



Usability Studies in Times of Pandemic: Different Solutions for the Remote Usability Tests of Research Digital Tools

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Abstract. In this paper, we present the usability evaluation of three digital tools of the Leibniz Institute for Educational Media | Georg Eckert Institute, namely Curricula Workstation, GEI-Digital and International TextbookCat, compared with a Meta Search Engine (MSE) *search.gei.de* which shall replace the use of the individual tools. Due to the lockdown measures enforced by the German government at the end of 2021, we developed different solutions to adapt our usability test plans to remote settings. First, the MSE was compared with Curricula Workstation using recordings performed via Zoom. Second, we compared the MSE with GEI-Digital by leveraging mouse tracking data using a combination of Zoom with OBS Studio for recording the screen. Third, a comparison was made between International TextBookCat and the MSE with data collected via CamStudio. The experimental results showed that the individual tools are perceived as better than MSE mainly in terms of intuitive design and ease of learning, while MSE is more satisfying for users.

Keywords: Usability · Human-Centred Design · Remote Testing

1 Introduction

The Leibniz Institute for Educational Media | Georg Eckert Institute¹ (hereafter “GEI” or “the institute”), member of the Leibniz Association, conducts international, multidisciplinary and application-oriented research into educational media, focusing on approaches drawn from cultural and human-centred studies. Over the years, a large number of digital tools have been implemented at the GEI. These include several types of information services, e.g. for searching or browsing curricula or textbooks, which could only be accessed singularly with no uniform index for all the documents. In order to find all existing information

¹ <https://www.gei.de/en/>.

that could be relevant to one's own research questions, researchers would currently still have to access the relevant websites and familiarise themselves with the respective search logic. To deal with these challenges, a Meta Search Engine (MSE), named *search.gei.de* [7] has been developed as a new overarching tool.

In this work, we assess the usability of MSE, which shall replace the use of each individual search engine. We started a usability test planning process to evaluate the different possibilities of interacting singularly with the information services, namely Curricula Workstation [1, 2], GEI-Digital [3, 4] and International TextBookCat [5, 6], compared to the overarching search.

Initially, in-lab studies were planned using an eye-tracking device, i.e. Tobii Pro Nano². Due to the lockdown measures enforced by the German government at the end of 2021, we developed three different solutions to adapt our original usability test plans to remote settings. First, MSE is compared with Curricula Workstation, using recordings performed via Zoom to assess several usability goals, including intuitive design, ease of learning and subjective satisfaction. Second, we compare the Meta Search Engine with GEI-Digital evaluating intuitive design and subjective satisfaction, also leveraging mouse clicks using a combination of Zoom and OBS Studio for recording the video sessions. Third, a comparison is made between International TextBookCat and search.gei.de by leveraging mouse tracking collected with CamStudio. In the continuation of the paper, we will describe the digital tools analysed (Sect. 2) and then illustrate the conducted usability studies with related results (Sect. 3).

2 Analysed Tools

In this section, we briefly describe the digital tools of the GEI, which are objects of the presented usability studies.

2.1 Curricula Workstation

The **Curricula Workstation** [1, 2] tool has been developed by the Research Library of the institute with the support of the German Research Foundation (DFG) funding line "Promotion of outstanding research libraries". Its aim is to provide a central access point to German and international curricula for humanities subjects. Curricula for the subjects of geography, history, social studies, politics and religion/ethics are permanently accessible. The majority of the documents are available for full-text online searches. The number of available texts is being continuously expanded, and historical curricula are gradually being added. The user interface (UI) provides a structured search function (Fig. 1) for curricula using the criteria of country, subject, level of education and year of publication. Free searches of the metadata and full texts of the digital curricula are also possible.

² <https://www.tobii.com/products/eye-trackers/screen-based/tobii-pro-nano>.

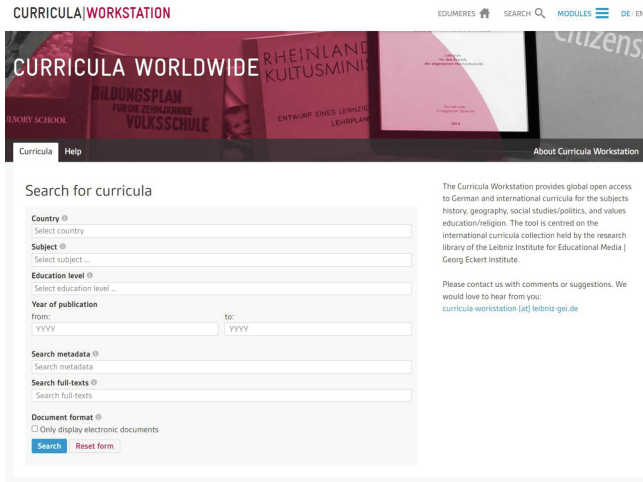


Fig. 1. Curricula Workstation UI

2.2 GEI-Digital

The creation and the development of the *digital textbook library*, known as **GEI-Digital** [3, 4], has been developed at the institute and also funded by the DFG. This tool provides online access to the digitised full texts of the historical German textbook collection held by the GEI Research Library (the user interface is visible in Fig. 2). Textbooks from other libraries, which are often difficult to access, are also virtually captured, logged and brought together with other collections, making them available to a wider circle of users.

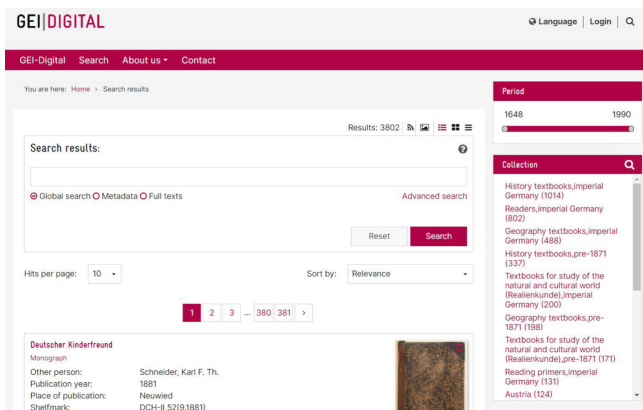


Fig. 2. GEI-Digital UI

2.3 International TextbookCat

The **International TextbookCat** (ITBC) [5,6] is a research tool that enables researchers to search textbook collections in new and more intuitive ways. It was created over two project phases to supplement the Research Library’s OPAC³, with the goal to expand the catalogue inventory accordingly. Two international institutions were therefore selected as partners: the University of Turin (Italy) and the National University of Distance Education (UNED - Madrid, Spain). The data records of the two international partners’ textbook inventories were standardised in order for the ITBC to work as a common, cross-collection search tool. The ITBC uses the internal GEI classifications of the textbooks, which enable targeted searches by being categorised by country, education level and school subject (Fig. 3). Facets such as federal state and type of school are added for textbooks from Germany. The integrated international textbooks can also be filtered according to language. Lending and availability information is provided in the list of results for each search result that is not available directly online.

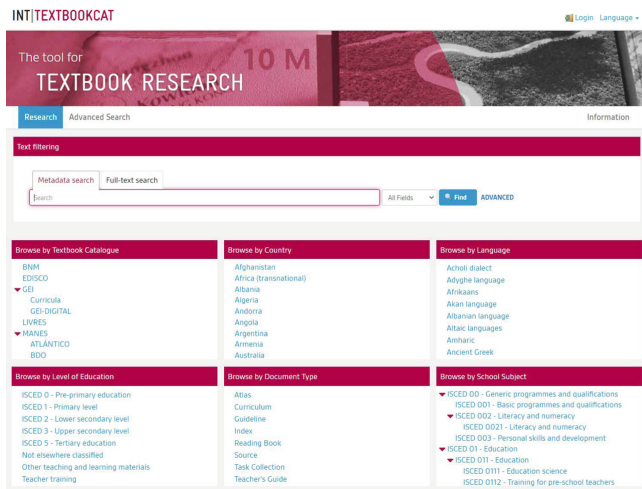


Fig. 3. International TextbookCat UI

2.4 The Meta Search Engine *search.gei.de*

The **Meta Search Engine**, referred to as MSE, has been implemented within the department “Digital Information and Research Infrastructures” with the aim of creating a central access point for retrieving all the data covered by the institute’s digital services and tools. The related UI (Fig. 4) is developed with a minimalist design to enable a user-friendly experience.

³ Acronym for “Online Public Access Catalogue”.



Fig. 4. Meta Search Engine UI

3 Usability Studies

This section presents the three different remote solutions (including the related results) made in place to test the usability of the MSE against Curricula Workstation, GEI-Digital and ITBC, respectively.

3.1 Curricula Workstation compared to the Meta Search Engine

In this first test, the participants interact with the tools on their own laptops, and the sessions are recorded via Zoom⁴. In particular, they are asked to solve different tasks (T) and then answer questions (Q) related to specific usability goals (UG). The questionnaire is designed by leveraging 5-point Likert scale questions. Below, after illustrating the tasks and the corresponding questions to every usability goal, we show the resulting findings.

- $T1$: Search in all curricula for the subject “History”;
- $T2$: Find all curricula from the years 1950 to 2000;
- $T3$: Find the oldest German curriculum containing the term “Demokratie”.
- $UG1$: **Intuitive design** (*definition*: nearly effortless understanding of the architecture and navigation patterns of the site).
 - $Q1$: I felt confident in navigating through this tool;
 - $Q2$: I can easily solve the task using this tool.
- $UG2$: **Ease of learning** (*definition*: how fast a user who has never seen the UI before can accomplish basic tasks).
 - $Q3$: It was easy to learn the basic functions of this tool.
- $UG3$: **Subjective satisfaction** (*definition*: whether the user is satisfied with interacting with the tool).
 - $Q4$: This tool is pleasant to use;
 - $Q5$: I believe I would use this tool in future.

The results of the described test are shown in Table 1, where for each tool, the average of the answers to the questions is reported. We can see that Curricula Workstation is perceived as easier to use, but the Meta Search Engine provides greater user satisfaction.

⁴ <https://zoom.us/>.

Table 1. Results of the questionnaire for the usability study where Curricula Workstation is compared with the Meta Search Engine. The best scores are in bold.

Usability goal	Question	Curricula Workstation	MSE
UG1	Q1	4.0	4.125
UG1	Q2	3.5	3.75
UG2	Q3	4.375	3.875
UG3	Q4	4.0	4.125
UG3	Q5	1.625	2.375

Table 2. Results of the questionnaire for the usability study where GEI-Digital is compared with the Meta Search Engine. The best scores are in bold.

Usability goal	Question	GEI-Digital	MSE
UG1	Q1	3.0	2.375
UG1	Q2	3.125	2.25

3.2 GEI-Digital Compared to the Meta Search Engine

In this experiment, the tools are compared *explicitly*, in terms of **ease of learning** (*UG1*) through a 4-point Likert scale questionnaire after solving a specific task (*T1*: Use the search function to find the first published German book which contains the word “Demokratie”), and *implicitly*, by analysing the **time spent** during the test and the **mouse clicks** needed for the operation. The participants interact with both tools remotely on their own machines, and the sessions are recorded via OBS Studio⁵.

The questions provided to the participants to assess *T1* are the following:

- *Q1*: It was easy to learn the basic functions of this tool;
- *Q2*: It was easy to learn how to find the book I was searching for.

The results of the explicit and implicit analysis are displayed in Table 2 and Table 3, respectively. It is evident that the participants perceive GEI-Digital as easier to use, but the interaction with the Meta Search Engine needs fewer clicks to complete the task.

3.3 ITBC compared to the Meta Search Engine

For the third test, the participants are asked to compare ITBC and MSE by solving a specific task involving the use of filter necessarily (*T1*: Searching for the first digital resource in ITBC where the term “Demokratie”. Then search for the same book on MSE. The procedure must involve the use of filters on both tools). The participants interact with both tools remotely on their own machines, and the sessions are recorded via CamStudio⁶. The usability goals assessed by

⁵ <https://obsproject.com/>.

⁶ <https://camstudio.org/>.

Table 3. Results of the implicit analysis (time spent and mouse clicks) where GEI-Digital is compared with the Meta Search Engine. The best scores are in bold.

Metric	GEI-Digital	Meta Search Engine
Time spent [seconds]	1.63	1.75
Mouse clicks [count]	11.5	10

Table 4. Results of the questionnaire for the usability study where ITBC is compared with the Meta Search Engine. The best scores are in bold.

Usability goal	Question	ITBC	Meta Search Engine
UG1	Q1	3.718	3.223
UG1	Q2	3.432	2.99
UG2	Q3	2.431	3.334
UG2	Q4	3.146	3.334

this test and the related post-session questions (provided in a 5-point Likert scale form) are listed below.

- **UG1: Intuitive design**
 - *Q1*: It was easy to find the filters on this tool;
 - *Q2*: Overall, the search process was intuitive.
- **UG2: Subjective satisfaction**
 - *Q3*: The tool was pleasant to use, and I found it as useful as my usual search engine to solve the same or a similar task;
 - *Q4*: I would use this tool again in future.

The results in Table 4 show how the participants found more intuitive to use the filters option while searching with ITBC, but overall, they are more satisfied while interacting with the Meta Search Engine.

4 Conclusion

In this paper, we presented the different solutions applied for three usability studies conducted in 2021. In particular, due to the pandemic period, the tests were conducted entirely remotely, leveraging different technologies. The main aim of the studies was to compare the usability of the Meta Search Engine *search.gqi.de*, developed at the Leibniz Institute for Educational Media | Georg Eckert Institute, with each individual tool included in the unified Meta Search Engine, namely Curricula Workstation, GEI-Digital and International Textbook-Cat. The results of the conducted experiments showed, from different perspectives, that the users prefer the design and the ease of learning of the single tools, but at the same time, they are more satisfied by the interaction with a modern UI like the one proposed by the Meta Search Engine.

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