.672	4
PU 5	Using the platform would improve my performance in meeting instructors' course-support needs.	4.47	0.671	5
PU 6	Using the platform would increase my productivity in meeting instructors' course-support needs.	4.41	0.712	6
	Attitude Toward Usage			
ATU 1	I believe that ConPEC could help in connecting with instructors to meet their course-support needs.	4.75	0.440	1
ATU 2	Using ConPEC is a good idea.	4.63	0.554	2
ATU 3	I think it is a good idea for practitioners to use ConPEC to connect with instructors to provide course-support.	4.63	0.660	3
ATU 4	I feel positive about using ConPEC.	4.59	0.560	4
ATU 5	I favor the use of ConPEC for connecting with instructors to meet their course-support needs.	4.50	0.718	5
	Behavioral Intention-to-Use			
BIU 1	ConPEC is worthy of being used to connect with instructors to provide course-support.	4.78	0.491	1
BIU 2	I intend to refer to ConPEC as often as possible in connecting with instructors to provide course-support	4.09	0.856	2
BIU 3	I intend to frequently use ConPEC in connecting with instructors to provide course-support.	3.88	0.942	3

Attitude Towards Usage (ATU): The attitude of the practitioners toward using ConPEC was also assessed as shown in Table 3. The practitioners largely had a positive attitude toward using the ConPEC platform (MS ≥ 4.50). The ConPEC platform was considered helpful in connecting with instructors (MS= 4.75). The practitioners agreed that using the ConPEC platform is a good idea (MS = 4.63) and believed that it is a good idea for other practitioners to use ConPEC as well (MS = 4.63). The practitioners had positive feelings about using the ConPEC platform (MS = 4.59) and favored the use of the ConPEC platform as a tool for connecting with instructors to meet their course-support needs (MS = 4.50).

Behavioral Intention-to-Use (BIU): Practitioners' behavioral intention-to-use the web platform was assessed with three statements as shown in Table 3. The mean scores (MS ≥ 3.88) reveal that the practitioners had the intention to use the ConPEC platform. The practitioners considered the ConPEC platform worthy of being used to connect with instructors (MS = 4.78). The practitioners intended to refer to the ConPEC platform as often as possible (MS = 4.09) and frequently use the ConPEC platform to connect with instructors to provide course-support needs (MS = 3.88).

4.2.2 Hypothesis testing

Using the modified Technology Acceptance Model (TAM), the study presented the results of the hypotheses testing in Table 4. In Table 4, seven (7) of the hypotheses were supported while three (3) were not supported. The results reveal that practitioners' behavioral intention-to-use the ConPEC platform is significantly influenced by their attitude, perceived ease of use, and trust in the ConPEC platform. Therefore, hypotheses H_4, H_6, and H_7 were supported. Practitioners' perceived usefulness of the ConPEC platform had no significant influence on their intention-to-use the platform, hence, hypothesis H_5 was not supported. However, practitioners' perceived usefulness and perceived ease of use of the ConPEC platform had a significant influence on their attitude toward using the platform. Similarly, their perceived ease of use of ConPEC had a significant influence on their perceived usefulness of the ConPEC platform. This shows that hypotheses H_1, H_2, and H_3 were supported. Furthermore, the results show that practitioners' trust in the ConPEC platform is significantly influenced by their perceived ease of use but has no significant influence on their perceived usefulness and attitude toward using the ConPEC platform. Therefore, hypothesis H_9 was supported while hypotheses H_8 and H_{10} were not supported.

Table 4: Hypothesis Testing.

Hypothesis	Relationship	ρ (Correlation Coefficient)	p-value	Remark
H_1	PU → ATU	0.532**	0.002	Supported
H_2	PEOU → ATU	0.430*	0.014	Supported
H_3	PEOU → PU	0.363*	0.041	Supported
H_4	ATU → BIU	0.389*	0.028	Supported
H_5	PU → BIU	0.1580	0.388	Not supported
H_6	PEOU → BIU	0.351*	0.049	Supported
H_7	T → BIU	0.630**	0.000	Supported
H_8	T → PU	0.193	0.289	Not supported
H_8	T → PEOU	0.413*	0.019	Supported
H_{10}	T → ATU	0.268	0.138	Not Supported

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

5. DISCUSSION

This study presents the design of a web platform, ConPEC, that can connect practitioners and instructors to enhance student learning. The study also examines practitioners' behavioral intention-to-use the platform through the Technology Acceptance Model. Although the web platform in this study is not directly related to practitioners' job

performance within their organizations, its purpose is to enhance student preparedness for the industry and promote practitioners' involvement. In addition, the web platform is a tool to support several endeavors of practitioners and their firms. For example, ConPEC can be employed to foster collaborations between instructors and practitioners, offering avenues for practitioners passionate about teaching to find fulfillment and prepare for transition into academia after their days in the industry (Lu and Jacobs, 2022). Additionally, ConPEC could also facilitate connections between construction organizations and students for recruitment purposes (McCleary and Weaver, 2009). ConPEC could also enable practitioners to contribute to community outreach and enhance the career development efforts of construction organizations (Lu and Jacobs, 2022). The collaboration opportunities provided by ConPEC extend to practitioners improving their technical presentation skills with feedback from instructors and students (Abudayyeh et al, 2000). Other benefits to practitioners and their organizations could include building relationships with instructors and students, accessing talent from preferred colleges, enhancing the company's image in the eyes of future professionals, as well as fulfilling social responsibility (Anderson and Mourgues, 2014).

This study highlights the effectiveness of incorporating design principles and heuristics such as human factors principles in user interface design (Gould and Lewis, 1985), user-centered design principles (Hartson and Pyla, 2012), Jakob's law of internet user experience (Nielsen, 2000), and Nielsen's usability heuristics (Nielsen, 1994) in the development of a user-centered information system. This is underscored by the SUS descriptive statistics results which reveal that the practitioners perceived ConPEC as a useful, user-friendly, and easy-to-use system to connect with instructors for student development. The participants were unanimous in their agreement with the positive statements and in their disagreement with the negative statements. According to Bangor et al (2009), the overall SUS score of 88.70% falls in the "B" grade which is described as acceptable and excellent. The SUS score indicates acceptance of ConPEC by practitioners (Sihombing et al, 2020). It also shows that ConPEC is considered user-friendly, useful, and easy to learn and use (Lewis, 2018, Vlachogianni and Tselios, 2022). Therefore, it is evident that the usage of ConPEC by practitioners in connecting with instructors to support academic pedagogical efforts was effortless and the user experience was satisfactory.

ConPEC is intended to foster collaboration between instructors and practitioners. This requires relationships between the two parties. Therefore, in addition to the effectiveness, efficiency, and user satisfaction revealed by the SUS score, trust is a critical indicator of satisfaction especially for web platforms (Urban et al, 2000). The response of the participants to the trust questionnaire provides a basis to infer their trust in ConPEC. This agreed with Kohn et al (2021) who noted that trust is cognitive and cannot be directly measured but must be deduced. This is important because as noted by Sharp et al (2023), trust is essential in cooperative relationships that are characterized by uncertainties. This is crucial in the case of ConPEC where practitioners would connect with and work together with diverse instructors to contribute to student learning. In addition, TAM provides a basis for understanding the acceptance of ConPEC by practitioners. Overall, the results show that the findings of this study align with initial TAM propositions (Davis, 1985). All the hypotheses from initial TAM positions have positive correlations and are statistically significant. The practitioners in this study demonstrated a positive attitude toward using ConPEC and they intended to use it.

Similar to prior studies (Alharbi and Drew, 2014, Letchumanan and Muniandy, 2013), both practitioners' perceived usefulness and perceived ease of use of ConPEC had a significant influence on their attitude toward using ConPEC. This consequently influenced practitioners' behavioral intention-to-use ConPEC. This shows that the more practitioners perceived ConPEC to be useful and easy to use, the greater their attitude towards using the web platform. Also, the result revealed that as practitioners' perceived ease of use of ConPEC increases, their perceived usefulness of ConPEC also increases. This finding agreed with prior studies such as Alharbi and Drew (2014) and Kasilingam (2020). Also, practitioners' attitude toward using ConPEC has a significant influence on their behavioral intention-to-use ConPEC. The finding agrees with Okoro et al (2023) but differs from Teo and Van Schalk (2009) who found that attitude toward usage did not have a significant influence on intention-to-use. Hence, more functions, features, and optimizations could be incorporated to further enhance ConPEC's ease of use and usefulness to practitioners and facilitate a better attitude towards using the web platform. However, although practitioners' perceived ease of use of ConPEC had a significant influence on their behavioral intention-to-use ConPEC, their perceived usefulness of ConPEC did not. This underscores the need to ensure optimal user experience and user-friendliness in developing information systems. The findings agree with Letchumanan and Muniandy (2013) but differ from Mohamed et al (2011) who found that perceived usefulness is more significant to intention-to-use than perceived ease of use.

Practitioners' behavioral intention-to-use ConPEC is significantly influenced by their perceived ease of use of ConPEC, their attitude toward using ConPEC, and their level of trust in the web platform. Therefore, efforts can be put in place to improve practitioners' attitudes towards using ConPEC, their level of trust in ConPEC, and their perceived ease of use of ConPEC to ultimately facilitate greater acceptance by practitioners. This study also revealed that practitioner's perceived ease of use of ConPEC and their behavioral intention-to-use ConPEC are significantly influenced by their level of trust in ConPEC. That is, the more practitioners perceive ConPEC to be trustworthy, the higher their behavioral intention to use ConPEC and their perception of its ease of use. This underlined the importance of trust in users' acceptance of web platforms. This agreed with Kasilingam (2020) who also showed that intention-to-use is directly influenced by trust. However, the results showed that practitioners' trust in ConPEC has no significant influence on their perceived usefulness of ConPEC and their attitude towards using ConPEC. The findings differ from Wu et al (2011) who found a strong correlation between trust, perceived usefulness, and attitude toward usage.

6. CONCLUSIONS, LIMITATIONS, AND FUTURE WORK

This study presented the design and user evaluation of a web platform called ConPEC aimed at facilitating instructor-practitioner collaboration. The study demonstrates the efficacy of design heuristics and principles in developing web-based systems that are useful and easy to use. The finding shows that ConPEC is of acceptable usability (88.7%) and can be trusted. This study modified the original TAM with the trust construct to assess practitioners' behavioral intention-to-use the ConPEC platform. Overall, the results underscored the relationship between perceived ease of use, perceived usefulness, attitude towards usage, and behavioral intention-to-use as defined in TAM. The results also reveal how practitioners' trust in ConPEC influences each of the TAM constructs. The study shows that practitioners' behavioral intention-to-use the ConPEC platform is significantly influenced by their attitude, trust, and ease of use of ConPEC. The study also revealed that practitioners' attitude toward using the ConPEC platform is significantly influenced by how much they perceived it to be useful and easy to use. These insights are important to understand practitioners' behavior to use innovative systems and to provide insights for further system development. Also, the methods and procedures highlighted in this study can be leveraged in other disciplines to develop similar frameworks aimed at making students workplace-ready through instructor-practitioner collaborations.

Using trust as the only external or moderating factor in the modified TAM could be a limitation. As the instructor-practitioner collaborative platform is put to wider usage, other external variables such as gender, age, self-efficacy, and familiarity could be considered. Also, due to the small sample size used, this study represents an initial effort to demonstrate how ConPEC can be evaluated. It is possible that the findings would differ if conducted with a larger sample size. Thus, to improve the generalizability of the findings, it is important to conduct the study with larger sample sizes of practitioners.

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APPENDIXES

APPENDIX A

Acronym	Meaning
TAM	Technology acceptance model
CoP	Community of practice
ICT	Information and communication technology
BIM	Building information modeling
AR	Augmented reality
ImT	Immersive technology
ATU	Attitude toward usage
PU	Perceived usefulness
PEOU	Perceived ease of use
BIU	Behavioral intention to use
T	Trust
ConPEC	Collaborative platform to connect professional and educational communities
SUS	System usability scale
GUI	Graphical user interface
SQL	Structured query language
JSON	JavaScript object notation
MNI	Mean normalization index
REST API	Representational state transfer application programming interface
MS	Mean score