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NO PICTURES, PLEASE! HOW GRAPHICS AND PHOTOS CAN DISTORT PAPER PROTOTYPING

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Abstract

Usability is becoming more and more important for information centres and digital libraries, because it is a core prerequisite to compete with the popular search via Google. A quick and easy method for improving the usability of a Web site or software is paper prototyping. Thereby, graphics and photos are often included as placeholder in the paper prototype. However, there is the danger that such visual details can distort the findings on the usability of the structure and navigation of the prototype. The reported study illustrates this effect for three different design versions of a homepage of a library 2.0 as paper prototypes. The multi-method approach of the study provides also a possibility how a misinterpretation due to single details can be avoided. Further implications for technology-enhanced learning and libraries 2.0 are discussed.

Keywords: Usability, paper prototyping, graphics, library 2.0, technology-enhanced learning

1 INTRODUCTION

Good usability is a prerequisite for the repetitive and frequent usage of software or a Web site. This is especially important in the educational field since e-learning platforms, educational software or services for literature search are normally used in a repetitive way. Thus, the improvement of usability is not only a hot topic for commercial software and shopping Web sites, but also in the field of e-learning.

Usability is especially important for digital libraries and information centres, because nowadays students rely more and more on a quick and easy Google search even though the search results are suboptimal. Other, more professional information sources and search services of libraries are often neglected because of a bad handling. This in turn results in an inadequate basis of literature: Students (and also researchers) sometimes use grey literature and partly neglect the most important articles (if they are not provided by the Google search). For modern digital libraries and information centres it is a core challenge, to encourage students to recognize the shortcomings of a pure Google search and to use professional search instruments. One important question in this context is how to attract students and how to develop a Web site and an according search engine that fits the needs and preferences of students and researchers. Thereby, the entrance card is a suited homepage of the information centre. The homepage has to be attractive and should be perceived as useful and easy in handling.

The presented study addressed the usability and the structure of the homepage of a library 2.0 (like defined by [1]), namely the ZBW – Leibniz Information Centre for Economics. The ZBW is not only the world's largest library for economics, but also one of the leading information centres for the development and application of Web 2.0 for technological library innovations (http://www.zbw.eu/e_about_us/e_library_profile.htm). The ZBW offers numerous online services like EconBiz for literature search or EconStor for publishing working papers. Additionally, the ZBW is also present in several popular Web 2.0 channels like Facebook, YouTube or Twitter. The homepage of the ZBW is also the entrance portal for literature search by means of the professional service EconBiz.

The reported study was the first part of the accompanying usability evaluation in course of the redesign of the ZBW's Web site. This first study was done by the method of paper prototyping since it is a cheap and quick method for testing the usability of new Web sites in their very early stages of development [2]. As testing material three different design versions of the homepage were used as paper prototypes in order to identify not only usability problems but also the most apt structure and interface design. Thereby, also pictures were included in the paper prototypes. In order to receive a broad spectrum of user feedback and to have a holistic view of the users' perceptive a multi-method approach was applied. The result of the multi-method study provided not only a differentiated view of the three design versions and thus, enables a "best-of" design. It also opened up the possibility to

differentiate the influence of single prominent elements like pictures and graphics from the more structural design features.

In the next chapters, first the theoretical background on usability testing with paper prototypes and the connection between aesthetics and usability is explored. Afterwards, the methodological approach of the presented study is described. Subsequently, the empirical results are presented. The discussion compares the partly contradictory findings and offers a combined interpretation. Further implications for a multi-method approach in usability testing and implications for libraries 2.0 are outlined.

2 THEORETICAL BACKGROUND

Like mentioned above, the so-called paper prototyping is a quick and low-cost method for usability testing. Paper prototyping can be used to evaluate the structure of a page, the main navigation and the single elements of a page. As testing materials rough sketches or even hand-drawings are sufficient. However, web designers often create more detailed paper prototypes including also preliminary pictures as placeholders. Even though the test persons might welcome this, there is the danger that such details can distort the findings about the structure and main elements. Thus, it is an open question if such preliminary pictures as placeholders influence paper-prototyping and how this (potential) influence can be controlled.

2.1 Short definition of usability and paper prototyping as method

There are many slightly different definitions of usability. Besides accessibility, most of the definitions are based on four elements: effectiveness, efficiency, usefulness (appropriateness for subjective aims of the user) and joy of use (see for example [3]). Nowadays the end-users expect Web services, software and online platforms not only to be useful for the original purpose, but also to be self-explanatory and easy to handle. In the best case, the use of software is not only helpful but also includes "joy of use".

Paper prototyping is a quick and easy method to identify usability problems and to receive qualitative feedback in very early phases of development. Paper prototypes are paper-based sketches of the planned interface (e.g., of a software, a Web site or a mobile device). The paper prototype of a Web site can be just one single screen (e.g., homepage) or it can also comprise the subsequent screens that will appear in the course of interaction, e.g., after clicking on a link. A usability study by means of paper prototyping can include general open questions to assess the first impression of the users. Additionally, also single details can be evaluated by specific questions. By means of concrete usability tasks, usability problems and obstacles can be identified and the information architecture of the Web site can be evaluated. Furthermore, paper prototypes can also be used to produce or evaluate alternative design versions of an interface. A very detailed and good description about paper prototyping can be found by [2].

Even though paper prototypes are so-called low-fidelity prototypes and rough sketches are sufficient, they can also include some pictures. Normally, the pictures are only intended to be placeholders. These placeholders can vary from iconic representations or rough sketches to real photographs. On the one hand, these pictures can also be seen as a prototype, e.g. the photograph is in a similar artificial style as planned for the final design. In this case, the user's reactions can be useful indicators for the appropriateness of the picture. Furthermore, it can also be tested, if users want to have more or less illustrations and graphical features on a page. On the other hand, it has to be taken into account that pictures might influence the perception of the other characteristics of the paper prototype. This in turn might distort the first impression of a site structure or distract the user from other, more severe usability problems of a page.

2.2 Pictures: Perceived usability, perceived aesthetics, and user preferences

The influence of pictures is well-known and exploited in advertisement as well as in instructional science. For example, a product will be judged more valuable when presented in a pretty wrapping [4]. In instructional design, several multimedia principles are available how pictures can be used to support learning and when and how pictures distract from learning [5] [6]. Research indicated that the processing of pictures is not merely an intuitive, affective process with a minimum of cognitive resources, but rather follow a visual rhetoric [7]. Some pictures can also act as schemas or as scripts (see e.g., [8], [9], [10]).

Especially, pictures of people and faces attract attention [11] [12]. This is closely related to the social nature of HCI (Human-Computer Interaction). Reeves and Nass [13] stated (based on broad empirical evidence) that the interaction of people with new media is fundamentally social and natural and established for this phenomenon the term “media equation” [13]. Also stereotypes and social principles of the real life can be found in HCI, like e.g., the attractiveness-stereotype described by Dion, Berscheid and Walster in their popular paper “What is beautiful is good” [14]. The “beautiful is good” phenomenon can be explained by a stereotype approach or by the halo effect. According to the stereotyping approach, attractiveness is associated with other desirable attributes like intelligence or kindness. According to the halo effect, the attractiveness is the most obvious and accessible attribute. Thus, it is perceived very early in interaction and influences the later impressions in the same positive direction. In relation to this, Tractinsky, Katz and Ikar [15] titled their article “what is beautiful is usable” and described the relationship between aesthetic attributes and usability. Overall, many studies have found correlations between perceived beauty/aesthetics and perceived usability. The found correlations differed from study to study; partly there were also inconsistent findings, i.e. non-significant correlations. This might be traced back to differences in methodology and assessment instruments for perceived usability and aesthetics, in the selection of the tested products or in the used sample of participants (overview by [16]). The rare experimental studies showed inconsistent findings and the causal direction of influence remains unclear. Partly the notion “What is beautiful is usable” was supported and partly there was empirical support for the “What is usable is beautiful” perspective (overview by [17]).

However, besides these theoretical open questions, research has shown that aesthetics and especially pictures can indeed influence the perceived usability and the user’s preference for an interface design. Thus, aesthetics should be controlled when conducting usability tests and paper prototyping, respectively. This is of special importance, if different versions of a prototype are tested. The control of aesthetics might be very difficult because usability and aesthetics are often closely connected [17]. In many cases, usability aspects cannot be changed independently from the design’s aesthetics. Additionally, it is rather hard to make an objective judgement of aesthetics in advance (i.e. before testing the design). Sometimes differences in aesthetics or associations to certain pictures are not apparent. In these cases it is necessary to incorporate additional methods in the evaluation of usability. In this context, a multi-method approach opens up the possibility to have a more holistic view and divide the influence of aesthetics in general and pictures in specific (including the connected associations) from the more structural usability issues like page structure, menu, and wording.

3 MATERIAL AND METHOD OF THE PAPER PROTOTYPING STUDY

Like mentioned in the introduction, the presented study was part of an iterative usability evaluation project in the course of the redesign of the Web site of a library 2.0, namely the ZBW. The reported study took part at the very beginning of the redesign project. Thereby, three different design versions of the planned new homepage of the ZBW were presented as paper prototypes. The aim was *not* to find out “the best” design version, but rather to identify an appropriate structure and receive the user’s feedback on the different elements, the structure and the arrangement of the design versions: which structure is preferred, which arrangement is the most appropriate, which elements are necessary and liked, which are useless and can be skipped and which elements are confusing and have to be modified. Overall, the results served as the basis for the development of a “best-of” design / prototype.

The similarity between the three design versions was that each version comprised the main elements that were considered as essential and necessary: ZBW-logo, headline, slogan, direct access buttons “Literature search” (link to the literature search service EconBiz), “Borrowing” (link to the local online catalogue ECONIS and the login to the personal user account), and “Publishing” (link to the publishing portal EconStor), main navigation menu, ZBW news, linkages of the ZBW to Web 2.0, footer, language-button and Web site search at the head of the page.

The main differences between the three design versions were the structure of the site and the arrangement of the main elements. Furthermore, in each design version different preliminary pictures were included as placeholder. Design version A comprised three graphics with abstract symbols that were embedded in the direct access fields. Version B had one slightly bigger realistic photo with embedded written text besides the direct access buttons. Design C included three realistic photos that were embedded in the direct-access fields. Additionally, the three versions showed different banners with special announcements of the ZBW: Design A contained a banner with a blog contest of the ZBW at the right side of the page. Design B had also a banner with a blog contest of the ZBW with a slightly different graphical design that was placed at the bottom of the page. Design C had a banner of the

ZBW's online service EconDesk. Fig. 1, fig. 2, and fig. 3 show the three tested design versions of the planned homepage.



Fig. 1: Design version A



Fig. 2: Design version B

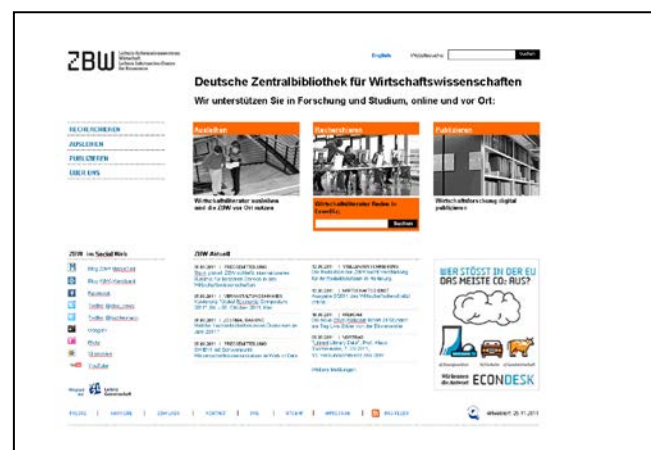


Fig 3: Design version C

The subsequent pages of the three versions were nearly identical; however, the linkage with the according starting page was slightly different.

The study was conducted at the ZBW location in Hamburg with a German sample. All test sessions were recorded by videotapes (three cameras from three different perspectives) in the usability laboratory of the ZBW which consisted of two rooms. The wall between the rooms had a large one-way mirror. There were three video cameras and a microphone in the test room. In the observation room a second person (helper of the instructor) operated the cameras and the technical equipment of the laboratory. Test persons were 10 students (five male and five female, age between 21 and 30 years), partly with experience in scientific work (PhD students). All participants were already familiar with the ZBW. Each participant was interrogated separately in a single test session. Every test session was moderated by an instructor. Additional one helper assisted as “human computer” for the paper prototyping (details see below). The instructions, questions and tasks were presented in German. Before starting the test session, the participants were informed that the usability department worked as independent task force and critique was very welcomed, because every critique was helpful to improve the prototypes. The participants were explicitly instructed that there are no right or wrong answers and that they should not be polite but honest. Furthermore, participants were informed about privacy issues and that their data and answers are treated anonymously.

The test session had three main parts (details will be explained in the next section):

- Working with one chosen paper-prototype: Semi-structured interview and usability tasks
- Advanced scribbling: Comparative analysis of the three design versions
- Handicraft task: Creation of the user’s wish-homepage

Throughout the complete test session the think-aloud method was applied, i.e., the participants had to verbalize what was going through their mind. Since the think-aloud method was a critical element of the study, each participant was trained in think-aloud while working on a rebus (immediately before starting the paper prototyping test).

The session started with the spontaneous selection of one favourite design version. After the main parts of the test session the participants could revise their initial selection of a favourite design version. After the test session each participant had to fill out a questionnaire for the assessment of control variables (age, gender, socio-economics, prior experiences with the ZBW, and open remarks). The duration of the single sessions was between one and one and a half hour. During the session drinks and sweets were offered in order to foster motivation throughout the rather long session. After the session each participant received a 30,-€ voucher for a popular online shop as reward for the participation. In the following subchapters, the three main parts of the test session are described in more detail.

3.1 Working with one chosen paper prototype: semi-structured interview and usability tasks

At the very beginning of the test session, the participant was asked to choose spontaneously one of the prototypes (design A, design B, or design C) that he/she preferred for the further working during the session. The selection of a prototype should be based on the participant’s very first impression of the prototypes. At the very end of the study (after the handicraft task), the participant could revise/change this selection.

After the initial selection of one prototype version, the participant had to answer four questions (semi-structured interview) on the general impression of the new design for the ZBW’s homepage:

- What do you think, this page is made for?
- What do you think about this page? What do you notice?
- Do you think the slogan is appropriate for the ZBW?
- What do you think you can do with this page?

The questions were orally asked by the instructor and additionally given in written form on small cards. In addition to these leading questions, the instructor asked for details and motivated the participant for further comments and critique. Since the pictures within the prototypes were only placeholders, they were not explicitly addressed by the leading questions or by additional questions of the instructor. However, the participant was free to make spontaneously comments about the pictures, the colour or the layout of the prototype.

After this semi-structured interview, the participant had to manage seven usability tasks with the selected prototype. Therefore, the linked subpages were also available as paper prototypes. When the participant clicked on a link, a button or another active field by pointing out with his/her finger, then the

linked page was presented by a “human computer”. The procedure followed the usual standards of paper prototyping [2]. The seven usability tasks are listed below:

- Task 1: Starting literature search via the online service EconBiz
- Task 2: Other options for finding important literature and related information on a topic
- Task 3: Using the online help EconDesk
- Task 4: Finding information about online book lending
- Task 5: Finding information about opening times and rooms at the location in Hamburg
- Task 6: Publishing via the online publishing portal EconStor
- Task 7: Finding information about research activities and cooperation partners of the ZBW

There was no time limit for the usability tasks. However, after a maximum of seven minutes (or if the participant was strongly frustrated because he/she didn't find the needed information), the instructor stopped the task with the following sentence: “Thank you, this was very informative and helpful for us. We will now turn to the next task.” The participant was free to stop the task at every time. After each task, the participant had to make a difficulty rating on a Likert scale (from “1 – very easy” to “5 – very difficult”). After the completion of all usability tasks, the participant had to make three general ratings for the complete paper prototype including the subsequent pages: a general rating of the handling, a general rating of the ease of orienting and a general rating regarding the clearness of the paper prototype. The dependent variables of the usability tasks were the number of persons who solved the task, the number of errors (i.e. unnecessary or wrong clicks) as well as the described difficulty rating and the general rating at the end.

3.2 Advanced scribbling: comparative analysis of the three design versions

In the second part of the session, the method of advanced scribbling was applied. Therefore the participant received a print-out of each prototype version (design A, design B, and design C) and a green, a yellow, and a red marker as well as a blue pen. The participants were instructed to mark the single elements of the design versions with the different colours as follows: green for important elements, yellow for unnecessary, and red for confusing elements. The blue pen was for writing additional comments or reasons, why something was marked in a certain colour. As a reminder, a small card with the meaning of the colours was placed besides the print-outs of the three design versions. The participant was also free not to mark anything at all.

The analysis of the advanced scribbling for the three design versions was partly qualitative and partly quantitative. Handwritten comments and the think-aloud protocols were analysed in a qualitative way. The markings with the different colours were analysed in a quantitative manner for the single elements. Thereby it was counted, how many participants had marked the accordingly element in green, yellow or red. This analysis was done separately for all three design versions.

3.3 Handicraft task: creation of the user's wish-homepage

In the third part of the session the participant had to tinker his/her wish-homepage of the ZBW (handicraft task). The participant could use single elements of the three design versions or could create a completely different design. As materials the participant received a blank sheet of paper, print-outs of the three design versions (for cutting out single elements) as well as different coloured pencils, a scissor, and glue. The participants had a time-limit of fifteen minutes for this handicraft task.

The analysis of the handicraft task was partly qualitative and partly quantitative. Comments, annotations and the think-aloud protocols were analysed in a qualitative way. The quantitative analysis was twofold. On the one hand the structure of the wish-homepage was analysed, i.e., how many participants tinkered a specific structure with respect to the placement of the navigation menu and the arrangement of the direct access buttons. On the other hand it was assessed how many participants used the different main elements (including additional elements that were not in the original three versions).

4 RESULTS

Like mentioned above, the described study served as first empirical data base for identifying not only usability problems but also the most apt structure and interface design. The overall analysis of the data resulted in several recommendations for improvement and suggestions for a “best-of” design of the new homepage. In the following only the analyses and results are reported that are connected with

the influence of the embedded pictures. Like described in the methodology, the data analysis was mainly qualitative. Partly, also quantitative variables were assessed. However due to the small sample of ten people, the quantitative results have to be handled with caution. According to literature a rather small sample of ten people is sufficient to identify about 80% of the usability problems [18] [19]. However, with respect to the validity of the methodological approach and the findings on the influence of aesthetics, the results can only be seen as first pilot data that needs broader empirical support.

4.1 Results of working with one chosen paper prototype

For the initial selection of a design version there was no clear preference, but a first tendency that people liked version A less than the other two versions. Version A was selected by two people, version B was selected by four persons and version C was selected by four persons. The think-aloud protocols as well as the semi-structured interview revealed that the abstract graphics of version A were disliked especially the graphic with the stylized numbers of the direct access "Publishing". Even though the instructor explicitly verbalized, that the layout and pictures were only thought as a first draft and were not the in the focus of the study, the pictures were commented rather exhaustively.

For the revised selection of a favourite prototype version at the end of the test session (i.e., after the participant was familiar with the details of the prototypes), in each case half of the participants changed the initial selection. One person chose version B instead of A, two persons chose version B instead of their initial selection of C. Of the four persons who chose initially design B, one alternated to version A and one to version C. Overall for the revised selection two persons selected design A, five persons selected design B, and three persons selected design C.

The answers to the four leading questions showed, that all three design versions were recognized as a library's homepage. However, the slogan was only by four of the ten participants recognized at first sight. It is also noticeable, that none of the participants who worked with design B identified the slogan but needed some help of the instructor. The participants explained this by the low contrast (white text on a colourful background) and the length of the sentence (too long for a slogan). Correspondingly, none of the participants who worked with design B qualified the slogan as appropriate. (Since the three design versions had different slogans, the finding could trace back to the graphical design of the slogan as well as to the wording of the slogan.)

The general comments on the first impression of the (initially) chosen design version showed a slightly different pattern for the three design versions:

Version A was qualified as clear and well structured. The direct access buttons were recognized as very prominent which reflects the main priorities of the page. However, the priorities of the other elements were less obvious; especially the banner with the blog contest was too distracting.

In *version B* the priorities of the elements were not immediately recognized: The big photo besides the direct access fields and the banner with the blog-contest distracted the user's attention from the direct access buttons. This causes a negative appraisal of the blog banner: This field was very eye-catching, but the functionality of this field remained unclear and thus was irritating to the user. Also the big photo distracted the user's attention and the embedded slogan was not recognized. However, despite these negative aspects, the big picture was evaluated positively.

Version C was judged as well structured and the priority of the direct access buttons was clear for the participant. The fragmentation of text and pictures was commented positively. Also the banner of the online service EconDesk received positive comments; however, it also distracted from the main features of the page.

For *all design versions* the functionality of the navigation menu and the direct access "Literature search" was correctly identified. The direct access "Borrowing" was initially commented as understandable. However, the usability task 4 (finding information about online book lending) revealed that many participants didn't associate the according functionalities with the direct access "Borrowing". The direct access "Publishing" was partly confusing to the users (who were students) and they expected tips for writing or publishing their master thesis (and not a publishing portal). But when confronted with usability task 6 (Publishing via the online publishing portal EconStor), they intuitively used the direct access button and most participants had no problems in handling.

For the work with the usability tasks only minor differences between the design versions were found according to the task solution, the errors, or the ratings of the tasks. (Since the linkages and subsequent pages were nearly identical for all three design versions, this was not surprisingly.) The

identified usability problems and obstacles were independent from the embedded graphics and thus will not be reported here.

4.2 Results of the advanced scribbling

For the common main elements of the three design versions, the data of the advanced scribbling showed a similar pattern. Detailed results will not be reported here, because they had no relevance for the judgement on the embedded pictures.

The embedded pictures were rated slightly negative. Most participants didn't make any colour marking on them. Three (of the ten) people marked the abstract graphics of version A in red (as confusing). The pictures of version B and C were only by one person marked in red. Additionally, the pictures of design version B were marked by one person in green and by one person in yellow. The think-aloud protocols revealed that the negative judgements traced mainly back to the quality of the graphics. (Also in this part of the test session the instructor commented, that the pictures were only placeholder and the layout is only a rough draft with minor visual quality.) Similar to the first part of the test session, the think-aloud protocols showed that most participants preferred the photos of version B and C compared to the abstract graphics in version A.

4.3 Results of the handicraft task

The results of the handicraft task showed, that most (seven of the ten) participants created their wish-homepage with a similar structure like design version A. Partly the direct access buttons of design A were used, however without the abstract graphics. Partly the direct access buttons of the other versions were used, however in a modified way that was more similar to version A and in combination with the navigation menu of version A (therefore, the overall structure was more similar to version A).

All ten participants included the direct access button "Literature search" and the direct access button "Publishing". Eight participants included also the direct access button "Borrowing". (Two persons omitted it and commented that they found it confusing and expected the borrowing functionality in the course of literature search.) Seven participants used a navigation menu on the left side, only two participants on the top of the page. One of these participants used two menus (left and top). One person used a completely different navigation menu and one person used no navigation menu at all. The ZBW-logo was included by all ten persons. The headline was included by eight persons. A slogan was only used by four persons. All participants used the footer (partly in a modified way). ZBW news was included by six persons. The linkages to the Web 2.0 channels were included by seven persons. Three persons used the banner with blog contest, and four persons used the banner with the online service EconDesk.

Four people used pictures in their wish-homepage: one person by a hand drawing, the three other persons used the picture (realistic photograph) of design version B.

5 DISCUSSION: INTERPRETATION OF THE RESULTS AND OUTLOOK

To sum up, the pattern of results was partly different for the three main parts of the session and the applied methodologies. For the initial selection, there was a tendency that the participants disliked version A compared to version B and version C. For the usability tasks only minor differences were found that had no obvious connection to the embedded pictures. The results of the semi-structured interview and the advanced scribbling showed that version B and version C were spontaneously liked more compared to version A. The think-aloud protocols revealed, that the objection of version A was connected with the dislike of the abstract graphics. The advanced scribbling strengthened the findings of the think-aloud protocols: The pictures of version A were marked more often as confusing and disliked (in red). Contrariwise, the marking of other elements of the three versions showed only minor differences. In the handicraft task most people simulated the structure (direct access buttons and main navigation menu) of version A. However, the abstract graphics of version A were not used.

If one concentrates only on the first part of the test session – which is the usual methodology of a usability test by paper prototyping, this would lead to the recommendation to create an improved prototype similar to B or C, because A was disliked (and for the usability tasks no critical differences between the versions were found). The data of the revised selection at the end of the study would strengthen this interpretation because it suggested that version B was the most likeable one.

The data of the think-aloud protocols provided some indicators that the embedded pictures in version A were the main reason for the dislike of version A. Similarly, the results of the advanced scribbling led to the conclusion to avoid abstract graphics. Also a look at the results of the handicraft-task led to a changed interpretation compared to the pure results of the first part of the session. Even though version A was disliked and received more negative comments, most people simulated the structure of version A. The dislike of version A in the beginning could be explained with a halo effect of the abstract graphics.

Thus, the overall recommendation for a “best-of” design is, to have a structure analogous to version A. With respect to embedded pictures, realistic photos of people are preferable. However, according to the arrangement and size of the picture(s), the danger of distraction has to be taken into account. Even though the participants were explicitly instructed, that the pictures were only placeholders and had no relevance for the study, the pictures were commented very exhaustively and influenced the overall impression of the page. In this context, it is important to note that only four of the ten people included pictures in their wish homepage. Taking these findings together it can be concluded that the embedded pictures had only minor influence on the handling of the page, but bore a high distracting and affective potential. Thus, for the pure usability testing in early design phases, the inclusion of pictures should be avoided. For the testing of the final layout and design, the inclusion and selection of pictures should be done very carefully.

The affective influence of pictures and the danger of distraction are especially important for technology-enhanced learning and libraries 2.0 in specific. On the one hand, pictures can attract or discourage the users. The first impression of the Web site can be critical for decision to use Google search or a professional search. On the other hand, pictures can distract the users from the main functionalities of a Web site and thus, complicate the learning process or cause information overload [20]. Thereby, the homepage (of a learning platform or a library 2.0) acts as signboard and gateway for the embedded services and functionalities. Thus, it should be created very cautiously with respect to the target audience. Iterative usability evaluation is one cornerstone to optimize the appeal to the potential users. However, the presented pattern of results showed that the applied evaluation methodology is crucial to receive valid and fruitful recommendations for improvements. The study demonstrated, first, how pictures of a paper prototype can distort the results on the structure of the paper prototype, and second, how an accordingly misinterpretation can be avoided by a multi-method approach.

REFERENCES

- [1] Maness, J. M. (2006). Library 2.0 theory: Web 2.0 and its implications for libraries, *Webology*, vol.3(2), online available: <http://www.webology.org/2006/v3n2/a25.html>, 2006.
- [2] Snyder, C. (2003). *Paper prototyping. The fast and easy way to design and refine user interfaces*. San Francisco: Elsevier.
- [3] Rubin, J. & Chisnell, D. (2008) *Handbook of usability testing*, Wiley Publishing Inc., Indianapolis.
- [4] Howard, D. (1992). Gift-wrapping effects on product attitudes: A mood-biasing explanation. *Journal of Consumer Psychology*, 1 (3), 197-223.
- [5] Mayer, R. E. (2003). The promise of multimedia Learning: Using the same instructional design methods across different media. *Learning and Instruction*, 13, 125-139.
- [6] Sweller, J., van Merriënboer, J. J. G., & Paas, F. G. W. C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, 10, 251-296.
- [7] Scott L. M. (1994). Images in advertising: The need of visual rhetoric. *Journal of Consumer Research*, 21, 252-273.
- [8] Anderson, J. R. (2000). *Cognitive psychology and its implications*, 5th Ed, W. E. Freeman & Co Ltd.
- [9] Abelson, R. P. (1980). Psychological status of the script concept. *American Psychologist*, 36, 715-729.

- [10] Bargh, J. A. (1996). Automaticity in social psychology. In E.T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (169-183). New York: The Guilford Press
- [11] Theeuwes, J. & Van der Stigchel (2006). Faces capture attention: Evidence from inhibition of return, *Visual Cognition*, 13 (6), 657-665.
- [12] Ro, T., Russell, C., & Lavie, N. (2001). Changing faces: A detection advantage in the flicker paradigm, *Psychological Science*, 12, 94-99.
- [13] Reeves, B. & Nass, C. (1996). *The Media Equation*. CSLI Publications.
- [14] Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of Personality and Social Psychology*, 24 (3), 285-290.
- [15] Tractinsky, N., Katz, A. S., & Ikar, D. (2000). What is beautiful is usable. *Interacting with Computers*, 13, 127-145.
- [16] Hassenzahl, M. & Monk, A. (2010). The inference of perceived usability from beauty. *Human-Computer Interaction*, 25, 235-260.
- [17] Tuch, A. N., Roth, S. P., Hornbæk, K., Opwis, K., & Bargas-Avila, J. A. (2012). Is beautiful really usable? Toward understanding the relation between usability, aesthetics, and affect in HCI. *Computers in Human Behavior*, 28, 1596-1607
- [18] Nielsen, J. (1993). *Usability engineering*. London: AP Professional Ltd.
- [19] Virzi, R. A. (1992). Refining the test phase of usability evaluation: how many subjects is enough? *Human Factors*, 34, 457-468.
- [20] Jones, Q., Ravid, G. & Rafaeli, S. (2004). Information overload and the message dynamics of online interaction spaces. *Information System Research*, 15 (2), 194-210.