Evaluation of Online Consulting Using Co-browsing: What Factors Are Related to Good User Experience?

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Abstract. Technological advancements have changed many, if not all industries. This paper focuses on changes for service providers. Many services have been implemented without the knowledge about their effectiveness and user acceptance. This paper evaluates a web browser-based support framework for banks that provides customers with assistance through text chat and co-browsing. The focus lies on elements of design and the implementation of co-browsing. The mixed-method approach was implemented in the study. 29 participants were given online-banking related tasks, where after their experience was assessed through a questionnaire and a semi-structured interview. The results indicate, that common visualizations and designs are better understood and that the time to solve tasks is significantly reduced when participants were supported through co-browsing.

Keywords: Usability · Co-browsing · User experience · Technology acceptance

1 Introduction

Digitization has reached many industries and their customer services [1]. Today, there is a need for data that show the effectiveness and the user acceptance of these digital consulting tools [2]. In this study, we explored the user experience of a browser-based consulting system for the banking industry. Different elements were implemented in the browser based consulting system to support the interaction between customer and bank agent. Those elements were "Chat Window", "Document Sharing" and "Co-Browsing". The latter one enables the transfer of the customer's screen and interaction functionality to the bank agent. It provides a similar functionality to "Team Viewer" [3] software. A bank agent directly sees and interacts with the customer's E-Banking browser session. This is wholly web-based, the agent is restricted to the banking website and cannot access other parts of the customer's system. Analog to all other functionalities studied, this "Co-Browsing" function can be visualized in different ways. To decide which combination of elements may affect the consulting process in a positive way, we conducted two studies. In the first study, we tried to shed light on the factors that are related to better user experience during an online consultation process. For this, evaluation

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criteria were defined and are described in the next section. The second study covered the self-evaluation of the performance (during the consulting process) from the customer perspective and the duration of the consultation time.

1.1 Theoretical Foundation of Evaluation Criteria

We used concepts from the TAM3 Model [4] to enable variations in customer perceptions. The technology acceptance model (TAM) itself is a theory that describes the relation of the concepts "user-acceptance" and "usage of information technologies" whilst simultaneously illustrating the link between these and additional human factors. The model suggests that several factors influence the intent, behavior, and acceptance of users who are interacting with new technologies. The TAM has been adapted and expanded over the nearly 30 years of its existence. With the help of an expert panel discussion, we selected TAM3 factors, that were necessary for the study and created items that represented the following human factors (see Table 1).

Table 1. The theoretical human factor concepts used with their abbreviation and meaning

Human factor/concept	Abbr.	Meaning
Perceived usefulness	PU	Perceived friendliness/usability during interaction
Perceived ease of use	PEU	Perceived effort of learning the interaction with the new technology
Behavioral intention	BI	Intention of using the new technology
Perceived enjoyment	PE	Perceived enjoyment during the interaction process
Perception of external control	PEC	Perception of attenuating circumstances
Perception of internal control	PIC	Perceived control over the technical system

"Perception of internal control" was an addition to existing TAM concepts. This addition was due to the unique quality of "Co-Browsing" where the perception of loss of control seemed likely for first-time users. These six human factors were adapted to a one-item-format [5] questionnaire. This was part of several instruments that were created to evaluate the online consulting system and the perception of the users during the interaction process. In Table 2 an example of the six items (six human factors) for the GUI element icon is given. The design of both studies can be seen in Fig. 1.

Building on this and following the suggestions of Venkatesh, Brown and Bala [6] a half-structured interview was designed and items from the INTUI questionnaire [7] were added. Additionally, objective measurements like eye-tracking (study 1) and time measurement (the duration of the consulting process in study 2) were used. The expert panel method was used to build two graphical user interfaces (GUI) which were the different stimuli in the study.

First, the main goal of the study was to evaluate, whether a change in the presentation of elements in the online consultation system, affect the perception of the users during a consultation. Second, we were interested if those changes also occurred

Table 2. Example for the single item questionnaire design: the abbreviation of human factor Perceived Usefulness, the GUI Element and the Item

Element of GUI	Abbr. human factor	Item
Icon	PU	This icon represents the best option to symbolize "Live Chat" and should remain this way
	PEU	This icon clearly indicates its function to start the "Live Chat"
	BI	I found the icon in an expected place
	PE	I thought the icon for the "Live Chat" was pleasant
	PEC	I can start a "Live Chat" without any help
	PIC	I had complete control over the system while working on this task

in objective data (e.g. duration of the consultation process). This was investigated through a mixed method design with two studies building up on each other and using an experimental-simulated consultation process. Further details are described in the next chapter.

2 Study 1

In study 1, two prototype versions (profile A and B) of the GUI of the online consultation tool were created. The users (N = 29) had to solve different task (e.g. do a bank transfer) and sub-tasks, while interacting with a simulated bank agent (experimenter in a different room) through the consultation system: The subtasks tasks were:

1. Find the chat icon and initiate chat
2. Start a conversation with the bank agent
3. Accept the co-browsing invitation from bank agent
4. Navigate back to the website
5. End the conversation and proceed with the bank transfer

During this process, the simulated bank agent acted in a standardized manner. They had a prepared range of answers for the consultation process. For every GUI element (icon chat, message, visibility of the bank agent, insertion of documents, return to website and co-browsing) that was evaluated, an appropriate sub-task was created. After finalization of this sub-task the single-item questionnaire was presented (for an example, see Table 2). After the study, a half-structured interview and a short evaluation with the INTUI questionnaire were completed.

In study 2, the results of study 1 were implemented and only two ways of supporting the consulting process were realized: (A) working with chat only (B) working with chat and co-browsing. More details are given in Chap. 3. Figure 1 describes the research process with study 1 and 2.

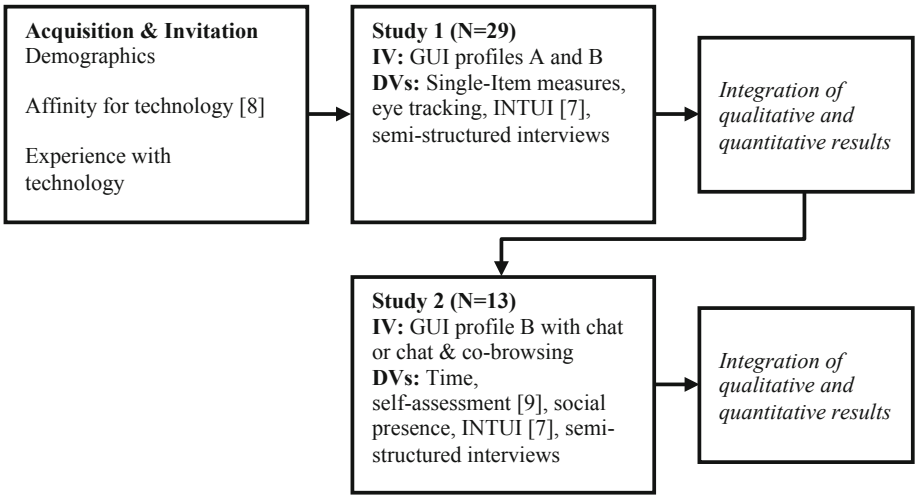

Fig. 1. Mixed-methods study design IV = independent variable, DV = dependent variable

2.1 Methods

The experiment had a between-subject design. The first study was conducted to examine the representation of the functions (1) the understanding of the "Co-Browsing" term (2) and the control perception of the end customer (3). In this study, both quantitative and qualitative data were collected. The independent variables were represented by the two profiles A and B of the consultation system. Each profile used different visualizations and terms for the functionalities (see Table 3).

Table 3. Differences in the consulting system between profile A and profile B

GUI element	Profile A	Profile B
Starticon	Bell icon	Speech bubble icon
Placement start icon	Bottom right	Bottom right
"Read" representation	Two ticks	"Read" text
"Agent View" representation	Green frame around the website	Green frame around the website and the toolbox
Switch document/bank website	Toolbox top right	Toolbar bottom center
End co-browsing	Cross icon	"End Co-browsing" text
Terms in general	Website sharing	Co-browsing
Terms: viewing document	Document sharing	Document co-browsing

The primary dependent variables were the elements "Perceived Usefulness", "Perceived Ease of Use", "Behavioral Intention", "Perceived Enjoyment" and

"Perception of External Control" of TAM 3 [4], as well as "Internal Control". These were measured with a short questionnaire following each sub-task. In addition, after completion of all tasks, a semi-structured interview was conducted. Only the element "Term understanding" was evaluated with an open question before solving the tasks.

2.2 Participants

A total of N = 29 psychology students from the University of Applied Sciences and Arts Northwestern Switzerland between the ages of 21 and 54 were recruited to participate in the study. Of those, 20 were female. The control for differences in technical affinity between the groups showed no significant differences ($p = .759$, part. Eta2 = .072).

2.3 Procedure

The experiment was carried out at the University of Applied Sciences Northwestern Switzerland on the premises of the "Virtual Technologies and Innovation Lab". While the study leader was in the same room as the participants, another person was in an adjacent room. The other person played the role of a bank agent, interacting with the participants through the consultation system. Care was taken to ensure that the interaction was standardized as much as possible. The participants received a set of six tasks, each of which covered the different elements of the consultation system. After completion of each sub-task, the participants had to complete a short questionnaire. Finally, a semi-structured interview was conducted to gather in-depth information on the elements of the consulting system followed by INTUI questionnaire.

2.4 Results

In order to check the differences between the profiles, the short questionnaires were evaluated using multivariate variance analyzes (MANOVA). The qualitative data were analyzed and categorized in terms of content.

2.4.1 Representation of the Functions

The "Live Chat" of profile B in the form of a speech bubble shows significantly better values in the quantitative data than the "Live Chat" of profile A ($p = .016$, part. Eta2 = .46). This is supported by clear statements in the interview. The placement of the "Live Chat" was rated similarly in both profiles. Concerning the "Read Representation", the quantitative data did not show any significant differences between the profiles ($p = .336$, part. Eta2 = .249), whereby the evaluation of the interviews shows that the text "read" in profile B was rated better (Figs. 2 and 3).

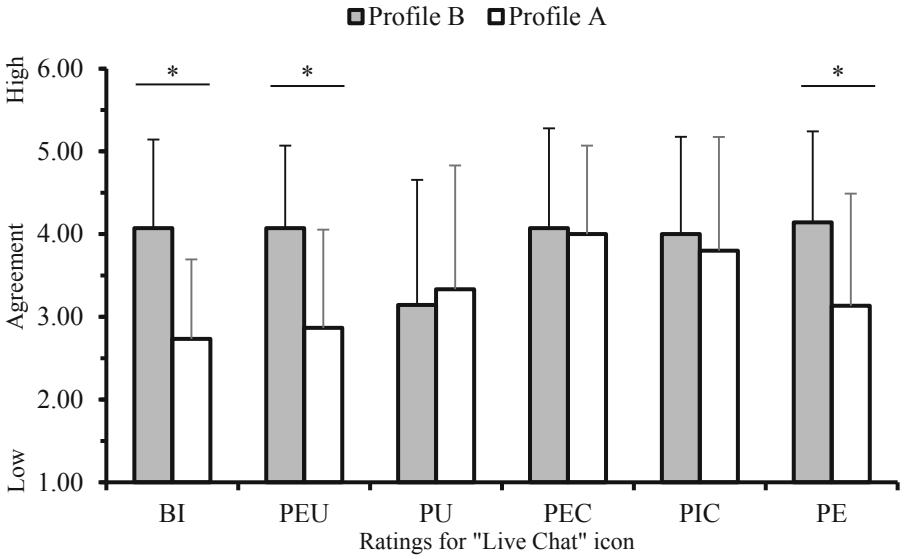

Fig. 2. Single-item measures for different icons to start the "Live Chat".

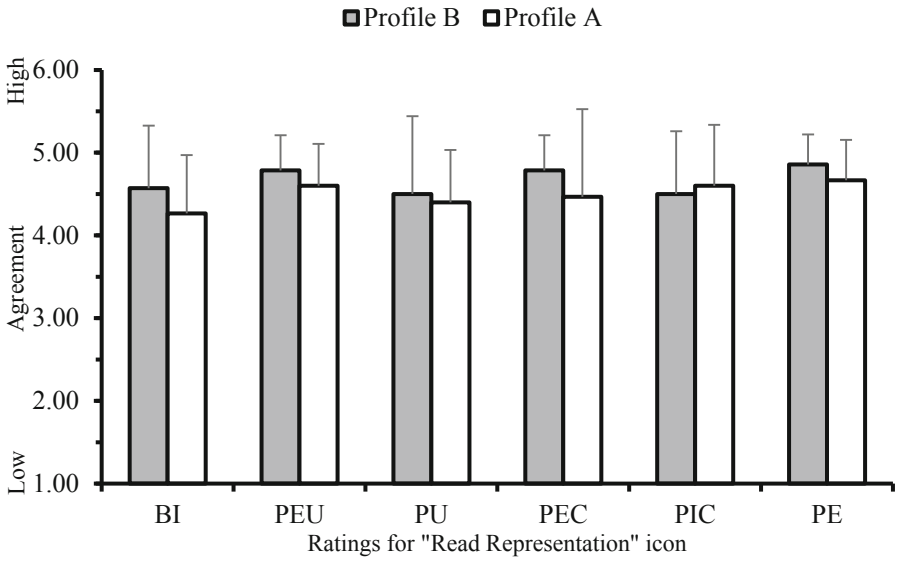

Fig. 3. Single-item measures for different visualizations to show when a message has been read

The "Agent View" representation of profile B was rated significantly better ($p = .03$, part. Eta2 = .442). However, qualitative data only partly supports these findings. While the visualization was generally rated positively, there were also statements about the lacking distinctness of the frame (Fig. 4).

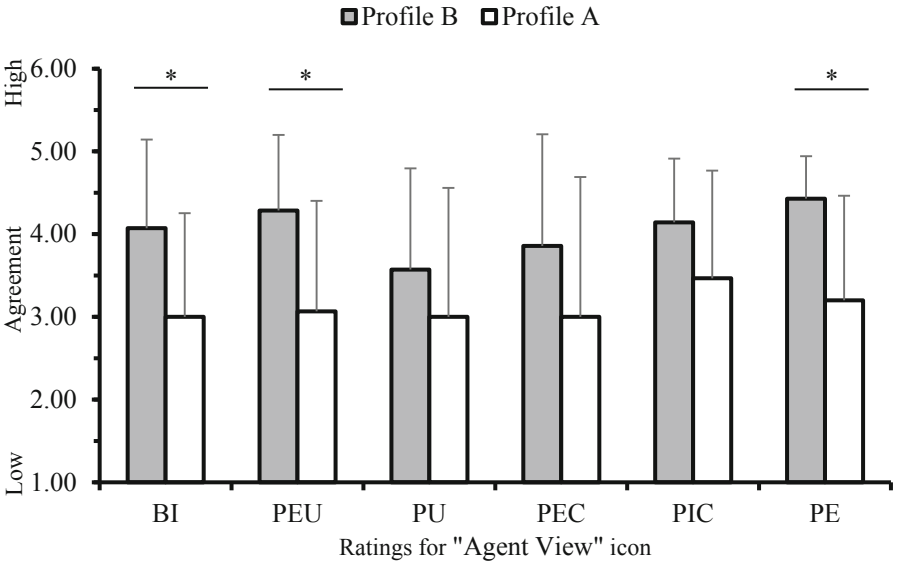

Fig. 4. Single-item measures for different visualizations to show what part of the screen is visible to the agent.

Regarding the completion of co-browsing, both the quantitative and the qualitative data show that profile B was rated better than profile A (p = .029, part. Eta2 = .444) (Fig. 5).

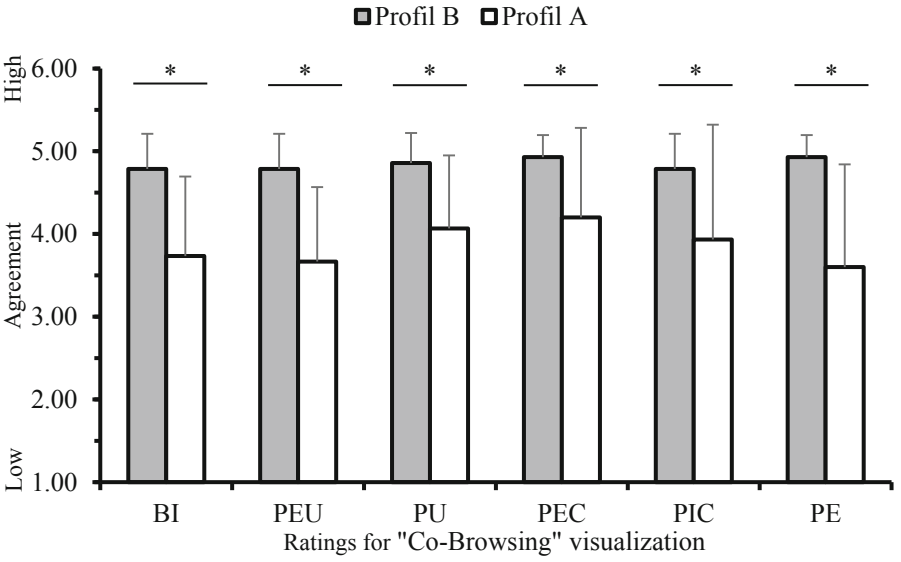

Fig. 5. Difference between the groups with and without co-browsing support.

2.4.2 Understanding of the "Co-Browsing" Term

The answers to the open question regarding the general terms show clearly that "Co-Browsing" in profile A is better understood than "Website Sharing". Participants offered the explanation that the latter is more in line with social media and the corresponding function to share content with friends. The sharing of the document by the bank agent showed no distinction between the two groups ($p = .755$, part. Eta2 = .133). However, the qualitative data showed the participants understood the "Co-Browsing" functionality better in profile A because the term "Document Co-Browsing" was more comprehensible. The term "Document Sharing" was interpreted by the participants to mean, that it could be used to send the document to other people.

2.4.3 Control Perception of the End Customer

The perception of control does not differ between groups in either quantitative or qualitative data.

3 Study 2

After integrating the qualitative and quantitative data from study 1 it could be demonstrated that, from the user-perspective, profile B had an advantage over the profile A. Since the tasks for the user were the same, we only chose profile B for the second study but altered the functionality of chat only vs. chat with co-browsing (see below).

3.1 Method

The experiment had a between-subject design. The aim of this study was to analyze the efficiency of the consultation. The independent variable was the consulting modality in which the agent performed the consultation either with "Co-Browsing" or with just the chat. Dependent variables were the self-evaluation of the performance and the duration of the consultation time. Qualitative data were also collected based on a semi-structured interview.

3.2 Participants

A total of N = 13 psychology students from the University of Applied Sciences and Arts Northwestern Switzerland between the ages of 21 and 54 were recruited to participate in the study. Of those, 7 were female. When examined for differences in technical affinity between the groups, the Mann-Whitney U test showed no significant differences ($p = .628 - p = .836$).

3.3 Procedure

Based on the results of the first study, the superior profile B was selected. The experiment took place on the same premises as the first study. For each group the interaction between the participants and the agent was standardized as much as

possible. The participants had to solve one task while consulting the agent. After that, they completed a questionnaire to evaluate their own performance [9]. A semi-structured interview was conducted to gather in-depth information.

3.4 Results

The Kruskal-Wallis test showed no significant differences in the self-assessment of the participants performance ($p = .056 - p = .812$). However, there was a highly significant impact on the time the consultation needed to complete the task ($p = .009$). Qualitative data also showed that participants generally prefer "Co-Browsing". They explained that using this function makes the process more efficient. In addition, the need for explanation is lower for participants and agents both. They also mentioned that the help they receive is more targeted and therefore more useful. Furthermore, the participants differentiated between task difficulties. The harder the task, the more they wanted to use "Co-Browsing" (Fig. 6).

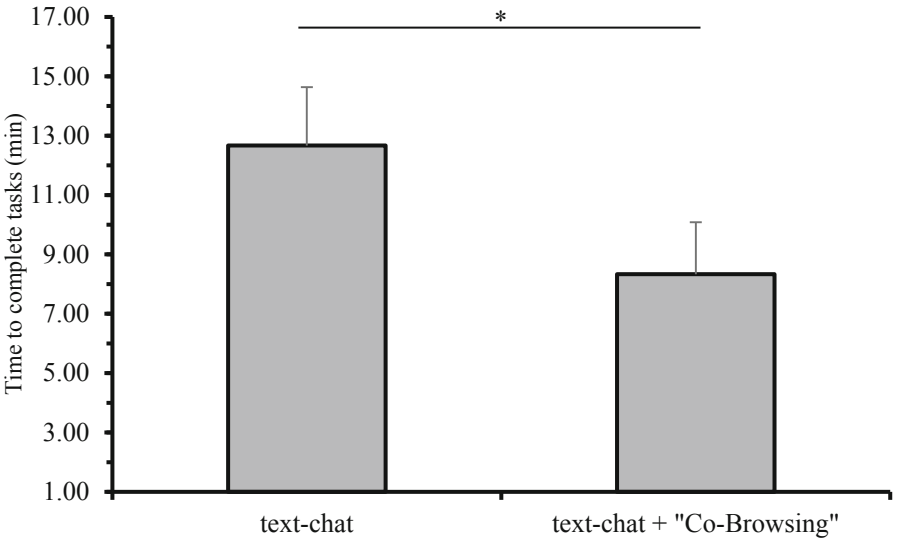

Fig. 6. Difference between the groups with and without co-browsing support.

4 Discussion

This study investigated, whether manipulation of design elements of support software would change the appraisal of potential customers on TAM3 dimensions. The data does not support differentiation of all postulated constructs in the TAM3 when collected through a mixed methods design [4] combined with single-item measures [5]. However, this design proved lean and economical while still yielding useful insights for both scientific understanding as well as concrete suggestions to improve the support software. This could be due to the combination of the different graphical elements into

two profiles. The results also show that common visualizations seem to be better for user experience. This would imply, that innovation in regards to graphical interfaces should be based on research or not stray too far from familiar standards. In terms of terminology, the use of an unknown term for a non-familiar function was better understood and lead to better user experience in the consulting process. We could show that a better user experience was associated with profile B. Another interesting point to consider is the seeming ignorance of participants towards the value of support through co-browsing. Both groups, with and without support did not differ in their self-assessments yet the group with support was considerably faster. This could of course be due to the small sample size though it might warrant further research. Finally, it would be interesting for future studies to investigate the quality of support further. It is already quite common to use chatbots [10] to automate common customer interactions. Knowing that support from an agent improves performance, differentiating what part of the support can be automated and what qualities are important (regardless of human or automated supporter), would not only lead to better customer satisfaction but also to potential savings.

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