

A FACILITATED VMC-BASED REMOTE SERVICE KIOSK INTERFACE FOR INFORMATION SYSTEMS

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ABSTRACT

The assumption behind kiosks used in public places is that they are meant for simple tasks and crowds of people who do not require help. Complex occasionally used information-intensive services provided by kiosks, diversified customer groups and situations where people are dependent on the systems available, have challenged this assumption. Our study on a new video-mediated communication (VMC) based service kiosk shows that the help from a real person by VMC is a possible solution to the problems and the human-facilitated kiosk interface is appropriate for the systems used in public places. Based on experiences with the kiosk, we suggest enhancing VMC-based kiosk interfaces for information systems.

KEYWORDS

Video-mediated communication, kiosk interface, facilitation, service system

1. INTRODUCTION

People's increased mobility and changes in lifestyles have been setting new demands for the availability of various services. Providing human service is seen as expensive, and this has led to the increasing popularity of self-services offered by local kiosks and by Internet. Today the availability of cheap computer and network solutions also enables offering of quite complex remote services, such as banking and travel services through interactive kiosks. These are defined as short-term and publicly used computer-based Information Systems (ISs) that the digitally identified but otherwise unknown user uses (Holfelder & Hehmann, 1994).

However, with diversified customer groups and situations where people are dependent on the offered technologies, delivering of complex information-intensive services (Glushko & Tabas, 2009) and services where people have to make multiple choice interactions (e.g., buying travel tickets) is seen as an increasing problem for customers (Alcock & Millard, 2006) and service providers (Reinders et al. 2008). This has motivated a search for intermediate solutions for ISs, one of which is a remote service kiosk using a video-mediated communication (VMC) (Finn et al. 1997) through which a service clerk facilitates and personalizes the service for each customer (Paradi & Ghazarian-Rock, 1997). Thus, kiosks as interfaces for ISs are not new in Service fields. However, in Information Systems fields, most of the research has focused on completely computer-supported self-services, e-services, or technology-driven process improvements, leaving thus the potential of VMC in kiosks untapped, especially in the development of distributed Business to Customers (B2C) services via kiosk networks, appropriated for customers and service organizations. Consequently also related case studies on VMC-supported kiosk systems and service are scarce.

This paper explores a VMC-based service kiosk interface and its use taking place in a public place; in particular, how facilitation affects the interaction situation and how users experience the facilitated kiosk use. Our approach is based on situated analyses on Avis's new remote car rental service using VMC-based kiosks, contributing thus to the lack of case studies on VMC-based kiosk solutions. By giving a configuration example how such a system can be implemented, our goal is to increase future research on VMC with ISs.

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2. RELATED RESEARCH

In a F2F situation, people observe, interpret and transmit communicative expressions to each other and coordinate the situation toward certain purposeful outcome. One typical situation is a F2F service that is used as a model for self-service interfaces implemented in ISs and in kiosk services used in public places. Untapped possibilities for ISs are VMC-based interactive kiosk interfaces by which human-facilitated F2F services can be offered for the customers who need help and personalized service.

2.1 F2F Service Interaction

According to Clark and Brennan (1991), shared information and its continuous updating is the common ground upon which people rely and build their mutual understanding for accomplishing certain collective purposes. The authors define how different personal media, such as F2F conversation, telephone, video conferencing, letters and emails affect interaction situations. The success in sharing of conversations is dependent on the used medium's capabilities to mediate the content, evidences and references needed for participants' turn-taking in their information exchange. A F2F situation is thus often seen as the everyday standard for negotiating, decision making, and agreement based services with the appropriate costs of producing and achieving the desired outcome (Clark & Brennan, 1991; Glushko & Tabas, 2009).

Whittaker and O'Conaill (1997) show how F2F communication also is dependent on actors' nonverbal behavior and how the context is visualized, and objects and events shared in its environment. The authors point to how people coordinate their activity by turn-taking cues (transition between speaking/listening) and availability cues (when one can start and should end communication) which enable them to initiate new subjects or spontaneous interactions. Due to the importance of the interaction in social life, humans are very skillful in maintaining and repairing discussions, by using reference and feedback cues and interpersonal cues that provide propositional, social and affective information (Whittaker & O'Conaill, 1997).

Also, to a great degree, F2F communication defines the norm of modern service experience in which one person provides a service to another (Glushko & Tabas, 2009). Accordingly, service quality is determined as co-produced, involving interactions between the customer and the service producer or the person who represents the service firm in question. Therefore, it is dependent on what is expected and actually received as a service, in which service willingness or the intensity and hands-on actions taken by the service producer and the flexibility in adaptation of the service process for customers are vital factors (Glushko & Tabas, 2009). Interaction between a customer and a service producer is thus the key and most challenging element of any service situation, and when it fails, access to the systems used in that situation will fail too.

2.2 Self-Service as Human-Computer Interaction

Human-Computer Interaction (HCI) based service kiosks are typically either individual machines or embedded interfaces for public, local, or remote services by Internet (Tung & Tan, 1998) that have to be offered with a certain degree of privacy and security. Use of a service kiosk is one form of self-service, where user cannot select interaction media, and usually takes place by graphical user interface elements. When standing at the kiosk, the user has to interpret buttons, symbols and signs, icons, menus and forms on the screen, and try to select, push or manipulate the right objects when doing some designed task (Bolchini & Paolini, 2006). In a self-service situation, the service outcome is thus dependent on the user's skills, and typically none of the correction and repair mechanisms used in F2F discussions are available, but only a limited set of digital clues and advice a kiosk interface can offer via its formal, programmed procedures.

It may be possible view a HCI-based self-service as a dialogue between a service producer and a customer (Campbell et al. 2011). For the customer, this may be hard, as the interaction disappears beyond layers of self-service technologies (SSTs), even though the service provider has designed the services to be available. While using a kiosk, the customer has to follow a step-by-step procedure, such as identifying 1) whether the service s/he needs is available, 2) how the service should be initiated, 3) when and what form of input is needed from his or her side, and 4) how the service output can be received and the procedure ended.

It has been shown that making the steps of a HCI self-service process easy for diverse customer groups is a formidable design task. Simple kiosks selling snacks and beverages work quite well, but disturbances are common with them, too, and more complicated services, such as selling travel tickets for different routes and

different times are very difficult to design in such a way that the service quality would be convenient and acceptable for the customers. According to Alcock and Millard (2006), customer surveys have shown that the required use actions with self-service systems can make use unpleasant for almost half of the customers. When available, many prefer personal services because of the immediacy of interaction with a real person, and having experienced only the complexity when using digitalized HCI-based self-services (Alcock & Millard, 2006). This is a serious problem for ISSs, where kiosk interfaces are applied as interaction and service solutions (Paradi & Ghazarian-Rock, 1997; Tung & Tan, 1998; Reinders et al. 2008).

2.3 VMC in Real-Time F2F Interaction

Remote video connections became publicly available in the 1980s and since the 1990s there has been a lot of interest in VMC (Finn et al. 1997). Many concepts, such as situational awareness and interaction cues that are today related to user or customer experiences (Dong & Fu, 2012; Lee et al. 2012; Payne et al. 2012; Yamauchi et al. 2012), date back to these early studies. VMC has inspired studies with multimedia and multimodal systems, people's use of senses, as well as what are the expected interaction rituals, such as eye contact when greeting each other and how to shape affective information (Whittaker & O'Conaill, 1997).

For instance, Lee and others' (2012) observations on online game players' micro-coordination show that seeing action on screens is not sufficient to understand the meaning of communicative situations and that even though talk is used to diagnose satisfaction, a lack of talk is not necessarily a sign of dissatisfaction. Their interpretation was that "talking more" is not the key for successful cooperation but only one way of affecting the situation, and many varieties of non-talk were recognized as being just as important in directing interaction and affected experiencing. Consequently, situated pair work studies have promoted VMC as a solution to complex, multi-phase negotiations (Dong & Fu, 2012) and to expertise sharing where the physical setting, tasks, and objects play a vital role (Kraut et al. 2003).

Moreover, several VMC solutions have been implemented for general videoconferencing, e-learning, telemedicine, or chatting (Finn et al. 1997; Ames et al. 2010; Dong & Fu, 2012) but hitherto, VMC has not been as widely utilized in publicly available kiosk interfaces (Figure 1: A) and in information-intensive services. Thus VMC's great audio-visual potential is well recognized in supporting real-time, natural human-to-human interaction (e.g., negotiations, decision making, agreement making), but there seems to be a lack of case studies on VMC-based kiosk solutions that have been intentionally implemented as interfaces for ISSs.

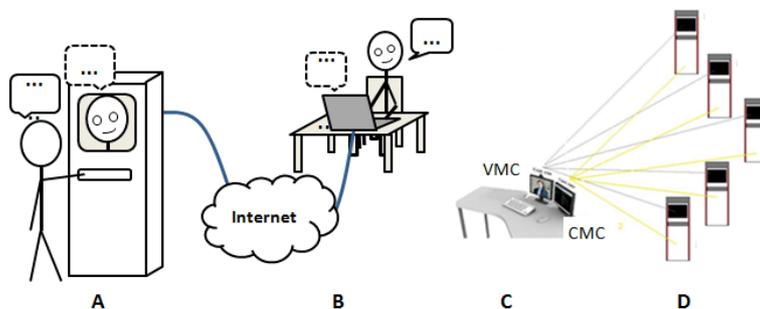


Figure 1. A) Customer's view, B) Service Clerk at work, and C) his VMC & CMS views, D) a kiosk network

Ideally, when actual system data needed in interaction is provided by effective devices, databases, and networks (Figure 1: B, C, D) VMC kiosk interface solutions can be modified for many types of services and system users. The basic VMC-based remote service kiosk (Paradi & Ghazarian-Rock, 1997) as an interface for a service and integrated with related Customer Management Systems (CMCs) and other systems by the service clerk, makes it possible to add personal, real-time, remote F2F facilitation to a service process. This could be one relevant solution to today's problems of SST kiosks.

2.4 Facilitated Service Interaction by a VMC-Based Remote Kiosk

Advances in ICT have greatly improved the possibility of using VMC, and today, an adequate communication quality can be achieved via standard broadband and Internet connections by using personal

computers. As the interest in kiosk design has been in STTs (Alcock & Millard, 2006) and virtual assistance (Payne et al. 2012), VMC-based human-facilitated service kiosks are still novelties, though a basic idea of distributed remote service production was provided over a decade ago by Paradi and Ghazarian-Rock (1997). Based on the model, service can be organized so that one clerk serves several kiosk locations (Figure 1: C, D)

Compared with the use of VMC in personal communication, people involved in VMC-based service interactions do not only share a virtual space (Figure 1: A, B) but also play different roles: one is serving and helping the other who initiates the interaction and pays the costs. Different types of helping (Åberg & Shahmehri, 2001; Kraut et al. 2003; Kirk & Fraser, 2006) via VMC have been discussed in interaction research, but aspects of services and customer-service relations have remained peripheral in relation to varieties of physical task guidance with the roles of learner-helper, relatives, or work mates. They thus offer an interesting starting point for analysis of VMC-based service interaction, which can be seen as a need-cost based interaction between the actors, where human interventions enact the production of the desired outcome.

According to Schwarz (1994), the core elements of facilitation are what a facilitator says and does in a particular situation, which reveals a set of values and principles behind his or her action and expertise (p. xi). The purpose of facilitation is to make the situation easy for the facilitated person (Schwarz, 1994; p. 14) by intervening in an ongoing activity (Argyris, 1970; p. 15) to be improved in the direction defined by the initiator. Usually, facilitation occurs in the presence of the facilitated (Schwarz, 1994; p. 15), which separates it from asynchronous, or virtual user assistance (Åberg & Shahmehri, 2001; Payne et al. 2012) or user support per se. Depending on the initiator's request, timing, and response, Schwartz (1994) has defined two general facilitation modes: help given for ad hoc needs and help given for the sake of longer-term affects to future needs (e.g., learning). As Kraut and others (2003) have shown, for help to be effective, one must receive it when it is needed and when one is mentally, socially and emotionally capable of receiving it. The timing of the intervention is thus critical and the facilitator has to maintain situational awareness of the state of the task and objects handled for conceptual grounding of the communication (Clark & Brennan, 1991). Facilitation, showing the service willingness (Glushko & Tabas, 2009) thus requires anticipating the help needed and understanding of how to ask for the other person's activity needed for the desired service outcome.

Hence, facilitation is typically structured by diagnosis (observing, interpreting, and inventing the means for helping) and intervention (using the means) repeated as a cycle of appropriate steps (Schwarz, 1994; p. 68) which balance the roles of actors and the use of resources and settings. Facilitation cannot be driven mechanistically as the customer should perceive it as meaningful and satisfying (Schwarz, 1994; p. 8). As part of service work, facilitation involves reflection of how the customer reacts to the help offered regarding the expected service experience, while the outcome is produced in a way that it will be beneficial for both parties. The following case will show how users reacted to facilitation given by VMC during a service.

3. CASE STUDY SETTING

Our empirical study was conducted with a car rental service Avis (www.avis.fi). Avis offers remote services by VMC-based service kiosks in Scandinavia, including at a Finnish University. In this case, our data was collected in the situations when participants and the kiosk located in the university's large passageway and a service clerk in a remote workspace working through Internet. This kiosk is equipped with a video display, video and document cameras, fine adjustment speakers and microphones, and a remote controlled credit card reader, scanner, laser printer, and car key boxes. Kiosk use starts when a customer pushes a start button that opens a VMC connection and a service clerk's face figure appears on the video display (Figure 1: A).

Organizers of the study were a group of students and one of the authors who worked with the participants. Participants were selected among university staff and students (seven women and nine men, ages 22-63 years, id1-id16) who had a driver's license. They were invited by emails containing information on the study and three themes for car rental, a business trip, a winter holiday trip, and a family visit. In each theme, a car renter might have special requirements for a car, route, timing, or belongings (a navigator, child seat or skis) but he or she could branch off the theme freely and the car rental process at the kiosk was not pre-scripted.

When arriving at the kiosk, a participant answered background questions (approx. 5 min), rented or reserved a car using the kiosk (approx. 10 min), and gave the first impressions to an interviewer who then interviewed (approx. 15-20 min) him or her by using user experience adjectives. All communication was informal, and the participant could ask for help if needed. Study situations were video recorded and analyzed

by using an interpretative approach (Klein & Myers, 1999) to situated analyses on how people reacted to VMC use in a public place, facilitation, and talking at a kiosk, which is usually used alone and quietly.

4. FACILITATED SERVICE INTERACTION AT A VMC-BASED KIOSK

The background data revealed that participants generally considered their ICT-use skills as good or excellent; no one had used this type of a kiosk earlier; all had used F2F services and self-services and nine of them were first-time car renters. Their rental processes (Figure 2) will be next analyzed by the discussion on VMC use at a service kiosk with facilitation and participants' comments and their reflection on the experiences.

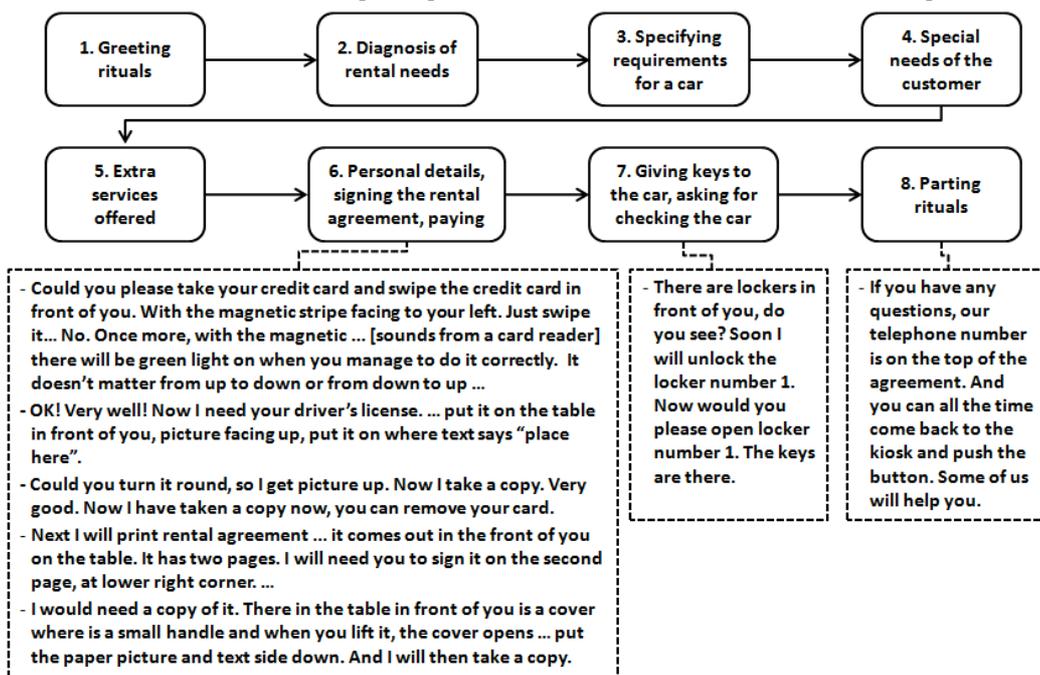


Figure 2. Typical steps in a car rental service at the VMC-based kiosk

4.1 F2F Car Rental at the Remote Service Kiosk

We identified eight main steps in the car rental service (Figure 2), and the general facilitation cycle (Schwarz, 1994; p. 68) which, however, contained features that are typical only in VMC-based kiosk use. The first five steps contained usual service facilitation such as in diagnosis of the rental needs and interpreting the means for helping. A rental agreement where the customer guarantees that s/he will follow the national driving laws has to be personally signed before receiving the car keys. Otherwise, as in a customary F2F service, the rental could vary depending on participants: "This was my first time with a customer attendant by a web camera. All the same things could be made here as in a live situation" (id4). Standing at the kiosk interface and talking by VMC were referred to qualities of F2F interaction as "surprisingly personal because it's face to face" (id15), or "normal, it's not different from other car rental desk face to face situations" (id13).

The rental dialogue can be seen as F2F-conversation-type (Clark & Brennan, 1991), containing typical elements of interactions with turn-taking and conduct rituals. The function of rituals is very important in F2F services where people expect politeness and appreciative interaction (Goffman, 1967; Glushko & Tabas, 2009). VMC thus enables the service producer to use customary service rituals, "the clerk was clearly a true customer service clerk" (id10) and to adopt a suitable intensity as showing service willingness to customers: "This was surprisingly flowing, the service clerk managed to give me all information before I even asked anything" (id6). Generally, the anticipation of customer needs contributed to the flexibility of use by "quick

understanding about the customer requirements” (id15). Informal communication by speaking made the kiosk use convenient and easy (Alcock & Millard, 2006) and the service interaction personalized for individual customers. To a great extent, this was due to the timely facilitation (Kraut et al. 2003) given for the user’s input and output actions during the actual car rental process.

4.2 Facilitation of Car Rental Process and Interaction with Kiosk

The rental processes contained two types of ad hoc facilitation related to car rental activity as producing the negotiated outcome, car rental agreement (Figure 2, steps 2-5) and interaction with kiosk interface peripherals (showing a driver’s license, using a credit card, handling rental papers) (Figure 2, step 6). Similarly as in F2F service, in most of the rental processes the rental dialogue was driven by small questions. “There is insurance, covering damage done by others. But there is all liability if you’ll damage it ... Would you like to have that kind of insurance?” (Clerk) “It’s a business trip, so let’s add that for safety’s sake.” (id16) “OK. Any other services? (Clerk) The excerpts show VMC as part of a flexible online interaction. The purpose of negotiating can be associated with producing a result piece by piece (Dong & Fu, 2012). Negotiation in this case was purposefully enacted with real economic consequences: service was produced for the customer who initiated the interaction and paid the costs. All participants were willing to pay the car rental, and extra services offered (Figure 2, step 5) were deemed as useful: “You can do it in one pack, many in one service” (id14). The need–cost relation was in balance and they perceived the service as the desired outcomes (Campbell et al. 2011) fulfilling the need to drive safely from one location to another.

The second facilitation type was adopted due to kiosk technology-mediation needed in the rental information transfer. It contained a variety of input and output help, invitations to the user to attend the interaction, telling what would be the next steps, and explaining how to use personal things with interface functions. Hence, on the one hand, VMC helped to coordinate rental action along with the customer’s real-time conduct and handling of interface peripherals. On the other hand, kiosk use involved the service clerk’s indexical phrases in relation to the space and the user’s situation (Robertson, 1997) (Figure 2, steps 6 & 7), intervening in it by asking the user to show a driver’s license and use a credit card and a scanner with rental documents. In the related functions of SST interfaces users usually need help (Alcock & Millard, 2006). In this case kiosk “worked quite well, everything I needed worked and there was no confusion.” (d16) “This is much better than ATM, not to worry about interface. I could say what I wanted and use normal interaction.” (id14) During the car rental process, facilitation given for the functions by speaking was therefore deemed as “interesting because a live person explains very clearly and fast” (id13).

In several cases, the two types of facilitation overlapped. Due to this, the use of kiosk technology was seen as easy and the interaction experienced as flowing and flexible: “It is fully interactive ... user can be active” (id15), “the whole process was quick, not slow at all” (id2). “It would go slower on the Web as there one has to ponder the issues. Now, I could ask about them.” (id10) Principally, this ensued from “the service clerk who guided the process and that’s why it went quickly.” (id6) These show that the technology-mediated context had been considered (Orr, 1996; Schmidt & Bannon, 1992) as designing the service for VMC use.

Based on the rental process analyses, we can conclude that VMC supported facilitation of real-time information-sensitive service and negotiating during exchanging car rental information (Clark & Brennan, 1991; Glushko & Tabas, 2009) (especially relative to rental steps 1-5), whereas talk about or referring to technology, the user’s things, and rental papers with interface functions, epitomize features of the technology-mediation bended with the social service dialogue (especially relative to rental steps 6-8). We consider that articulation in person-to-person services is not only socially oriented but showing of such nuances would require a more detailed approach and discussions than we could provide in this paper.

4.3 Summary of Experiences with the VMC-Based Service Kiosk

The configuration idea for VMC-based service kiosk (Figure 1), the implemented equipment (Chapter 3) used during the rental processes (Figure 2) with human-driven facilitation can be seen as an appropriate combination for kiosk users based on the participants’ comments. The car rental service contained two types of ad hoc facilitation related to the service process and the interaction with the kiosk interface, which overlapped in practice. This gave the user the experience of being personally serviced by the remote kiosk and affected the flexibility of interactions.

The users' comments show the importance of articulation work within this information-sensitive service context. Due to the interaction driven by speech and visuals, this new kind of remote kiosk service using VMC was generally received positively, and judged as novel, controllable, easy to use, and fast. When users described their experiences at the end of the study, facilitation within the rental process was the main talking point for most of them. One user distilled the interaction and kiosk experience into: "I use a lot of Internet and can do business there too, but this was flowing. ... In a way novel and dated as you talk with a customer attendant and work with a machine." (id8)

The case study shows that, for the users, this kiosk interface offered a very non-traditional approach to ISs. Contrary to digital HCI-dialog based self-service kiosks, no manipulation of objects or data on screens is required as the interaction takes place via VMC and a service clerk takes the actions with related systems. This new interaction form can be seen as useful for the kiosk users, and the VMC-based kiosk interfaces for ISs used in information-intensive services where negotiations and making of agreements are required.

5. CONCLUDING REMARKS

This paper has looked into the experiences of VMC remote service kiosk use, in particular how facilitation affects the interaction situation and how the users experience it. The case confirms a number of earlier research results regarding VMC as a technology applied to real-time online interaction purposes. The configuration used within this kiosk setup, however, is a new kind of unique solution, being intentionally developed as the VMC-based interface for the purposes of remote service production, using human-facilitated service processes. The service process has thus been designed to resemble a F2F situation, and our study shows that the kiosk enables quite natural, two-way interaction modes using audiovisual channels. Our study also shows that VMC can be applied to publicly available service kiosks as an interface to information-intensive services, where the human-driven facilitation is especially beneficial. We have provided an example of how this kind of remote service can be implemented in practice, contributing thus to the lack of case studies on VMC-based kiosk solutions intentionally developed to be a service interface.

The situated analysis on the remote car rental service reveals two types of ad hoc facilitation, related to the service process and the interaction with the kiosk interface, which appropriately overlapped each other. This gave the user the experience of being personally serviced by the remote kiosk and affected the flexibility of interactions. The service process facilitation followed a general facilitation structure. The interaction facilitation contained a variety of input and output help given to the user. These are typical only for VMC-based facilitation and involved the service clerk's professional and ICT knowledge and articulation skills.

Hence, application of VMC in remote service kiosks enables a service provider to take a new approach to personalized kiosk services by the integration of kiosk interface interaction with person-to-person service interaction. For the users, VMC gives the opportunity to be serviced and facilitated when needed, as the service provider takes care of all the necessary steps in the service process and in the use of the kiosk, and takes all the use action with related information systems. In addition, based on how users experienced the VMC use in a public place, talking to a kiosk interface seems not to be difficult for the people of today. In this case, speech as an informal communication method made the kiosk use easy and helped in personalizing the service interaction for individual customers.

In conclusion, based on the experiences with the kiosk, we suggest enhancing VMC-based kiosk interfaces for information systems. VMC can be seen as beneficial in supporting facilitation of real-time information-sensitive service, negotiating during information exchange, and as facilitating interaction with kiosk interface functions. Consequently, facilitation can be seen as a useful concept when analyzing VMC-based service interaction, and for technology-mediated kiosk service and product design. VMC in service kiosks could be one relevant solution to today's problems of SST kiosks and could be practical for diverse groups of users who may benefit from audiovisual communication and service facilitation from a real person. Furthermore, when VMC and the human-driven facilitation become available for self-service kiosk users, other kinds of users might benefit from it even more than the participants involved in this case. We therefore suggest future studies on such situations, and focusing on how to transfer the facilitation idea to other service contexts. By giving a real configuration example of how a VMC-based kiosk system can be implemented, and an example of how it can be used, we suggest increasing research and design efforts on the VMC-based kiosk interface development for information systems.

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