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Building a Community of Practice in the Workplace:
A Case Study at a University Information Technology Call Center

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ABSTRACT

This study adopts Wenger's (1998) community of practice (CoP) framework to understand the relationships and professional learning community formed at an information technology call center at a large research university in the United States. Forming CoP in the workplace can facilitate organizational knowledge sharing and improve employee performance. In this study, 14 indicators are used to investigate the phenomena of a community of practice at an IT call center. Data on key features of a community of practice was collected from multiple sources, including on-site observations, surveys, interviews, and documents and artifacts. A social network analysis was performed to reveal the connections among employees at the IT call center. The findings indicate that a community of practice was formed at the IT call center based on the Wenger's CoP indicators. These determining features can be used to evaluate the successful adoption of a community of practice within an organization as a means to enhance informal workplace learning and facilitate professional development.

KEYWORDS

Wenger's Community of Practice framework, Workplace learning

INTRODUCTION

Call centers play an important role in enhancing business success for organizations by providing information and assistance to their customers (Aksin et al., 2007). Building a community of practice (CoP) at a call center could foster organizational knowledge management and sharing, facilitate professional development, and support the overall performance of the organization. A CoP is defined as groups of people who share the same values, interests, or goals working together to complete tasks (Wenger, 1998). The CoP framework has been adopted in organizations to promote professional learning and group work (Koliba & Gajda, 2009). The literature suggests that CoP can enhance knowledge sharing (Koliba & Gajda, 2009; Sánchez-Cardona et al., 2012), help novices become experts (Fuller & Unwin, 2003), increase employee satisfaction (Ikeazota, 2016), and foster workplace innovation (Sánchez-Cardona et al., 2012).

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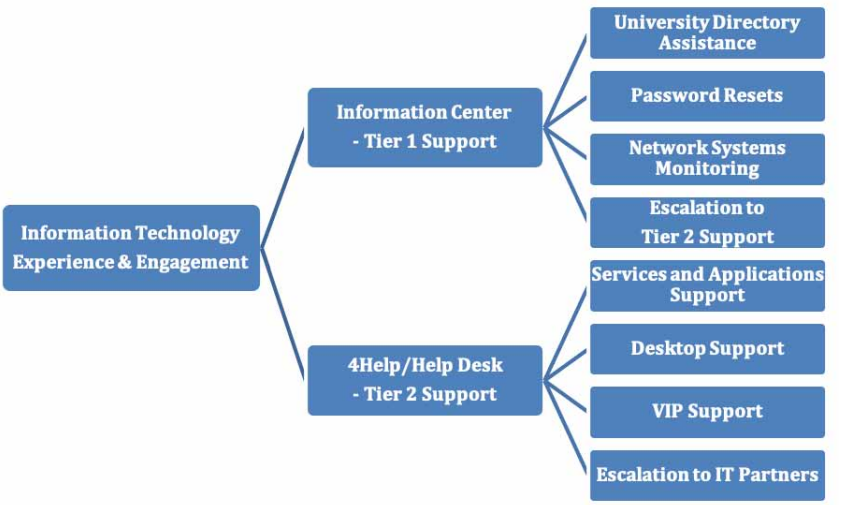
This study was conducted at an information technology (IT) call center also named as the IT experience and engagement unit at a large research university in the United States. The call center consists of two groups, one is the Information Center (IC), and the other is the 4Help/Help Desk. The call center offers support for all stakeholders within and beyond the university community, including students, staff, faculty, alumni, and visitors who need support for IT services offered by the university. The IC has 15 full-time and part-time employees that provides 24 hours all year-round support to customers, whereas the 4Help opens from 8am-5pm, Monday-Friday with one full-time supervisor and 22 student consultants.

Previously, these two groups operated at two different locations, and they were merged into one physical location when this study was conducted. The IC provides the first tier of support for users, by which the agents and consultants take phone calls from users and help them resolving problems, such as password resets, university directory assistance and escalating incidents to the second tier of support. Figure 1 displays the organizational structure and main tasks that are performed by each group. The 4Help group offers second tier support with providing advanced trouble shooting services, such as resolving wireless connection issues, assistance with downloading programs, and troubleshooting applications. Incidents reported by the users are recorded in ServiceNow that is the main ticketing system used at the call center. Agents and consultants can create an incident ticket, view ticket information, and track the progress of an incident in ServiceNow. Then student consultants at 4Help pick an incident from the queue and assist users with their problems via phone or email.

Figure 1. Organizational structure and associated tasks



LITERATURE REVIEW

CoPs are closely related to the notion of situated learning. Situated learning posits that learning is actively constructed via social interaction in a contextualized environment (Lave & Wenger, 1991). In a CoP, members share information, construct new knowledge, and achieve mutual goals through social activities and engagement (Smith et al., 2019). Brown, Collins, and Duguid (1989) stated that learning is inseparable from the context and culture where it occurs, furthermore, they introduced the concept of cognitive apprenticeship that emphasizes

learners learn from observing their teacher's problem-solving process. A learner can reach a higher level of performance by receiving assistance from more capable members within a community (Vygostky, 1978). Peer learning is a critical component of CoP, as Boud and Middleton (2003) mentioned that peers learn from each other via informal learning opportunities especially in the workplace. A newcomer moves from peripheral participation to full participation by getting involved in group activities and adopting the culture and social norms of that community (Brown et al., 1989; Lave & Wenger, 1991).

Wenger (1998) proposed 14 indicators of CoP, including sustained mutual relationship, shared ways of doing things together, shared stories or inside jokes, etc. Events, leadership, and artifacts are essential components of a CoP (Wenger, 2000). Events are organized for members to interact with one another; leaders contribute to community development by building connections among the members and with other communities; artifacts include documents, tools and stories that are valuable for recording and passing on the knowledge of a community. In addition, Wenger (2000) stated that identity is rooted in a community, in the way that it represents whom the members are, what they know, and their competences and experiences. A person may have multiple identities by getting involved in various communities. The key indicators and components of CoP can be utilized to evaluate and understand knowledge transfer, institutional relationships, and structure of professional learning communities (Koliba & Gajda, 2009). This study adopts Wenger's framework (1998) to explore and interpret the CoP phenomena at the IT call center.

METHODOLOGY

A mixed method approach that incorporates quantitative and qualitative research methods (Collins et al., 2007; Creswell, 2014; Johnson & Onwuegbuzie, 2004) was utilized in this research. Mixed methods provide "the most informative, complete, balanced, useful research results" (Johnson et al., 2007, p.129), which indicates data collected from multiple sources contribute to more rigorous and valid findings. Qualitative data can be gathered from open-ended survey questions (Creswell, 2014) to describe the lived experiences of the participants (*Collins et al.*, 2007; Sale et al., 2002). In comparison, quantitative data can be retrieved from close-ended survey questions (Creswell, 2014) to confirm and validate qualitative data. Research questions in this study include:

1) Can a community of practice be formed at an IT call center?
   1.1) What characteristics of a community of practice can be identified within the call center?
   1.2) What are the potential threats to the formation of a community of practice within the IT unit?
2) What communication and interaction structures are formed within the call center?
   2.1) What are the sub-groups?
   2.2) What are other features of this community?

Data Sources

Online Survey. An online survey was distributed to a total number of 38 IT agents and consultants with receiving 21 completed survey responses. The survey collected participants' background information, information about whom they worked with daily, tools used at work, etc. Participants' information is presented in Table 1. The average employment length of the participated agents at the IC was about 4 years, and whereas the average employment length of the participated student consultants at 4Help was 1 year and 2 months.

One-on-one Interviews. Five call center employees volunteered to participate in the interviews. The participants included one supervisor of the IC group, one supervisor of the 4Help group, one IC agent, and two student consultants with one of them was the 4Help student manager. Five one-on-one interviews were conducted, each interview lasted about 20 minutes.

On-site Observations. Three on-site observations were planned and conducted based on the shift schedules of all agents and student consultants to observe as many of them at work as possible. Notes were recorded right after each observation, including details of the employees' troubleshooting processes, tools used to resolve IT incidents, approaches utilized to communicate with each other, and major events occurred at the call center.

Table 1. Participant roles and employment length

Name	Status	Period of Employment (year, month)
Karen	Student	6 months
Jean	Full time	1 year, 6 months
Victor	Full time	1 year, 9 months
Julia	Full time	6 years, 4 months
Christy	Student	1 year, 8 months
Keith	Student	2 years, 1 month
Amanda	Student	1 year, 1 month
Sandra	Full time	2 years, 8 months
Donna	Student	1 year, 3 months
Abby	Student	3 years, 6 months
Todd	Full time	2 years, 3 months
Diana	Full time	9 years, 4 months
Douglas	Student	1 year, 3 months
Fred	Full time	8 months
Jessica	Student	5 months
Arthur	Student	3 months
Joe	Full time	10 years, 3 months
Mary	Student	4 months
Emma	Student	6 months
Justin	Full time	8 months
Kelly	Student	1 year, 2 months

Data Analysis

Data triangulation was adopted to investigate and interpret the CoP phenomena at the IT call center. According to Noble and Heale (2019) and Hussein (2009), triangulation is used to increase the validity of research findings (Noble & Heale, 2019) and obtain a deeper understanding of a certain phenomenon (Hussein, 2009). Decrop (1999) stated that different materials and data sources should be collected and analyzed during data triangulation process. In this study, interview scripts, observation notes, and open-ended survey responses were coded and triangulated to answer the research questions. Content analysis was performed to identify themes from the collected qualitative data using Wenger's CoP framework.

Social network analysis (SNA) techniques were utilized to investigate the communication and interaction structure and sub-groups formed at the call center. A social network graph that is composed of nodes and lines was created based on participants' responses to survey questions. Those questions include "Who normally ask for your help or opinions on resolving an incident?" and "Who do you talk to or consult with regarding an incident?". Chan and Van Aalst (2004) stated that SNA reveals the structure and information exchange within a community. Research has suggested using SNA to study and understand social learning (Chan & Van Aalst, 2004; Rabbany et al., 2014; Toikkanen & Lipponen, 2011) when "information circulates in a networked learning environment" (Toikkanen & Lipponen, 2011, p.365). The SNA package in R was used to compute the degree centralization, betweenness centralization, closeness centrality, and EigenCentrality values of the call center community, and the igraph package was installed and loaded to build social network graphs.

RESULTS

Characteristics of a Community of Practice at the IT Call Center

The findings indicate that a CoP was formed at the IT call center with revealing all 14 indicators based on Wenger's (1998) CoP framework. The CoP indicators and supporting data are presented in Table 2.

Table 2. CoP indicators, data sources, and examples

Indicators of CoP	Data Source	Description/Examples
Sustained mutual relationships	Interview	"Every agent is my brother and sister, we relate to that…Hey we get a gap here, we need to fill in here, and we need to work over there. They took responsibilities and they handle it like a family." – Joe
Shared ways of engaging in doing things together	Onsite observation	A Ticketing System – ServiceNow was used at the call center by the agents and student consultants to record, track, and work together to solve incidents; In addition, meetings, discussions, and conversations between the employees were observed at the call center.
Rapid flow of information	Onsite observation	Instant group chat tools were utilized to inform everyone of changes made to IT services on campus.
Substantial overlap in participants' descriptions of who belongs	Interview	"Every agent is my brother and sister, we relate to that… They took responsibilities and they handle it like a family." – Joe "A lot staff we do are password resets and directory assistance …" – Sandra
Knowing what others know, what they do, and how they can contribute to an enterprise	Interview	"One time I remember, I got a ticket, someone was not receiving emails to their exchange account. This was the first time that I ever encountered it so I went to Abby for help, cuz she knows a lot about email." – Mary
Mutually defining identities	Interview	"We know we all have a job to do, get the job done, but we are all not like super serious. We try to take it easy and get relax, and by not being so rigid ourselves. We can perform well when we talk to a user... When sometimes users are super upset, and you like it is okay we will figure it out." – Todd
The ability to assess the appropriateness of actions and products	Documents	The working documents for all agents at the Information Center highlight phone etiquette, when to escalate an incident, etc.
Specific tools, representations, and other artifacts	Documents and onsite observation	A cheat sheet of university directory was placed on many call center employees' desks. The cheat sheet provided the contact information of collaborating departments on campus that the agents and consultants can use to seek knowledge and help from departments.
Local lore, shared stories, inside jokes, knowing laughter	Interview	"We have this Friday afternoons when nothing was going on, we play games together" – Abby
Jargon and shortcuts to communicate	Onsite Observation	'Switchboard', 'Pagerduty', 'Pidgin', etc. were used by the employees to look up information, escalate tickets, and communicate with each other. Those jargons, tools, and shortcuts are only shared within the call center.
Absence of introductory preambles	Onsite observation	"I still get the same error message on my screen, would you please come and see it?" One student consultant asked her supervisor for help when she couldn't solve an incident. An introduction of themselves and description of the problem was skipped, which indicates that the supervisor and the consultant knew each other, and the supervisor was also aware of the incident status.
Very quick setup of a problem to be discussed	Onsite Observation	Agents and consultants sat close to each other at the call center, the setting was very convenient for them to reach out to each other for help whenever an issue occurred.
Certain styles recognized as displaying membership	Interview	Being able to handle phone etiquette and have users verbalize their issues was viewed as essential skills to prove membership at the call center mentioned by several interviewees, as Sandra described: "Usually, the biggest problem is I try to figure from the caller what the problem is because they normally just say it is not working and they won't tell you what it is. They don't always know, and you try to get very specifics from people. The biggest hurdle is actually getting caller to verbalize what exactly the problem is." -Sandra
A shared discourse reflecting a certain perspective on the world	Interview	Several of them indicated that helping people is an important component of their job, e.g. "I like helping people" – Sandra

Sustained Mutual Relationships

"We are like a family" was a statement made by the agents and student consultants during the interviews. Those interviewees were satisfied with the working conditions at the call center, and they mentioned that other agents and consultants were very approachable and willing to help each other. The agents and consultants collaborated to solve incidents at work, and some of them even became friends, as Abby said "We go downtown and get drinks. I hang out with Julia a lot outside work, and she and I are sort of in the same position in our academic program…". Sustained mutual relationships is a key indicator of a CoP (Wenger, 1998) where members build trust, develop deep relationships, and share professional knowledge to achieve mutual goals (Gray & Gabriel, 2018). Sustained mutual relationships was identified at the call centered based on the interviews with the employees, onsite observations, and employees' survey responses.

Shared Perspective

Sharing common values and goals are essential for building a CoP (Gray & Gabriel, 2018; Hasmath & Hsu, 2020). Helping others was recognized as the shared perspective of the call center employees, as Mary said, "It is nice to help people with their problems. I kinda like dealing with I guess older people who don't really like their computers or Internet, because I feel like I get to really convince them that technology is great". Helping their users to solve problems is the mutual goal and shared perspective of the agents and consultants, which also made their work meaningful.

Shared Ways of Doing Things

The employees shared many ways of doing things within their unit. For instance, the participants mentioned the common use of a ticketing system - ServiceNow, to record, review, and resolve incidents. The frequent use of ServiceNow at the call center was confirmed during onsite observations. Other shared ways of doing things included using the shared wiki site and knowledge base (KB) to look up answers to a problem. The group wiki site contains solutions to issues reported by users over the years. The KB includes answers to common IT problems and can only be accessed by the call center employees. By creating shared ways of doing things, the members developed a common language and tacit knowledge when working together (Ingram et al., 2014). Each member also formed their own identity in the community through collaboration and community building activities (Snijders, 2019).

Threats to the Community

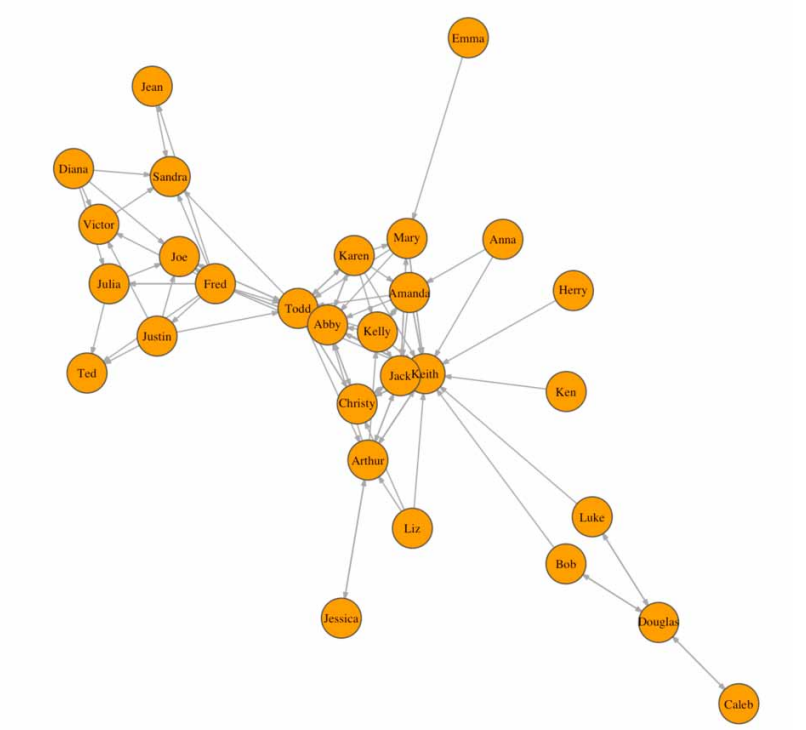
Leadership Change

The change of leadership may lead to disappearance of or less interaction within the community (Gongla & Rizzuto, 2004). Abby is the student consultant manager who has been playing a key role in the unit. Not only did she create the training modules for 4Help but also offered one-on-one and group training sessions for new student consultants. However, she will graduate and leave the call center soon, which can result in a leadership change within the community. This change could cause a threat to maintain a CoP and affect the communication and information sharing structure within the unit.

Subgroups Formed within the IT Unit

A few sub-groups were identified within the unit as shown from the social network graph in Figure 2. The social network graph communicates how knowledge and information is passed on between the members and groups. One group includes Fred, Joe, Sandra, Victor, Jean, Diana, Julia, Ted, and Justin. All of them are from the IC group. The largest cluster of participants revealed from the social network graph includes Todd, Abby, Karen, Amanda, and Kelly who belong to the 4Help group. A small community contains Luke, Bob, Douglas, and Caleb is a subsidiary of the 4Help group as shown in the bottom right corner in Figure 2, however, they are at the peripheral of the call center community. The social network graph also reveals that a few members are at marginal positions of the community, including Emma, Jessica, Herry, and Ken.

Figure 2. Visualization of sub-communities at the IT call center



Several members were discovered as brokers in the entire community. Brokers are the connections between sub-communities and pass information from one group to another (Santos-Díaz & Towns, 2020; Wenger, 1998). The brokers at the call center as shown in Figure 2 are Todd - 4Help supervisor, Joe - one of two supervisors at IC, Fred - full-time agent at IC, and Keith - student consultant who has been working at 4Help for over two years. They have played important roles in connecting different groups and are crucial to maintain a CoP.

A dendrogram graph as seen in Figure 3 was plotted in R using community detection techniques based on edge betweenness. The cluster_edge_betweenness function was adopted to detect communities within the call center. The detected communities presented in Figure 3 are in line with the results from the social network graph with the largest community of members from the 4Help group (in the blue rectangle).

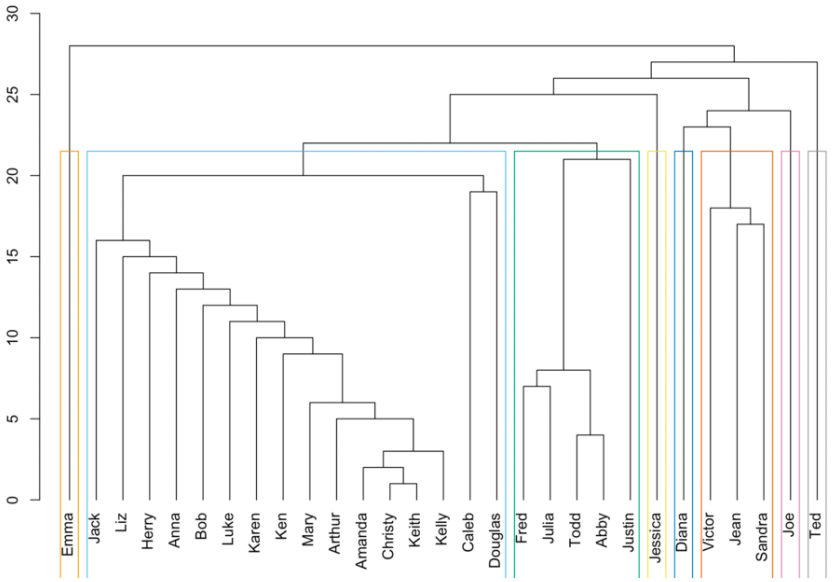
Others Features of the IT Call Center

The social graphs and statistical outputs from R also revealed other features of the IT unit, including the degree of coherence of the community and density of the communications. The following section describes the network behaviors using the statistical outputs from R.

Network Behaviors

Several statistical analyses were performed to identify certain behaviors in this network, including betweenness centrality (indicated by the links held by each node), degree centrality (indicated by the number of times one node is on the shortest path between other nodes), closeness centrality (indicated by the shortest path between all nodes), and EigenCentrality that reveals a node's influence within the network. The betweenness centrality value of the call center community is 0.1189, degree centralization value is 0.3373, closeness value is 0.4967, and EigenCentrality value is 0.8372. The larger the EigenCentrality value is, the more likely there is a central member within this community. If the value equals one, it means there is only one central member with absolute power in the community. The social

Figure 3. Dendrogram of detected communities



graphs and statistic values (such as the EigenCentrality value equals 0.8372) indicate that several key members exist in the community who form the core group to "provide intellectual and social leadership" (Wenger & Snyder, 2000, p.141). Baker and Beames (2016) believed that such leadership is important for the success of a CoP.

Cross-unit Collaboration

Data collected from the interviews, field notes, and survey have shown that the IC agents and 4Help consultants also sought help from other IT units. The agents and consultants reported that they had walked to, emailed, or called other IT units for help. As Mary said "Abby (student consultant manager) took me over to the guys who deal with email service and showed me what information I need to ask in order to better help the caller." The 4Help supervisor also mentioned a similar experience:

"When I have problems, I just walk across the hall, pick the brains over there. Across the hall, there are network teams, I can always go there and ask them. Hey, we have this situation, could this be this and this… Just pick the brain, and see what they can come up with. We know people in NIS, ECS, CCS, IMCS, all the divisions, we can reach out to… it is easier to talk to the person about stuff, and sometimes just do it over the phone and the we come back and reach out to the user."

A large number of IT services and applications are owned or managed by other IT units at the university. Therefore, it is crucial for the IT call center employees to work closely with other IT units to resolve issues and offer high quality support to their users.

CONCLUSION AND DISCUSSIONS

Data collected from the interviews, onsite observations, and survey responses indicate that a CoP exists at the IT user experience and engagement unit, reflecting Wenger's (1998) key CoP features, such as sustained mutual relationships, shared perspective, and shared ways of doing things. Tools used at the call center include cheat sheet and group websites to find information to resolve incidents. Troubleshooting has been reported as a frequently performed task

at work. The agents and consultants also mentioned that they used Google to search for an answer when the solution is not available in their shared Wiki sites or Knowledge Base.

The findings show that the agents and student consultants were satisfied with their working condition and relationships built at the call center. "We are like a family" was a frequent statement made by the interviewees. The social network graphs reveal that a few sub-communities were formed with the IT unit and connected by supervisors or brokers. However, the social graphs also show that several members were at the marginal positions of the community, which could prevent them from fully developing themselves professionally. Creating online communities using social media platforms are proven to be effective in cultivating and sustaining a CoP (de Carvalho-Filho et al., 2020; Tranos, 2020). An online community provides both formal and informal learning opportunities for group members where they can ask questions, provide solutions, and build relationships with each other. Therefore, creating an online social space for the call center employees could foster more interaction and help the new comers or members at the peripheral positions to move towards the central positions in the community.

In addition, it is crucial to train all agents and student consultants on a variety of tasks to meet challenges this unit may encounter, especially when it experiences leadership changes or a high turnover rate. According to the supervisors at the center, they have started a training program that cross-trains the agents and student consultants. As Todd described: "When people are sick at the call center, we need to back them up. I assign some of my consultants to take calls. This all points to us to cross train everybody so we can share resources." The IC supervisor also mentioned that the training content has been put online so that all agents and consultants can access it.

"Now we are trying to remodel and trying to reinvent the wheel…we are also going to get online, kind one-on-one, two-on-two stuff. More hands on by the agents...Now it is more towards at it, showing that agents this is what the knowledge is, here are some sites you can go on Canvas to take a look at it. Next time, we will bring you here to ask some questions about the sites, it is more ownership of the agents, less ownership by the supervisors, great!"

When cross-training between the IC and 4Help groups is implemented, more collaboration and information and task exchange will take place at the call center. With stronger ties being built between sub-communities, the CoP formed at the call center will also reach its maturity (Hasmath & Hsu, 2020). Hislop (2004) pointed out that building social relationships and trust is key to fostering knowledge sharing and information exchange between communities. Therefore, the call center should provide more opportunities for the employees to interact and socialize with each other both in and outside the workplace.

In summary, effective approaches and practices were implemented at the IT call center to enhance community building, knowledge sharing, and professional development. The findings from this study could inform the formation of a CoP and professional development at IT support centers worldwide. However, there are also limitations of this study. For instance, not all agents and student consultants completed the survey and participated in the interviews. The findings, including the social network graphs, could be different if the data were collected from all.

The next step of this study is to investigate the effects of building an online community using social media platforms and implementing a cross-training program on the evolvement of a CoP at the call center. Knowledge sharing paths, working relationships, and community structure will be visualized and identified using social network graphs and compared with the current findings. Effective tools and approaches used to enhance a CoP will also be shared with the academic and IT communities.

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CONFLICT OF INTEREST

The authors of this publication declare that there is no conflict of interest.

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