# ASSESSING THE USER ATTITUDE TOWARD PERSONALIZED SERVICES

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Abstract: The fast growth of the Web has caused an excess of information to become available. Personalized systems try to predict individuals' behavior based on user information, in order to deliver more accurate and targeted content by filtering out unimportant and irrelevant information. Prior personalization research has mostly focused on e-business issues, personalization techniques and processes or privacy concerns. In this research, we have studied users' attitudes toward personalization and their desire to control personalized services. The results are based on a field study consisting of 196 relevant responses from the users of a personalized medical portal. We also analyzed respondents' changes in attitude toward personalization by comparing responses from two field studies. The results show that the respondents appreciate personalized information which is closely related to their occupation. The respondents accept personalized services but they do not consider automatic content personalization to be important, nor do they appreciate automatic appearance personalization; they want to intervene in the transmitted information.

## 1 INTRODUCTION

The massive growth of available information on the Internet has forced system owners to pay more attention to easy access to the relevant information at the right time. Users can get lost when navigating in information space, or they might not find what they are looking for (Brusilovsky 1996b). Personalization tries to help individuals by reducing the workload required to get relevant information at the right time (Smyth and Cotter 2000).

Personalization has been implemented on the Internet largely in two ways: by allowing the user to customize personalized pages, or by allowing the system to make the modifications. Customization occurs when the user can to some extent manipulate the interface, user profile or content manually (Manber, Patel et al. 2000). In personalization, the user has less control; essentially the system takes care of content selection and presentation in a fully automatic way, based on information from the user model (Brusilovsky 1996b; Nielsen 1998; Kobsa, Koenemann et al. 2001b). Individuals need for control is guided their tendency to gain information from the environment (Baronas and Louis 1988). Individuals want to master their own acts and to know the causes and consequences of their own and others' acts (Baronas and Louis 1988). Basically, individuals are not willing to accept that they do not have control. Nielsen (1998) doubts a personalized system's ability to predict user behavior. He emphasizes that the user is the only one who knows her/his needs. Nielsen places emphasis on user control and the user's right to make their own choices. Conversely, Mulvenna (2000) suggests that check box personalization, where users can select pages they are interested in, is limited because users cannot know the content of the IS in advance. Brusilovsky (1996b) emphasizes that the question of who will adapt the information is not merely a user or system issue, it is dependent on the application area.

Earlier personalization research has been mostly focused on three areas: (e-)business issues (Riecken 2000; Schonberg, Cofino et al. 2000; Karat, Brodie et al. 2003; Murthi and Sarkar 2003), personalization techniques and processes (Resnick and Varian 1997; Kramer, Noronha et al. 2000; Mobasher, Cooley et al. 2000; Spiliopoulou 2000; Pierrakos, Paliouras et al. 2003; Tam and Ho 2005) or privacy concerns (Hoffman, Novak et al. 1999b; Volokh 2000; Kobsa 2002; Chellappa and Sin 2005). All these areas are



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linked with the service provider's viewpoint to personalization.

There are few studies which emphasize a "user-centered" view of personalization. The objective of this research is to focus on personalization as it appears to the end users. Many features of personalized Web information systems differ from those of "traditional" information systems, and we believe that this research can be expected to be of interest to researchers, designers and companies that employ personalized systems. In this research, we have studied users' attitudes toward personalization. In particular, we address issues relating to users' personalization expectations, experiences and their willingness to control the personalized information on offer. The users of the given information system – a personalized medical information system – are mostly doctors and medical personnel to whom it is important to receive relevant, accurate and timely information, for example, related to drugs, diseases or methods of treatment. The main objective of the IS is to provide access to special field information and to facilitate the flow of information. Personalization in a medical IS is designed for certain particular groups with varying duties and preferences by applying segmented personalization. Segmentation is based on the speciality e.g. news concerning anaesthesia is delivered to anesthetists.

Empirical data for the study was collected from the users who are registered in the Finnish medical network, and are users of the medical IS. Potential users of the IS are geographically spread all over Finland. We conducted a field study based on the Web questionnaire with a result of 209 responses. The total sum of reliable responses was 197.

Our findings suggest that people appreciate personalized work-related information which is closely related to their occupation. Moreover, respondents accept personalization but they have a desire to modify content themselves. Respondents do not consider automatic content adaptation or automatic appearance adaptation important.

The paper is organized as follows. In the following section we will discuss, based on prior literature, issues which may have an influence on users' attitudes toward personalized services. In section 3 we describe the research methodology, data collection procedures and the results of the study. In the last section we draw conclusions from the results of the study.

# 2 THEORETICAL BACKGROUND

Eirinaki et al. (2003) define personalization as "the process of customizing the content and structure of a website to the specific and individual needs of each user, taking advantage of the user's navigational behavior." Many researchers emphasize business values, loyalty and active interaction – for example, Zemke and Connellan (2001) suggest that personalization adds to the value of a site and may lead to better customer retention and loyalty. Mittal and Lassard (1996) emphasize the social side of personalization, defining personalization as "the social content of interaction between service employees and their customers." This definition of personalization includes the quality of interaction or closeness between the service employee and customers. The feeling of closeness is an important issue in the real world, and also in the virtual world. The interaction can range from cold and impersonal, to very warm and personal (Mittal and Lassar 1996). These definitions reflect the fact that there is a principled disharmony between the assumed needs of the user, the true needs of the user and the website designer's view on what is relevant (Mulvenna, Anand et al. 2000).

Nielsen (1998) emphasizes the usability of the personalized system. The system should allow the user to decide what information (s)he needs by offering several understandable options to choose between, so that the user's choice is easy. Nielsen stresses that the system should offer sufficient information to the user so that the user knows the consequences of their choices. Nielsen does admit that personalization can work in cases when the environment is stable and can be easily described in the system. Nunes and Kambil's (2001) findings are consistent with the previous suggestions. In their survey, they allowed customers to use services which were both customized and personalized. Their results indicate that customers clearly prefer customized services. Nunes and Kambil concluded that the best strategy might be to combine the two techniques by allowing customers a certain degree of control over an automatic personalized system.

# 3 RESEARCH METHODOLOGY

We performed a field study in which data was collected using a web questionnaire, which was designed and developed in cooperation with experts

in the IT field and the target company. The scale used was mainly the seven-point Likert scale, with 1 being the negative end and 7 the positive end ranging from fully disagree to fully agree.

## 3.1 Demographic Profiles

Our target group was all the doctors and medical students who are registered in the Finnish medical network, and who are users of the medical IS. Potential users of the IS are geographically spread all over Finland. A field study with 209 responses was conducted. The total sum of reliable responses was 197. The potential number of IS users in total was about 9500 including specialists, doctors, medical students and the group "others". Table 1 presents descriptive statistics of the sample.

Table 1: Profile of the respondents.

| Measure | Items | Frequency | Percent |
|---|---|---|---|
| Gender | Male | 100 | 50.8 |
| | Female | 97 | 49.2 |
| Age | ≤ 31 | 51 | 25.9 |
| | 32 - 41 | 53 | 26.9 |
| | 42 - 51 | 46 | 23.4 |
| | ≥ 52 | 47 | 23.9 |
| Occupational title | Specialist | 112 | 56.9 |
| | Doctor | 54 | 27.4 |
| | Medical student/Other | 31 | 15.7 |
| Computer expertise | Very/fairly weak | 13 | 6.6 |
| | Average | 102 | |
| | Fairly good | 66 | 33.5 |
| | Very good | 16 | 8.1 |
| IS usage time per week | < 0.5h | 64 | 32.5 |
| | less than 1h | 81 | 41.1 |
| | 1-5h | 50 | 25.4 |
| | 5-10h | 2 | 1.0 |

## 3.2 Usage of Different Services

We asked respondents to evaluate their usage of nine most used services of the given system. The selected services refer to different areas of interest: topics related to expertise and work, and topics related to study and leisure time. Table 2 shows responses that indicate frequent use (often and very often used) of the given services. We asked respondents to estimate their activity using a five-point scale of measurement ranging for never to very often. The name of each service refers to a link, which is visible on the portal's page. The distribution of results indicates that search services and special field news are the most frequently used services. It is obvious that respondents regularly follow the development, e.g. research and science, of their profession. Similarly, special field articles are considered important.

Table 2: Usage of medical portal services.

| Portal service | Frequency | Percent |
|---|---|---|
| Search services | 55 | 28.2 |
| Special field news | 52 | 26.4 |
| Leisure time services (weather, news, etc.) | 40 | 20.3 |
| Special field articles | 38 | 19.4 |
| Special links | 30 | 15.5 |
| Drugs | 23 | 11.8 |
| Congresses | 19 | 9.9 |
| Forms | 8 | 4.1 |
| Ordering medical products | 7 | 3.6 |

More leisure-related services, as weather and news were also popular among regular users. "Forms" includes, among others, different precompleted forms, which the respondent need concerning their work.

## 3.3 Respondents' Behavior toward Personalization Expectations

Personalization expectations were studied by setting three questions which started with "Would you like…", and using a three-point scale, with the options "No", "I don't know" and "Yes". First we asked the question "Would you like the medical portal to adapt automatically according to the services you have used?" Primary goal of these questions was to assess users' expectations towards services. Figure 1 shows that, in general, the responses were quite uniformly distributed between "No" and "Yes". The number of "Don't know" responses was also quite high. As Figure 1 shows there was a slight difference between males and females. The majority (39 %; N=39) of the male respondents answered "Yes", and 34 % (N=34) answered "No". Similarly 35.1 % (N=34) of females answered "No" and 34.5 % (N=32) answered, "Yes". In age group there was a slight difference between the groups that are under 41 and those 42 and over. According to cross tabulation followed by a Pearson Chi-Square test, there was an association between the variables expertise and automatic

adaptation; hence automatic adaptation is dependent on expertise. ($\chi^2$-value = 20.567, p-value = 0.002). This conclusion was not necessarily reliable because 33.3 % of expected frequencies were less than five (allowed maximum 20 %) and the expected minimum was 3.83 (maximum more than 1). Therefore, the difference was also tested using Fisher's Exact test (Fisher's Exact test value = 21.438; p-value = 0.001). The tests indicate that respondents' attitude towards automatic personalization is statistically significant and dependent on expertise. Surprisingly, respondents with fairly good or very good expertise would like automatic personalization more than respondents with weak or average expertise. Even though the differences between these expertise groups are quite minor, one would think that people with good expertise would like to adapt and control the system themselves more than respondents with weak expertise. According to our analysis, there were no differences between the groups in other combinations.

Overall, considering the whole data, statistical distribution show that 34.5 % (N=68) of the respondents responded "No" to this question, 29.4 % (N=58) answered "Don't know" and 36 % (N=71) of the respondents answered "Yes". Thus, "No" and "Yes" responses toward automatic adaptation were quite equally distributed; respondents' opinions about the question was quite neutral.

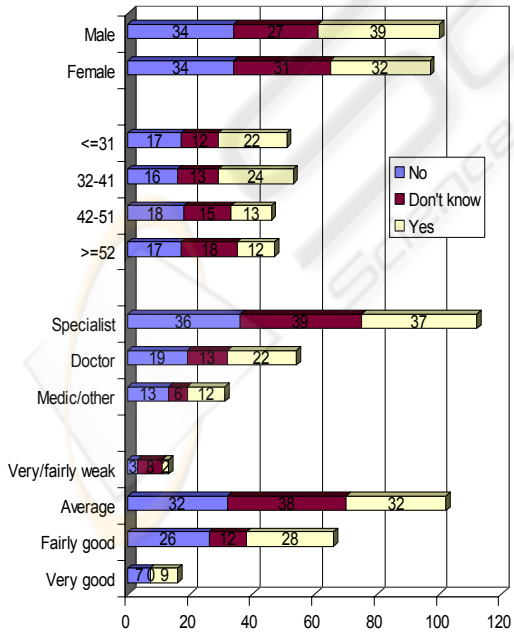


Figure 1: Respondents' expectations regarding automatic personalization.

Secondly, we asked the respondents the question "Would you like the most regularly-used services concerning your special field to be displayed?" Figure 2 shows that the majority of respondents agree that the most regularly-used services related to their special field should be on view. Moreover, most of the respondents, who answered "Yes" were specialists and they assessed their computer skills as average. This may indicate that willingness to receive information increases if the respondent feels that the information on offer is related to their work and tailored to their work requirements. On the other hand this may indicate that respondents rely on collaborative recommendations; they use the same services as their colleagues have used. According to cross tabulation followed by a Pearson Chi-Square test there was no association between the variables gender, age, occupation, expertise and displaying the most regularly-used services concerned to own special field.

Thirdly, we asked the respondents: "Would you like the most regularly-used services of all special fields to be displayed?" Figure 3 shows that some respondents in different classes would appreciate the most regularly-used services of all special fields being displayed.

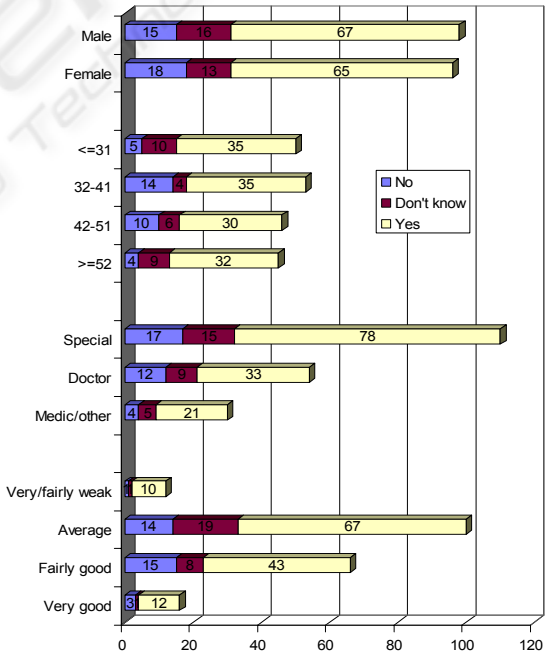


Figure 2: Respondents' expectations concerning the most regularly-used services relating to their special field.

However, the degree of interest is clearly lower than in the previous case (Figure 2). It is interesting that in some classes the results were negative. For

example, in the age group 32-41 most of the respondents (N=24) would not like these services to be displayed. Similarly, most of the specialists (N=42) would not like the most used services to be displayed. The results below confirm the finding that respondents are more interested in tailored services which are related to their job and familiar to them.

Cross tabulation analysis followed by a Pearson Chi-Square test indicated that there was association between the age group and the displaying the most regularly-used services of all special field (Pearson $\chi^2$-value = 15.160, p = 0.019). There was also relationship between the group occupation and question posed (Pearson $\chi^2$-value = 9.775, p = 0.044) and the expected frequencies were 0%, expected minimum 8.81. According to our analysis there was no relationship between other combinations. Considering the figures, Figure 2 and Figure 3, respondents hope for easy and quick access to personalized work-related information, and clearly appreciate depth of information (their own special field) more than breadth of information (all special fields).

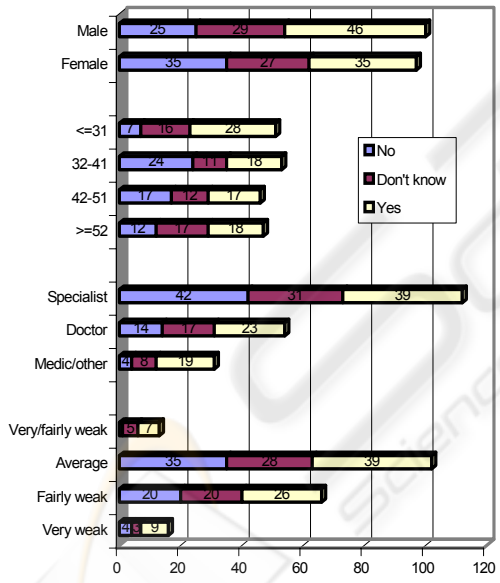


Figure 3: Respondents' expectations concerning the most regularly-used services relating to all special fields.

## 3.4 Respondents' Attitude toward Personalization

The analysis described in this section is twofold. First we analyze the differences between the selected groups toward the presented hypotheses by using T-tests and analysis of variance. Secondly, we assess responses to the presented hypothesis, from all of the data.

Respondents' attitude towards personalization were studied by setting four hypotheses starting with "In my opinion…", using Likert seven-point scales where 1 was "fully disagree", and 7 "fully agree". The hypotheses below were aimed at examining the users' willingness to be involved in the personalization process; that is, whether they want to personalize the system themselves, or have automatic personalization carried out by the system. We were also interested in respondents' attitude towards personalization objects: whether the respondents like to personalize layout and/or content or not. For example, respondents' attitude towards carrying out layout adaptation themselves was examined by setting the hypothesis "In my opinion, it is important that I can make the site more personal by editing the appearance (layout) of the service, such as the color of the display".

The selected variables we were interested in included gender, age, expertise and occupation. In the case of gender, we analyzed the responses by using a T-test. By using Levene's T-test, we confirmed that the variances were equally distributed. The results in Table 3 show that there is not a significant difference in attitude toward personalization between the appearance of the service, content and gender The significance of the variables age, occupation and expertise were tested using one-way analysis of variance (One-Way ANOVA). According to analysis there are no significant statistical differences between in the attitude toward personal adaptation of site layout and the age, occupation and expertise groups. However, in the expertise group F(3.193)=2.266, p=.082, it seems that respondents with better computer expertise are more willing to adapt the layout themselves than respondents with weak expertise. This may indicate that users with higher expertise may have stronger beliefs concerning their abilities and skills needed to execute the tasks ahead than users with weaker expertise. Overall, considering the whole data statistical distribution show that, 45.7 % (N = 90) of the respondents have a negative (fully disagree, disagree, disagree to some extent) attitude regarding user adaptation of layout, 15.2 % (N = 30) answered "Don't know" and 39.1 % (N = 77) have a positive (agree to some extent, agree, fully agree) attitude toward the hypothesis. Total N = 197, mean 3.80 and standard deviation 1.521. Thus, most of the respondents do not consider the option to adapt the appearance of the site themselves to be important.

Table 3: Gender distribution regarding adaptation of layout and content.

| Attitude toward personalization | Gender | N | Mean | Std. Dev | t value | Sig |
|---|---|---|---|---|---|---|
| In my opinion, it is important that I can make the site more personal by editing the appearance (layout) of the service, such as the color of the page. | Male | 100 | 3.99 | 1.617 | 1.771 | .078 |
| | Female | 97 | 3.61 | 1.396 | 1.775 | |
| | Total | 197 | | | | |
| In my opinion, it is important that I can make the site more personal by adapting the content of the service, such as by selecting and deleting content according to my own preferences. | Male | 100 | 4.46 | 1.540 | 1.098 | .273 |
| | Female | 96 | 4.23 | 1.395 | 1.100 | |
| | Total | 196 | | | | |
| In my opinion, it is important for the site to become more personalized automatically according to my usage, by adapting the appearance (layout) of the service, such as the color of the page. | Male | 99 | 3.75 | 1.561 | 1.711 | .089 |
| | Female | 95 | 3.39 | 1.339 | 1.717 | |
| | Total | 194 | | | | |
| In my opinion, it is important for the site to become more personalized automatically according to my usage, by adapting the content of the service, such as by selecting and deleting content according to my own preferences. | Male | 100 | 3.78 | 1.541 | .227 | .821 |
| | Female | 97 | 3.73 | 1.425 | .227 | |
| | Total | 197 | | | | |

## 3.5 Attitude toward Personalization: Comparison between Two Field Studies

The objective of this section is to compare respondents' responses from two field studies. Time period between the studies was about one and a half year. Respondents of the field studies were the users of same personalized IS. In both studies the data was collected using a Web questionnaire. The questions that we are interested in were identical in both field studies, and related to the desire for automatic personalization and the level of available personalized information. We carried out the comparison by studying the differences between the "Yes" and "No" responses, taking into consideration male responses, female responses and total responses.

A two-sample Z-test of proportion was used on the study1 and study2, to reveal differences in respondents'attitude toward personalization. The statistical formula used in the two-sample Z-test for proportion to compute the Z-test statistic (Vasama and Vartia 1973; Zou, Fielding et al. 2003) can be presented:

$p_c = (x_1 + x_2)/n_1+n_2$, and the test statistic Z can be presented:

$$Z = \frac{p_1 - p_2}{\sqrt{p_c(1-p_c)(\frac{1}{n_1}+\frac{1}{n_2})}},$$

where the observed numbers of successes are $p_1 = x_1/n_1$ (relating to the study1) and $p_2 = x_2/n_2$ (relating to the study2). $x_1$ (the study1) and $x_2$ (the study2) are the numbers of successes and $n_1$ (the study1) and $n_2$ (the 2 study2) are the sample sizes.

When the test statistic Z is normally distributed, the interpretation of statistical significance is based on the location of the p- value within the normal distribution table (Herva, Vartia et al. 1983) of Z. Null hypothesis assume that there is no difference between the group gender and in attitude toward adaptation compared with the study1 and study2. The null hypothesis is rejected at the significance level $p<0.05$ if the test statistic Z exceeds the critical values below –1.96 or above +1.96.

In study1, the number of relevant responses was 144. The number of male respondents was 87 and female respondents 57, ranging from 22 to 67 years of age. The majority of the respondents (56.3 %) belonged to the age group 30-50 years of age. Most

of the respondents (64 %) were medical students, followed by the groups "specialist" (10%), "other" (24%) and "researcher" (2%). The results of the two-sample Z-test of proportion are presented in Table 4. With regard to the first question, Table 4 shows that there is a significant difference ($p \leq 0.01$), when comparing all the responses, between the study1 and the study2. There is no difference in the attitude of the male respondents, whereas there is a significant ($p \leq 0.01$) difference in the "No" responses of the female respondents between the study1 and study2. As Table 4 shows, there are changes in female and total groups in terms of the "Yes" and "No" answers. In study1, respondents' opinions about automatic adaptation were more positive than in study2. When the field study was conducted in study1, the degree of personalization of the system was not so sophisticated, therefore it could be that respondents did not have a precise mental impression of what adaptation or personalization really means. Another explanation is, as shown earlier, respondents with good expertise emphasized automatic personalization less than respondents with lower expertise. Thus in study2, respondents were more familiar and skilful with the system, and they were more able to interact with the system.

With regard to the second question, there are no significant differences between responses in the study1 and study2. Generally, changes in behavior over a one and a half year period are minimal. On the other hand, when considering the third question, there are significant statistical differences in the male group both in "Yes" responses ($p \leq 0.05$) and in "No" responses ($p \leq 0.05$), when comparing the study1 and study2. There are also statistically significant differences in female responses, both "Yes" ($p \leq 0.05$) and "No" ($p \leq 0.05$). The most important difference is in total responses; both "Yes" ($p \leq 0.001$) and "No" ($p \leq 0.001$) are statistically very significant. The direction of the change is consistent with the first question. In study1, respondents' attitude toward the most-used services of all special fields was more positive than in study2. Considering the two preceding questions, these findings support the hypothesis that there exist some changes in respondents' attitude towards more tailored and focused information services. It could be that the as the flow of information is increasing all the time, people are willing to think what kind of information they are willing to receive.

Table 4: Two-sample Z-test of proportion.

| Question | Gender | Response | $x_1$ | $n_1$ | $p_1$ | $x_2$ | $n_2$ | $p_2$ | Z |
|---|---|---|---|---|---|---|---|---|---|
| Would you like the medical portal to adapt automatically according to the services you have used? | Male | Yes | 41 | 81 | .506 | 39 | 100 | .390 | 1.565 |
| | Female | Yes | 27 | 56 | .482 | 32 | 97 | .330 | **1.864*** |
| | Total | Yes | 68 | 137 | .496 | 71 | 197 | .360 | **2.479*** |
| | Male | No | 20 | 81 | .247 | 34 | 100 | .340 | -1.361 |
| | Female | No | 8 | 56 | .143 | 34 | 97 | .351 | **-2.773**** |
| | Total | No | 28 | 137 | .204 | 68 | 197 | .345 | **-2.797**** |
| Would you like the most regularly-used services concerning your special field to be displayed? | Male | Yes | 56 | 82 | .683 | 67 | 98 | .684 | -.011 |
| | Female | Yes | 39 | 56 | .696 | 65 | 96 | .677 | .248 |
| | Total | Yes | 95 | 138 | .688 | 132 | 194 | .680 | .154 |
| | Male | No | 9 | 82 | .110 | 15 | 98 | .153 | -.851 |
| | Female | No | 6 | 56 | .107 | 18 | 96 | .188 | -1.311 |
| | Total | No | 15 | 138 | .109 | 33 | 194 | .170 | -1.568 |
| Would you like the most regularly-used services of all special fields to be displayed? | Male | Yes | 50 | 82 | .610 | 46 | 100 | .460 | **2.013*** |
| | Female | Yes | 34 | 56 | .607 | 35 | 97 | .361 | **2.950**** |
| | Total | Yes | 84 | 138 | .609 | 81 | 197 | .411 | **3.559***** |
| | Male | No | 12 | 82 | .146 | 25 | 100 | .250 | **-1.729** |
| | Female | No | 8 | 56 | .143 | 35 | 97 | .361 | **-2.889**** |
| | Total | No | 20 | 138 | .145 | 60 | 197 | .305 | **3.373***** |

*$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$

# 4 CONCLUSION

In this research we focused on users' attitudes toward personalization and their willingness to intervene in personalized services. Results show that respondents with fairly good or very good expertise would like automatic personalization more than respondents with weak or average expertise. It could be that respondents with good expertise would like to control the system more than respondents who do not have such advanced computer skills. Secondly, our results show that respondents are willing to receive information that is related to their work and tailored to their work requirements. When examining users' willingness to control personalization we formulate a hypothesis; would users prefer to intervene in personalization or to allow the system to take of care personalization?

Most of the respondents do not consider adapting the appearance themselves to be important. When analyzing the respondents' willingness in terms of content adaptation, the results indicated that most of the respondents considered it important that they could adapt the content themselves. Considering the whole data, the results revealed that the respondents have a negative attitude towards automatic adaptation of site appearance. When analyzing respondents' attitude towards automatic content adaptation, no differences were found between the groups. When comparing the field studies study1 and study2, the findings revealed that respondents' attitudes had changed. One significant change was toward more tailored and focused information services. Thus, users are looking primarily to use services which are closely adapted to their occupation.

The results of the study suggest that users do not consider automatic content adaptation and automatic layout adaptation to be important. Nor do they consider it important to be able to adapt the layout themselves. It was surprising that the users did not set great store by the visual impact of the IS. This shows that users appreciate content above visual impact. This result gives support to the findings of Kramer and Noronha (2000). Overall, the respondents accept personalization but they want to adapt and personalize the content themselves. It could be proposed that designers and/or managers should construct the user interface with an "opt-in" function, determining whether the users would like the system to provide personalized services or not. If users want personalized services, there should also be an opt-in concerning whether they would like automatic personalization or to select interesting topics themselves.

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