A Case Study of Integrating the Train-the-Trainer and Experiential Learning Models in Computer Skills Training

Xuefei (Nancy) Deng
California State University Dominguez Hills
ndeng@csudh.edu

Sheng Yi
California State University Dominguez Hills
syi@csudh.edu

Abstract

We conducted a case study to focus on the development of the Train-the-Trainer Model (TTT) through the Experiential Learning Model (ELM) in computer skills training. We argue that integrating the two learning models would allow us to enhance the effectiveness of student learning in computer education. The research site is a minority-serving public university in the United States, where students with diverse backgrounds were recruited and trained to design and deliver a campus-wide Excel skills workshop to their peers. The student trainers were found going through the stages of ELM: Experience – Reflect – Think – Act during two major events, the co-designing of workshop modules and the co-delivering of the live workshop. Our thematic analysis revealed four themes on the skills development of the student trainers. The study contributes to the computer education of underserved students through effectively integrating TTT and ELM and provides guidelines for educators to adopt such integration.

Keywords: IS education; Excel skills; Train-the-Trainer model; experiential learning; underserved students

1. Introduction

Higher education institutions continue to face challenges in retaining and graduating underserved students. Those students usually come from low-income families or racial and ethnic minority groups or are categorized as first-generation college students (FGCS) (ACT, 2014). They lack resources to facilitate digital inclusiveness, which is essential for the success of ethnically and economically diverse students. Digital inclusion is a broad concept that concerns individuals' ability to access and use information and communication technologies (ICT). Facilitating digital inclusiveness is particularly important for disadvantaged people: access to and proficiency in ICT are critical for high-risk and underserved populations to improve their lives and life chances (Notley, 2009). Among all ICT competencies, Microsoft Excel skills for data management and analysis are considered essential by both employers and higher institutions. For example, in a study of essential skill sets required by potential employers for college graduates at a four-year university, 94% of 107 board members and employer managers highlighted the importance of Excel skills, mentioning the need for Excel-based analytical skills in businesses of all sizes (Formby et al., 2017).

Despite the increasing importance of computer skills such as using Excel, an overwhelming percentage of students did not believe their college education had provided them with adequate digital skills, such as using Excel, and they were eager to close this gap (Rubin and Abrams, 2015). This situation is direr for underserved students, as digital divide research has provided evidence of a gap between underserved students and their counterparts in accessing technology resources and developing their digital competence, especially in times of global crisis (Deng and Yi, 2021).

To improve the situation, higher education institutions have initiated multiple training programs to strengthen college students' computer skills, including analytical skills with spreadsheet software. One challenge they face is the large amount of required investment versus limited resources. According to Bernacki et al. (2020), although many such training programs exist, they require significant investment of students' and instructors' time and effort and typically achieve small to medium effects on behaviors and performance.

Thus, to enhance our knowledge of effective and cost-efficient computer skills training for underserved students, we conduct a case study to answer the following question: *How can we improve the effectiveness of computer skills training of underserved college students through integrating the Train-the-Trainer Model and Experiential Learning Model?*

Train-the-Trainer model (TTT) has been successfully implemented in the education of disciplines such as health and social care and environmental education. One of the major benefits of TTT is its cost-efficiency. But we have limited knowledge about the

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effective implementation of TTT in the computer education of college students. Meanwhile, the Experiential Learning Model (ELM) proposed by Kolb (1984) has been widely adopted in higher education as ELM is demonstrated in the course design incorporating research projects, case studies, field experience, simulations, and labs (Kolb and Kolb, 2017). Focusing on individual learning, ELM highlights the active participating role of the learner instead of the teacher (Kolb, 1984), thus it is effective in improving learning. By integrating the two learning models, TTT and ELM, we can combine the benefits of the two models, which would allow us to enhance the effectiveness of student learning in computer education in a cost-efficient way.

We conducted the case study in a minority-serving public university in the United States to examine the experiences and perceptions of student trainers during the design and delivery of a campus-wide Excel skills workshop. We explained how to integrate ELM with TTT effectively through elaborating on two major events that the student trainers were involved in. Moreover, our analysis of the feedback from the student trainers revealed that they not only learned more Excel knowledge but also gained soft skills such as collaboration and communication. As a result, they were more confident in their future career choice and more engaged with the community. Our findings suggest that incorporating experiential learning in the Train-the-Trainer program enhanced the skills development of underserved college students.

2. Theoretical background

2.1. Train-the-trainer model

The train-the-trainer model (TTT) refers to a program or a course where individuals in a specific field receive training in a subject and instruction on how to train, monitor, and supervise other individuals (Pearce et al., 2012 a, b). This model is an active teaching approach involving a user in both the teaching and learning process, thus building a community among experts who become master trainers (Fulgencio and Asino, 2021). The model is also referred to as the training-of-the-trainer (TOT) model. In this paper, we use the term the train-the-trainer model or TTT,

There is a long history of using TTT models in various organizations. For example, the Standard Faculty Development Program trained hundreds of national and international facilitators for over 30 years, who have subsequently trained thousands of faculty members locally at their institutions (Survey et al., 2020). With the TTT model, an organization can rapidly increase its capacity to fulfill the demands of talents in a specific field. For example, a TTT-based voluntary counseling and testing (VCT) training program in the Caribbean Region trained 167 trainers in VCT training skills and 3,489 providers in VCT clinical skills within four years (Hiner et al., 2009). Other benefits of a TTT model are cost-effectiveness and the ability to incorporate local content to enhance learning (Hiner et al., 2009; McGushin et al., 2023; UNICEF, 2005;). As a result, TTT is particularly favored by large organizations such as the United Nations Children's Fund (UNICEF) and the World Organization of Family Doctors (WONCA) for their programs in low-income and middle-income countries (McGushin et al., 2023; UNICEF, 2005). WONCA used TTT because it can efficiently reach a broad and diverse audience of healthcare practitioners and has the potential to up-skill the workforce rapidly, cheaply, and exponentially (McGushin et al., 2023).

Research shows that TTT has been widely and effectively used in a variety of fields, such as health and social care (Pearce et al. 2012 a, b), science information literacy programs (Hartman et al., 2014), finance (Baron-Donovan, 2005), project management (Stoyan, 2008), adult education (Mavropoulos et al., 2019; McGinty, 2020), farm business management (Rumfield et al., 2017), environmental education (Cheung et al., 2018), and military (Van Baarle et al., 2017).

To conduct TTT effectively, one should incorporate interactive training methods into the TTT workshop. In a literature review of train-the-trainer programs for health and social care professionals conducted by Pearce et al. (2012 a), 11 out of the 13 positive studies used interactive components to deliver the training, suggesting interactive teaching methods are more effective than didactic-style training in delivering a TTT program. Other suggestions are that future trainers should receive printed materials, website support, and supervision (Pearce et al., 2012 b).

Previous literature also mentioned the challenges of adopting TTT models. One of the biggest challenges is maintaining consistency in knowledge, content, and growth (Fulgencio and Asino, 2021). For example, when using the TTT approach to teach project management, instructors faced challenges such as the need for more consistent course organizations when the students tremendously grew in a short time, and the need for improvement in individual lectures through assessment of learning outcomes and survey of lectures (Stoyan, 2008). Other challenges have arisen as well. For example, challenges in the adoption of the model are related to the management and regulation of an institution: faculty had issues using material developed by someone else (Servey et al., 2020), professors had no incentive to sacrifice scarce research time for the tremendous effort required to develop an interactive train-the-trainer based mass course (Stoyan, 2008), or

no instructor would take over the TTT-based program when the expert is no longer employed at an institution or cannot be reached (Yarber et al., 2015). Despite the challenges, the adoption of the train-the-trainer model has shown promise in meeting the increasing demand for skilled employees in organizations (Hiner et al., 2009; McGushin et al., 2023; Survey et al., 2020).

2.2. Experiential learning

Experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). According to the experiential learning model (ELM) set forth by Kolb (1984), such learning entails four stages: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). A learner engages in different cognitive processes during the four stages. In the CE stage, the learner builds hands-on experience in achieving a learning outcome. In the RO stage, the learner reflects and reviews the experience from different perspectives. In the AC stage, the learner analyses and connects the experience to previous learning and develops new ideas about a subject matter. In the AE stage, the learner acts on a new idea by experimenting in an experiential setting.

How to ride a bike is a good example to illustrate the four stages involved in the experiential learning model (Kraft, 1994). In the "Concrete Experience" stage, a learner physically interacts with the bike. Based on this hands-on experience, the learner can consider what is working or not working (Reflective Observation), formulate a generalized theory about riding a bike in general (Abstract Conceptualization), and think about ways to improve on the next attempt at riding the bike (Active Experimentation). After each cycle of previous experience, thinking and reflection help to inform a new attempt to ride the bike, reinforcing individual learning (Kolb, 1984).

According to Kolb (1984), all four learning modes must be completed for learning to be most effective. As new ideas are put into action, a new cycle of experiential learning begins. The four-step learning process can be viewed as Experience – Reflect – Think – Act, which is often applied multiple times in every interaction and experience. As such, knowledge is continuously gained through both personal and environmental experiences.

The experiential learning model highlights the role of the learner as an active participant in the educational process; learning is achieved through a continuous cycle of inquiry, reflection, analysis, and synthesis. In order for a learner to gain genuine knowledge from an experience, the learner must have four abilities: (1) ability to actively involve in the experience; (2) ability to reflect on the experience; (3) ability to possess and use analytical skills to conceptualize the experience; and (4) ability to possess decision making and problem-solving skills in order to use the new ideas gained from the experience (Kolb, 1984).

In education, scholars often compare experiential learning with academic learning (De Stavenga Jong et al., 2006). According to scholars, academic learning is the process of acquiring information through studying a subject without the necessity for direct experience. Both learning approaches aim to instill new knowledge in the learner, but the two approaches differ in their focus and mechanisms. Experiential learning focuses on analysis, initiative, and immersion and emphasizes actively involving the learner in a concrete experience, such as applied research projects, case studies, field experience, simulations, and labs. Meanwhile, academic learning focuses on constructive learning and reproductive learning through more abstract, classroom-based techniques.

Research has examined the latest thinking about the concepts of the experiential learning model and highlighted some exemplary disciplinary applications of experiential learning in higher education (Kolb and Kolb, 2017). In the experiential learning process, the teacher's primary role in experiential learning is to create suitable learning experiences and facilitate the learning process as a facilitator, rather than direct instruction. Although the wealth of experience a good facilitator also brings to the situation is recognized, scholars of experiential learning believe that a facilitator is not essential to experiential learning, meaning that the experiential learning of an individual is not defined by the presence of a facilitator (Rodrigues, 2004).

3. Method

Qualitative case study methodology was used to examine the process of conducting the computer skills training project, i.e., Excel skills workshop, from the perspective of key stakeholders. In this case, we studied the core project team of four student trainers who were majoring in computer information systems and data analytics. We used several approaches to data collection in keeping with the case study methodology (Yin, 2003).

Data collection was conducted through two primary modes: Observation and field notes of facilitator participants, and in-depth self-reflection of the student trainers. First, during the entire project period (11/2020 - 4/2021), the two instructors acted as facilitators and took detailed notes of all group activities, attendance logs, and training materials. Throughout the course of the project, the four student trainers accomplished

deliverables for each major project task and received feedback from the two instructors and from other student trainers for further improvement. Second, interviews were conducted with each of the student trainers at the beginning of the project to understand their motivation for participating in the project and to assess their proficiency in Excel skills. At the end of the project, the student trainers wrote a 500-word self-reflection and made a 15-minute presentation of their project experiences.

To analyze the data, the researchers followed a thematic analysis procedure described by Braun and Clarke (2006) and coded the qualitative data collected from the self-reflection of the student trainers and interview and observation notes. According to Braun and Clarke (2006), thematic analysis is a qualitative method for identifying, analyzing, organizing, describing, and reporting themes found within a data set. The two researchers coded the qualitative data together and identified four themes on skills development of the student trainers during the workshop design and delivery experiences.

4. Case background

4.1. Research site

The research site is a four-year public university in the U.S. designated as a minority-serving institution. As defined by the U.S. Department of Education (2021), minority-serving institutions are institutions of higher education that enroll a high percentage of minority students, such as African Americans, American Indians, Hispanics/Latinos, and Pacific Islanders. The research site's economically and ethnically diverse student population includes 65.5% Hispanic or Latino, 10.8% Black or African American, 6.2% White, 7.6% Asian, and 3% other. In addition, 70.7% of students' parents have little or no college, and 66.5% are eligible for a Pell grant, the U.S. federal grant usually awarded to undergraduate students with exceptional financial needs. Thus, this university is an ideal research site for studying the digital skills training of underserved students.

The authors were part of a larger project funded by the University President's Challenge to enhance the digital skills and competencies of underserved students at the university. The project aimed at improving students' digital competence for technologies in in-person classrooms, virtual learning environments, and professional workplaces by creating spaces for improving inclusion and equity.

4.2. Selection of student trainers

We recruited student trainers in October 2020, one semester before our Excel Skills Workshop in March 2021. They completed a 30-minute interview with the two faculty members. During the interview, each applicant first answered open-ended questions about their experience in using Excel and their expectations from the Excel Skills Workshop project. Interview questions included: 1) Why are you interested in this position? 2) What do you hope to get from this experience? 3) Please give us some examples of your experiences working with data, especially using Excel for data analysis, and 4) What is your career goal? They were then asked to work on an Excel file to perform key functions such as entering formulas, creating graphs, and summarizing data. Each of the analyses corresponded with one aspect of our Excel Skills Workshop, i.e., data organization using formulas, data visualization using charts, and data analysis using Pivot table.

In this interview, potential student trainers demonstrated their data analytics skills, communication skills, and active learning abilities, which were essential to the success of our Excel Skills Workshop. After the interviews and Excel skills demo, four students were selected to serve as peer trainers. All four student trainers were majoring in information systems-related fields. To ensure confidentiality, in this paper, we used pseudo names for the student trainers. The four trainers are:

- Trainer 1: Ms. B (junior, female, business analytics major, FGCS, Latina/Chicana)
- Trainer 2: Ms. M (junior, female, information system security major, non-FGCS, Black/African American)
- Trainer 3: Mr. A (junior, male, business analytics major, international student)
- Trainer 4: Mr. R (senior, male, business analytics major, FGCS, Latino/Chicano)

4.3. Mentoring the student trainers in designing workshop modules

The two faculty members trained the four student trainers for five months (11/2020 - 3/2021) by guiding them through learning activities, including reading and summarizing articles on Excel training, identifying essential Excel skills for employers, watching Excel skills videos from online resources (i.e., lynda.com and linkedin.com) to learn how to make effective training videos, working with the two faculty mentors to finalize the list of important Excel functions to be offered at the Excel Skills Workshop, and finally prerecording the

basic Excel skills tutorial videos two weeks before the Excel Skills Workshop. Four student trainers worked a total of 217 hours during the project period at a wage rate of $15/per hour.

To choose Excel functions for the workshop, we carefully researched academic resources. First, we researched prior studies on Excel training and determined the essential Excel knowledge and skills for undergraduate students. Informed by Ragland and Ramachandran (2014), Elrod et al. (2015), and Rubin and Abrams (2015), our Workshop aimed to improve students' Excel skills in data preparation and management, graphic presentation, and data analysis. Second, we read the latest articles on job search websites to understand the job market and the Excel skills expected by employers. Third, we asked faculty members from various disciplines (including Accounting, Finance, Management, Economics, and Information Systems) about the Excel skills their students need to succeed in their classes. Finally, we viewed the Excel videos on LinkedIn Learning, which provided a recommended Excel skills list.

After completing these steps, we decided on the Excel functions to be included in the Workshop. The Workshop consisted of three modules: preparing and managing data, visualizing data, and analyzing data. The three modules, learning objectives, and related Excel functions are listed below.

- **Module 1.** Preparing and managing data: Reporting data through five basic functions: 1) data entry (adding, deleting, and modifying data); (2) formulas and basic math functions (e.g., adding and subtracting); 3) filtering and sorting of data; 4) formatting functions; 5) aggregated functions (e.g., Average, Count, and Sum).
- **Module 2.** Visualizing data: Visualizing data through charts and graph functions, including pie charts, bar (column) charts, and scatter plots.
- **Module 3.** Analyzing data: Analyzing data through Pivot tables, If-Then analysis, add-on functions, and summary statistics.

4.4. Mentoring the student trainers in delivering the live Excel Skills Workshop

Three hundred sixty student participants from four colleges signed up for the Excel Skills Workshop and had access to the recorded Excel training videos, and 275 attended the live Excel Skills Workshops (via Zoom) in March 2021. To accommodate the adult college students' work schedules, we offered the same Workshop at three different times: (1) Friday, March 12th, 9-11 a.m.; (2) Friday, March 12th, 6-8 p.m.; and (3) Saturday, March 13th, 9-11 a.m. Participation in the Workshop was voluntary, and a flyer announcing the Workshop was distributed through campus email to all students enrolled in spring 2021. The three Workshop sessions lasted 2 hours each and followed the same presentation PowerPoint slides, demos, and practice exercises.

The design of our Excel Skills Workshop consisted of three major components: pre-workshop student preparation, live workshop presentation online, and team-based competition in an Excel case analysis. First, before the Workshop, student participants were required to watch a pre-recorded, basic Excel tutorial video posted in a Blackboard course module set up for the Workshop. The basic tutorial video was recorded by one of the student trainers.

The live Excel Skills Workshop on Zoom was led by the two faculty members with presentations by the four student trainers. Upon entering the Zoom meeting, participants were introduced to the faculty, student trainers, and two workshop facilitators (one staff and one faculty member who are experts on Excel features). Then, the four student trainers started their demos of key Excel features in data organization, data visualization, and data analysis. At the end of each trainer's demo, student participants were assigned to breakout rooms to work on a short Excel drill using the Excel feature they had just learned. At the end of the Workshop, student participants were encouraged to participate in a team-based competition analyzing a business case using the Excel functions demonstrated in the Workshop. Participation in the team competition was optional.

5. Findings

Our study objective is to examine how to achieve effective training of student peer trainers through a case study of information system and business analytics students. Those students were trained by two faculty to design and implement a campus-wide Excel skills workshop. The four steps of experiential learning were revealed in the major events of the Excel Skills Workshop. As a result, knowledge is continuously gained by the student trainers through both personal and environmental experiences. According to Kolb (1984), the four-step learning process can be viewed as Experience – Reflect – Think – Act.

In this section, we report two major events, i.e., co-developing workshop modules and delivering the live workshop, and present how the four learning steps occurred in each event. In addition, we presented the student trainers' perceptions of skills development from their experiential learning in the trainer training.

5.1 Event one: Co-designing workshop modules

During this event, the student trainers went through the learning stages of Experience – Reflect – Think – Act. They searched and identified the key Excel features for the workshop (Experience), received feedback on their selected lists of Excel features (Reflect), analyzed how the Excel features would be helpful and relevant to the participants of the workshop (Think), and finally chose an Excel topic to lead the development of the workshop module (Act).

***First*, Experience: Research on Excel functions.** In the first learning stage, the learner has hands-on experience in achieving a learning outcome. The instructors guided the four student trainers to identify the key Excel features to be offered in the Workshop. The student trainers achieved this objective through several activities, such as watching existing Excel skill videos from online resources such as LinkedIn Learning and lynda.com. They were also instructed to search and read the articles on main news channels such as *Forbes* and *The Wall Street Journal* to understand the Excel skills in high demand by employers. As a result of this activity, the student trainers were instructed to prepare a list of Excel Features they believe are important for the student participants, who have little knowledge in using the Excel software.

Through those activities, the student trainers strengthened their interest in Excel skills learning, as one trainer explained:

> "*I would be interested in taking an Excel class to further my knowledge. There was some material that I was not aware of and would enjoy learning more. There are always new things to learn on Excel.*" (Trainer: Ms. M)

***Second*, Reflect: Discuss the relevance of the Excel function to students' success**. In this stage, the learner reflects and reviews the experience from a range of different perspectives. The student trainers first compared their original thoughts on important Excel features to those highlighted in the relevant videos on LinkedIn and Lynda.com. They learned new features, and the learning helped them propose a list of Excel features to be included in the workshop design. Then, the instructors and student trainers reviewed all the lists of Excel features that the trainers selected and discussed the relevance of each Excel skill to the student population at the university (a minority-serving urban public university). Through those activities, the trainers learned the value of constructive feedback. As one trainer explained,

> "*We provided good constructive feedback to each other so we can be better next time and that is what teamwork is all about."* (Trainer: Mr. R)

In addition, through the feedback and reflection activities, the trainers develop an understanding of each other's skill sets and interests. This is reflected in the remark:

> "*I enjoyed reading our members' thoughts on our first assignment where we designed the structure of our workshop. We shared great ideas on that first assignment, and it was vital to define the structure of our training*." (Trainer: Mr. A)

***Third*, Think: Incorporate other trainers' perspectives to determine Excel functions to teach.** In this stage, the learner analyses and connects the experience to previous learning and develops new ideas about a subject matter. In the co-development of the Excel Skills Workshop modules, the student trainers analyzed the combined list of essential Excel features. Based on their own experience with using Excel in classes and their knowledge about their classmates, they proposed a final list of Excel features and justified their decision. As a result of the activities, a new list of Excel features was generated.

***Finally*, Act: Choose a favorite Excel topic for the future presentation.** The trainers chose an Excel training topic (i.e., data presentation, visualization, analysis, and interpretation) that they are most interested in developing for the Excel Skills Workshop. As a result, they each took charge of curating the training materials (i.e., presentation slides and Excel exercises) related to the topic and started working on the workshop module. The instructors provided a sample data set, which is used for the demonstration of all four Excel skills modules.

5.2. Event two: Co-delivering the live Excel Skills Workshop

During this event, the student trainers also went through the learning stages of Experience – Reflect – Think – Act. They practiced and rehearsed the workshop modules with the two instructors and other peer trainers (*Experience*), received feedback on their practice presentation (*Reflect*), analyzed their recorded video and rehearsal to improve the workshop (*Think*), and finally delivered the live Excel Skills Workshop (*Act*).

***First*, Experience: Rehearse the Workshop.** Each student trainer practiced and rehearsed Excel training presentations with faculty and other trainers. Through this activity, the student trainers learned the value of practice and rehearsal. The two remarks below show

how the learning was achieved from applying their knowledge into action:

> "*With each presentation we did we got better and better. By the last one we felt more comfortable and were able to tell the story more of the data we were presenting*." (Trainer: Mr. R)
>
> "*The first session when I was presenting my data, I was very nervous about fumbling my words and forgetting my Excel steps. I would practice before every session to ensure that I was able to cover everything that I explained in my video. Overtime, it became easier to present and I was excited to teach my peers more about Excel*." (Trainer: Ms. M)

***Second*, Reflect: Assess the rehearsal and review feedback from peer trainers.** The student trainers recorded Excel skills training videos, received feedback from faculty, and finalized their recordings. This activity allowed them to reflect on their presentation performance and learn how to improve their presentation. Their reflections are shown in the two remarks below:

> "*Recording the videos forced us to practice and it directly impacted on the success of our presentations*." (Trainer: Mr. A)
>
> "*Overtime, it became easier to present and I was excited to teach my peers more about Excel. This moment is significant, because I was able to leave my comfort zone to speak and present to my peers*." (Trainer: Ms. M)

***Third*, Think: Share rehearsal experiences and cogitate on future improvement**. The student trainers discussed the structure of the Excel Skills Workshop and shared lessons learned from the rehearsing and viewing of their recorded videos with other trainers and faculty. As a result of the sharing, they discussed how to structure the Excel Skills Workshop.

***Finally*, Act: Present the workshop to students**. The student trainers acted upon their acquired knowledge and skills by delivering the live Workshop. Each student trainer presented the training materials (i.e., Excel functions and data analysis using pre-selected Excel functions and data) to student participants and visited breakout rooms to help student participants with exercises and questions during the Excel workshop. The student trainers feel rewarded for contributing to the community (i.e., teaching student participants). The outcome of this activity is more psychological than informational: they found it a rewarding experience and felt the impact of their work. The student trainers expressed their appreciation for this experience, as shown in their remarks below:

> "*Excel skills workshop was something that I never have done before and it was very rewarding to show students skills that they either did not know or were able to refresh on*." (Trainer: Mr. R)
>
> "*The Excel Skills Workshop also exceeded my expectations. I didn't expect students to be as engaged or enthusiastic to learn about Excel, but I was proven incorrect. Everyone was excited to learn and wanted more information about where they could watch the videos*." (Trainer: Ms. M)
>
> "*I used to teach staff in the warehouse and did what I called "informative sessions," but this felt like I was making a difference. Even if these students learned one new skill from the workshop, it will save them hours in their future career*." (Trainer: Ms. B)

5.3. Skills development of the student trainers

Trainers reported their improvement in technical skills as well as soft skills. As the four trainers are majoring in IS, IS security, and Data Analytics, the improvement of their soft skills was much needed. One important skill is effectively teaching students and presenting the knowledge to people with little technical background. One student trainer explained:

> "*Workshop experience was able to teach me how to lead a group of students and explain things to them. I feel more comfortable now explaining things to a large amount of people and trying to get their attention."* (Trainer: Mr. R)

Through the preparation and delivery of the live Excel Workshop, the student trainers also improved their ability to adapt to unexpected circumstances arising in a live event. They learned how to deal with unexpected scenarios. This new skill will be beneficial to their performance in a professional workplace. This sentiment is echoed in a student remark:

> "*Anything can go wrong and I should have been prepared. This will significantly impact my future preparation methods for any presentation regardless of the material*." (Trainer: Ms. B)

In addition, our training of student trainers was conducted in a team setting (i.e., four student trainers and two instructors). The four trainers are from different ethnic backgrounds (i.e., Latina/Chicana, Black/African American, White), with different professional work experiences (i.e., employed full-time, employed part-time, and student only), and from different countries (i.e., local students and international students). The diversity in the team composition provided them an opportunity to learn different perspectives, which is important for the reflection on their learning. One trainer elaborated on this experience:

"*The experience of working (not studying) with someone who has a totally different background in terms of professional career was new for me. I have done teamwork projects in the past but usually I work with people that know similar things I know, and work on projects that share common technical requirements from my peers. My background is IT, while Ms. B's is Logistics. This was a different (and great) experience for me because we had to work on something new for both of us*." (Trainer: Mr. A)

Last but not the least, student trainers strengthened their teamwork skills. They realized the importance of learning from each other and applauded the success of their team members. These are reflected in the remarks:

"*We realized how much we all learned from each other, and from both projects. And what specifically each one of us we can improve for our future endeavors*." (Trainer: Mr. A)

"*Every team member was capable of successfully completing their videos and Zoom presentations. Those were vital parts of our Excel Skills Workshop, which every member did with success*." (Trainer: Ms. M)

5.4 Satisfaction of the student attendees from the Excel Skills Workshop

The train-the-trainer based Excel skills training in the online workshop was well received by the students' attendees. Of the attendees who completed the post-workshop survey (86 samples), the majority reported that the Workshop was successful in teaching them to summarize data using Excel formulas (85%), to create charts and graphs in Excel (86%), to use the Excel PivotTable function (80%), and to use the Excel IF-Then formula and data analysis tool (75%). Moreover, 90% of attendees reported that the Workshop successfully refreshed their Excel knowledge by providing a recap of basic Excel knowledge at the beginning. The positive feedback of the workshop attendees is reflected in the two remarks below:

"*Overall, I loved the simulation because it fostered what it would be like in the workplace, and I learned some new ways to analyze the data. I hope there will be more Excel workshops in the future*." (Female; FGCS; major in business administration; student only; Asian American)

"*I enjoy the workshop and I feel these videos are amazing. The videos shown before the workshop were short and sweet. I feel like I could show these videos to the leadership in my job to make our analyzing skills better using technology*." (Male; FGCS; major in logistics management; Employed full-time; Latina/Chicana)

As a result of their positive experiences, 91% indicated that they would recommend the Excel Skills Workshop to their friends.

6. Discussion: Contribution and implication

Our study makes several contributions to research and teaching practices. *First, contribution to the experiential learning theory.* In the Experiential Learning process, the learner is considered as an active participant, and learning is achieved through a continuous cycle of inquiry, reflection, analysis, and synthesis while the teacher plays only a facilitating role (Kolb, 1984). However, in the study of information systems subjects, such as using computer software for data management and analysis, it is not sufficient for the teacher to simply act as a facilitator: the learner needs more guidance from the teacher to achieve the learning outcomes. Our case study of the campus-wide Excel Skills Workshop has revealed the co-development activities of the learner and teacher during the four stages of learning, i.e., Experience – Reflect – Think – Act. Future research on the role of learner characteristics and learning styles would generate further insights into the boundary conditions of experiential learning in the training of trainers.

Second, contribution to the Train-the-Trainer model. Our study contributes to the Train-the-Trainer model by demonstrating the active role of trainers in the learning process. Prior research has suggested that the effectiveness of the training programs based on the TTT model is challenged by the trainer's (instructor's) resources and retention. For example, it requires tremendous efforts from professors to develop an interactive train-the-trainer based mass course (Stoyan, 2008), and the institutional knowledge of TTT-based programs may be lost after the departure of those professors (Yarber et al., 2015). In our integrated model of TTT and experiential learning, student trainers were involved in the design and delivery of the course (e.g., the Excel Skills Workshop), which further reinforced the Excel skills and knowledge of the student trainers through the learn-by-teach approach. Moreover, the student trainers were assigned to create video tutorials on an Excel module (i.e., to visualize data using Excel). Such a process of learning to be a trainer itself improves students' learning (learn-by-teaching approach). Those co-developed training materials and student-created video tutorials were retained for use by other course instructors and student trainers, facilitating knowledge sharing in a larger community.

Moreover, an effective TTT program is likely to have a positive effect on the learning performance of the Excel skills workshop attendees. Our supplemental

analysis of the post-workshop surveys of the attendees shows that workshop attendees were excited and motivated to see someone who looked like them act as a knowledge source to help them learn Excel skills. During the workshop, the student trainers not only provided the training but also helped the instructors answer questions raised by the workshop attendees (e.g., via the Chat and Breakout room in Zoom). As one student trainer recalled, "*The workshop experience was amazing. It felt like we accomplished a lot for the amount of time we had. I really feel that students learned something.*" (Trainer: Ms. B)

This sentiment was shared by workshop attendees. One workshop attendee explained, "*We were able to learn a lot from the workshop. The student mentors were very helpful. I feel that what we learned was interesting and can help us out in the future and I am very happy with what we learned.*" (Female; FGCS; major in accounting; Employed part-time; Latina/Chicana). In this regard, the availability of student trainers improves the overall quality of the Excel skills training program.

Our study offers some useful implications for computer skills training of college students, given the increasing importance of developing Excel-based analytical skills of college graduates for employers (Formby et al., 2017) and the presence of a gap in digital competence between underserved students and their counterparts (Deng and Yi, 2021). For educators, it is important to recognize the students achieve learning during the four stages of experiential learning. Therefore, it is important to design learning activities to provide students with opportunities to experience, reflect, think, and act to engage students in learning. In addition, for course teaching to achieve the desired student learning outcomes, active roles of students as participants should be encouraged, such as in co-designing and developing learning activities or projects.

7. Conclusion

Our study contributes to information systems (IS) research in marginalized contexts through a case study of an Excel skills workshop led by student trainers in a minority-serving university. In particular, the findings contribute to our knowledge about enhancing computer education in three key aspects: (1) applying the Train-the-Trainer (TTT) model; (2) providing opportunities for experiential learning; (3) achieving empowerment of underserved college students in computer education.

Despite the promising results and contributions, we acknowledge two limitations of the study. First, the research site of the study is a minority-serving public university, which has institutional characteristics that may not apply to other types of universities in the U.S. and other countries. Second, the size of the Train-the-Trainer program is relatively small (with only four student trainers). Incorporating the experiential process in the Train-the-Trainer model for a larger group (such as a class of 20, 40, or more students) may present new challenges. One potential solution is to use virtual conferences (synchronous communications) to facilitate the four steps as the electronic media has the capabilities to support the participation and interaction of a large group of people. Future research on considering different types of higher education institutions, expanding the size of the trainer group, and focusing on different types of technology skills would provide a more comprehensive assessment and evaluation of student learning of IS knowledge and skills.

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