

User Experience as a Personalized Evaluation of an Online Information System

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Abstract. While online information systems and platforms are being increasingly used, user expectations or the specific demands that come out of the usage context have received scant attention in previous developments. Therefore a finely structured, analytical instrument for evaluating information artefacts with specific emphasis on actors and usage was implemented in the Moodle learning platform for Moodle course room evaluation and tested with different student groups. Some surprising results came out of the discussion between the instructor and students. Moreover, this instrument, TEDS*MOODLE, can be scaled and flexibly customized and thus also integrated into existing e-government services and administrative networks.

Keywords. User experience, information systems, learning systems, information artefacts, Moodle course room evaluation

Introduction

User experience is a concept that covers the total effect of all the elements of an IT system on the user. As Eilermann has made clear [1], the range of interactive possibilities can be extremely diverse. Technical factors at the information system (IS) end are also crucial, while the user expectations or the specific demands that come out of the usage context have received scant attention in previous developments. In order to increase acceptance of online information systems in general and Moodle learning platforms with services in particular – which can be seen as “information artefacts” (IA) – the TEDS framework [2] was implemented into our Moodle system. The methodological background, including our original research questions, is outlined in [3]. The developed TEDS*MOODLE application activity was fully operational in the winter semester 2013–14, complete with didactical and technical support. It was in place in various courses with forty students from the Administration and Law department tested: it was tested for both the Moodle course rooms and two online learning courses, in student projects and supplemented by opinion papers submitted by the students. The student evaluations both of the Moodle course rooms and the online learning courses with the TEDS*MOODLE activity were, however, voluntary and, as a result, had varied participation rates. In this paper the results of three Moodle course room evaluations are summarized.

Based on the TEDS framework policy of discussing the assessment results with the users as evaluators [2,3], we were able to make improvements to our application activ-

ity. More importantly, these empirical results show how individual informational offerings can be evaluated in a user-oriented fashion and duly enhanced. Our specific research questions (RQ) in this part of the project are as follows:

- RQ#1 Is the implemented application TEDS*MOODLE self-describable and easy to use for course room evaluation?
- RQ#2 Are the categories and criteria of the evaluation for users (voters) sufficiently understandable and differentiable?
- RQ#3 What didactic and technical support is necessary to establish TEDS*MOODLE as a continuously usable evaluation method?

In Chapter 1 the literature background for the TEDS framework and the implementation of TEDS*MOODLE is shown. Chapter 2 deals with the evaluated Moodle course rooms and their results. Their individual results are summarized in Chapter 3 and in Chapter 4 an outlook for continued use of this delicate evaluation tool is given. At the same time concrete suggestions might be made on ways to improve e-Government services. These refinements are made possible through the inclusion of members of the public and their interaction with electronic systems. So, at the end of the paper, an outline answer will be offered to the question of how, in a similar way to the students of Administration and Law, citizens can become active co-designers in this kind of service provision and experience the transparency and comprehensibility they require when using IS. In turn, this helps fulfil the essential requirements of teaching and learning, which are today also associated with the area of e-Government and in particular with electronic service provision in administrative networks [4].

1. Literature Review and the Background of TEDS*MOODLE

While online information systems and platforms are being increasingly used in learning processes within a wide range of disciplines, this increase has often not been actively matched, in and of itself, by user acceptance, participation, collaboration, and co-design. The development is often generally done “for” and not “with” the user. The acceptance and use intensity of new media, which were originally strongly driven by technology, are now being increasingly explored with a view to advancing the action-oriented and self-directed learning of users [5]. Didactic scenarios and gender-sensitive didactic approaches are becoming increasingly important [6–9], and social media also play an innovative part in e-Government [10]. However, despite the fact that there are first methodological approaches to evaluate Open Government Data Infrastructure [11], there have been few approaches to an understanding of what values can be generated [12,13]. Our focus here is on the various needs of the users, particularly when it comes to the question of their motivation in grappling with information and learning systems (see also [4]). From this perspective, technical systems and learning platforms are also turned into sensitive instruments of intentional social intervention (cf. [14,15]).

This is where the original TEDS framework [2] comes in, which was published in 2011 and based on Taylor’s [16,17] criteria for evaluating human needs when dealing with IT. The TEDS framework has developed these criteria further on, presenting a finely structured, analytical instrument for evaluating information artefacts with specific emphasis on actors and usage. The TEDS framework approach is amenable to any kind of “information artefact”, be it a book, newspaper, TV ad, website, document, or an information system in its entirety. The TEDS framework has been used to evaluate

the websites of professional sports teams (cf. [18,19]). It can also be used in the analysis of social media and mobile information artefacts [20].

In our case the TEDS framework was integrated and electronically implemented into our Moodle learning platform in a purpose-customized way as a Moodle “activity” [3]. For this specific integration we use 33 criteria from the original 40 evaluation criteria, however the implementation is flexible and could be changed if necessary. We call our solution TEDS*MOODLE, which is so far the only one of its kind and is intended to be used firstly for course site evaluation and content evaluation, however, one is free to choose another object of investigation. The TEDS*MOODLE integration concept and interfaces are shown in [3]. Particular care is needed in the integration of the TEDS framework in the Moodle learning platform in order to give future users (evaluators) access to the methodology and the used categories that is simple and self-explanatory. For this purpose concrete user questions have been developed for each criterion (see Fig. 1 in English; see [21] for German) and, with their help we hoped, users can easily understand the fine sense of the TEDS*MOODLE evaluation. Moreover, multilingual capabilities are implemented for future target groups in order to make the process more comprehensible. In this initial implementation, the languages German, English, and Spanish were chosen.

Like the TEDS framework, the TEDS*MOODLE integration that we have derived from it is not limited to the academic sector and should be viewed simply as a preliminary area of concrete application. Elsewhere [3,21], we go into the demands and challenges associated with the integration of the TEDS framework into the MOODLE learning platform and demonstrate our integration solution as a concrete contribution to the further development of applications. Here results of the evaluations of three Moodle course rooms are presented.

2. Application of the Methodology: Case Studies and Results

A course with forty students from the Administration and Law department (first semester) were informed about the methodology of the TEDS framework. Like the original TEDS framework [2], TEDS*MOODLE contains the following steps, which then build on one another:

- The identification of “personae” with their concrete wishes, needs, values, and belief systems. Personae describe groups of actors operating within same contexts and information environments and having similar requirements.
- The identification of specific scenarios and their utilization as hypothetical archetypes of contextualized human activity.
- The evaluation of an IA in accordance with the six main categories and thirty-three sub-categories, which need to be largely self-explanatory for those taking part in the evaluations.
- Discussion of the results and the drawing up of detailed recommendations for improving the design of the IA being tested.

According to the TEDS framework, the first step is to determine what should be evaluated as an IA. Another key step is to find a reference IA, an “anchor”, that can be used as a basis for meaningful comparison in the actual assessment and as a means to “practice” the evaluations. The anchor could be the website of another equivalent

survey VR13 TEDS-Evaluation Informationsartefakt 2: Kursraum Aufbau- und Ablauforganisation from Margit Scholl

summary of the survey

- create evaluation file
- Show graphical analysis
- create evaluation file (OpenOffice)
- create evaluation file (Microsoft Office)

Save

assessment	category name	category description
neutral	Browsability	Could you find what you were looking for?
fully agree	Formatting	Was the formatting and presentation of information user friendly and easy to understand?
fully agree	Medation	Can the information be clearly navigated?
tend to agree	Accessibility	Is it easy to reach the desired information or functionality?
tend to disagree	Simplicity	Is the information presented in a straightforward manner?
neutral	Item identification	Is it possible to recognize information unproblematically?
fully disagree	Subject description/ Classification	Is information easy to find?
tend to agree	Subject Summary / Summarization	Is the information clearly and concisely summarized?
tend to agree	Linkage / Referral	Are there functioning links to other information sources outside the information artifact?
tend to agree	Precision of search	When searching for specific information, are the results sufficiently precise?
tend to agree	Selectivity	Is it easy to select specific information?
tend to agree	Novelty	Do you trust that the information you select is up to date?
tend to disagree	Accuracy	Do you consider the information to be free of errors?
tend to agree	Comprehensiveness / Completeness	In your opinion, is the information complete?
tend to agree	Validity / Reliability	Do you rate the information as reliable?
tend to agree	Authority	Do you find the information trustworthy?
tend to disagree	Feedback	Is it possible to give feedback?
tend to agree	Contextuality / Closeness to Problem	Is the information relevant to your current problem?
tend to disagree	Flexibility	Are you able to flexibly customize the information?
tend to agree	Simplicity	Is it easy to adjust the way the information is presented in the information artifact?
neutral	Transaction	Is there a direct transaction function available when required for purchasing goods and products?
tend to disagree	Trust on adaptability	Can you be sure that your customizations will be saved?
neutral	Community	Do you have forums available that you can make free use of?
neutral	Individualization	Can you tailor the way information is presented to meet your individual requirements?
neutral	Localization	Can you adjust the information display for different time zones, languages, or cultural circumstances?
tend to disagree	Privacy	Do you have information to help you find out how to secure and protect your data?
tend to agree	Cost / Time savings	Does the information help you to save time/money?
neutral	Security / Safety	Is the information made available in a secure way?
neutral	Aesthetics	Is the design attractive?
tend to agree	Entertainment	Do the entertainment elements in the information presentation encourage you to stay longer?
neutral	Engagement	Are you persuaded by the way the information is presented? Does it make an attempt to win you over?
tend to agree	Stimulation	Does the presentation of the information inspire you to undertake your own activities?
neutral	Satisfaction	Do you have a sense of satisfaction after retrieving information?

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Figure 1. The evaluation activity TEDS*MOODLE of the Moodle learning platform at the University of Applied Sciences (UAS) Wildau.

learning platform and is identified as outstanding (positive anchor) or poor (negative anchor). TEDS*MOODLE distinguishes the following six main evaluation categories: Ease of Use, Noise Reduction, Quality, Adaptability, Additional Performance Features, and Affection. The adaptation process reduced the number of sub-categories from the original forty to a total of thirty-three assessment criteria. The TEDS*MOODLE evaluation was set up according to a *German-style* Likert scale: “Strongly agree” (1), “Agree” (2), “Neither agree nor disagree” (3), “Disagree” (4), “Strongly disagree” (5).

2.1. Course Room Evaluation

In order to identify variances and assessment discrepancies, all the student evaluations were statistically analyzed. After the evaluation, lecturers and students discussed any variances, thus consolidating the basis for comparison. An *iterative* research process was applied, whereby the questions developed within the TEDS*MOODLE framework, which were designed to clarify the purpose of the individual assessment categories, were simplified and refined after the initial evaluation of the anchor (cf. [3,4,21]). The evaluation of the selected IA was then carried out using a Likert scale. These evaluations were also statistically analyzed and any variances were pointed up. This was followed by a new discussion of the variances, which then led to a final appraisal of the results. To conclude the process, the strengths, weaknesses, and problems were discussed and detailed recommendations for improving the IA were generated and documented.

2.2. “e-Government” Course Room

It is important to note that the students are not evaluating people with the TEDS method but rather collaboratively and interactively designed Moodle course rooms, in other words IAs with specific higher educational qualities. A Moodle course room for the lecture on e-Government that could be walked through from top to bottom was the first IA to be evaluated. It was divided up into the main areas of Communication, Organization, Course Resources, Lecture/Course Materials, and Tutorials, Assignments, and Exam Preparation. The most comprehensive section Lecture/Course Materials contains posts sorted according to topic in the form of PDF files, as well as links and videos. While at the beginning, the content, history, and terminology relating to e-Government is explained, the e-Government section includes Germany’s national e-Government strategy along with relevant legislation. The other sections are Project Management, IT Security, and Modern Citizen Services as a specialization. Related to this, the section Tutorials includes, for example, a link to a current issue (reducing the administrative load on parents) and practice tasks on IT security.

As shown in Fig. 2 Community (criterion 23) with the question “Do you have forums available that you can make free use of?” was positively rated, the best criterion of all, and only few students didn’t agree. However, this category covers the usability of forums – this always requires additional input from the instructor to provide feedback independent of time and place. In contrast the criterion 24 (Individualization/adaptability) with the question “Can you tailor the way information is presented to meet your individual requirements?” is rated almost the worst. This is not surprising since in essence students were not provided with any self-directed activities relating directly to Adaptability as part of rights management of the Moodle course room –

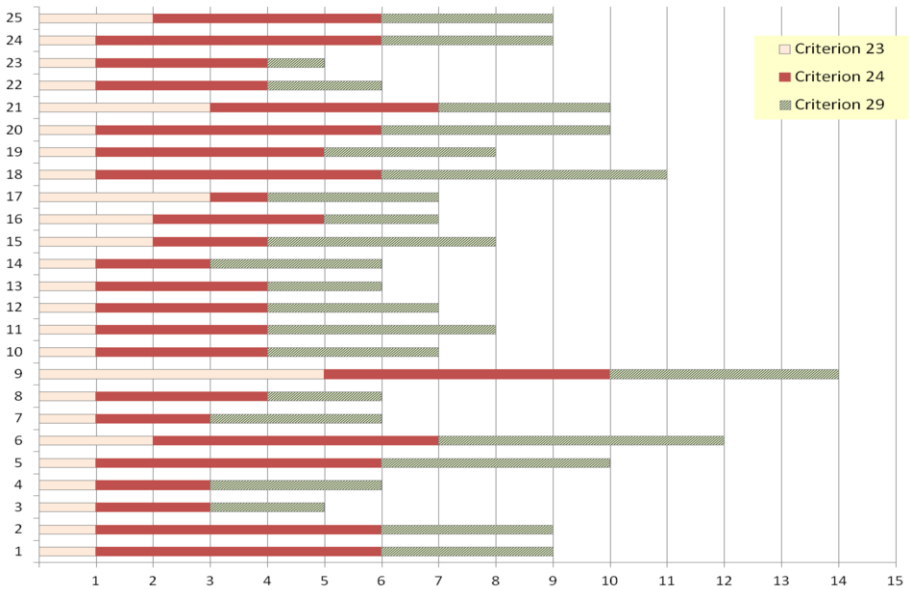


Figure 2. TEDS*MOODLE evaluation from 25 students of the first semester: Average values for the criterion 23 “Community/forums”, criterion 24 “Individualization/adaptability” and criterion 29 “Aesthetics/design”. German-style Likert scale: “Strongly agree” (1), “Agree” (2), “Neither agree nor disagree” (3), “Disagree” (4) and “Strongly disagree” (5).

the administrators of the Moodle platform do not allow this. As an example for a neutral evaluation in average the Aesthetics (criterion 29) is shown that treats the question “Is the design attractive?”. Contrary to the developers of the Moodle course room this neutrality is quite a potential for an improvement of the design.

2.3. “Administrative Modernization” Course Room

Administrative Modernization was the second Moodle course room to be evaluated by students. Apart from the final section, which is a collection of student projects, it has a similar formal structure. However, the course materials here include information on the organization of public administration, on project and process management (the selection of business processes, process analysis) and on document management and workflow systems, in particular the EL.DOK system used in Brandenburg. The Tutorials section includes tasks on electronic process organization and on process modelling. The student projects bring together topics like procurement procedures, registration, planning applications, or the description of summary proceedings.

The results of both course rooms exhibit a high degree of satisfaction with the various aspects of Ease of Use, although there is scope for improving Searchability, increasing Simplicity, and optimizing Mediation with regard to Accessibility. In the second main category, Noise Reduction, Novelty had the best score, followed by Item Identification. Conversely, poor scores were registered for discoverability, summarization, and precision. As the discussion revealed, this is partly due to the difficulty of knowing how to gauge the informational content in this phase of the programme (first semester). The third category, which covers quality criteria, gained unequivocally posi-

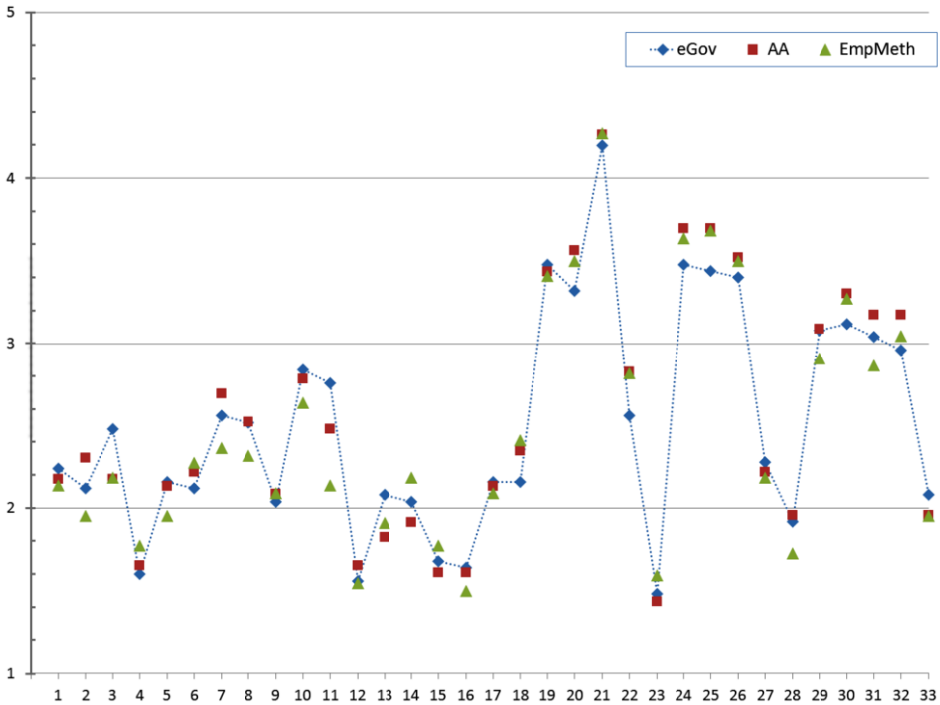


Figure 3. TEDS*MOODLE evaluation for the three Moodle course rooms “e-Government” (♦), “Administrative Modernization” (■) and “Empirical Methods” (▲): average value for each of the thirty-three assessment criteria according to a *German-style* Likert scale: “Strongly agree” (1), “Agree” (2), “Neither agree nor disagree” (3), “Disagree” (4) and “Strongly disagree” (5).

tive ratings overall. However, discussion showed that the good results in the areas Accuracy, Comprehensiveness, Currency, and Authority can be explained by confidence in the content posted by the lecturer. As shown above the worst assessments tended to come in the main category Adaptability. In the category Additional Performance Features, Safety scored particularly well. However, Cost/Time Savings, which is an important aspect of e-Government, while registering twelve positive ratings, also received a significant number of neutral evaluations. The final main category, Affection, recorded a high level of satisfaction after information retrieval. Set against that, Stimulation, Entertainment, and Aesthetics were given neutral or negative evaluations. In our view this has something to do both with the mundane, matter-of-fact nature of an electronic learning environment and the imperative of needing to deal with its contents – these two factors still need to be researched with regard to e-Government.

2.4. “Empirical Methods” Course Room

The third Moodle course room to be evaluated as an IA shows essentially the same tendencies as the two foregoing courses (see Fig. 3). It is noticeable in all three courses that the first half of the evaluation categories clearly received more positive assessments from first-semester students than most of the categories in the second half. However, the third course room fared better on average in these “poorer” categories. This is also interesting as all three courses have the same basic structure but are characterized

by an abundance of course materials and a variety of Moodle activities. So, the tool was thus used in a differentiated way by the students for their evaluation.

The surprising result coming out of the discussion between the instructor and students was that in the three classes that had different content but which the instructor ran in parallel during the semester with the same seminar group, the course rooms should be consciously differentiated in terms of design, e.g. using different colours, so that distinctive features would register in students' minds. The students of the first semester wanted a clear different, topic-specific layout/design for each course, so that they easily know where they are. This requirement of the students does not correspond to our administrators' opinion who wanted a standardization of all classrooms with the help of templates.

3. Discussion of the Results and Summary

The requirements established by e-Government policy as regards simplicity, transparency, speed, and authority can be seen in the evaluation results – extended to include the fine distinctions we developed. Simplicity and transparency of process are differentially assessed in our categories Ease of Use and Noise Reduction. Trustworthiness is included – again differentially – in the categories Quality and Adaptability. Adaptability, expanded into dimensions like contextuality and community, fosters active involvement and personal interaction. The category Affection also yields differentiated information. Concerning the first research question RQ#1, whether the implemented application TEDS*MOODLE is a self-describable and easy tool for course room evaluation, it is obviously the case.

So far, the evaluation activity TEDS*MOODLE was tested only in German by German students. The changes to the (German) evaluation questions prompted by the discussions with the students that were made by the TEDS@wildau team brought greater clarity on all sides. After these changes the categories and criteria of the evaluation for users (voters) are sufficiently understandable and differentiable (RQ#2). Although we have adjusted the English and Spanish questions accordingly, the author still thinks that the real-world use of TEDS*MOODLE in these languages will lead to necessary cultural improvements being made to the evaluation system. Cultural improvements will also apply to the forthcoming inclusion of key frames for illustrative explanation of the individual criteria.

The use of neutral Likert scale “3” led to some confusion. In the Likert scale it is not possible to explicitly rate something as “non-existent”, something that the vast majority of Administration and Law students would have liked to have had as an option. In their opinion, this would make the evaluation and appraisal of the information systems more meaningful, user friendly, and accurate. However, all in all, after working with TEDS*MOODLE and the TEDS framework methodology, the majority of Administration and Law students discovered for themselves that in future they would take a much more sophisticated view of unfamiliar media. With the current implementation of TEDS*MOODLE a tool is established that does not need much further didactic and technical support to use it as a continuously usable evaluation method (RQ#3). Moreover, it is flexible and easily adaptable.

4. Conclusion and Perspectives

With TEDS*MOODLE we have made it possible to engage – with full didactic and technical support – different target groups in specific user scenarios and involve them in the informed evaluation of e-Government IAs on an ongoing basis. This should contribute to the sustained improvement of these services. In usability terms, TEDS*MOODLE – also independently of Moodle – can be scaled and flexibly customized and thus integrated into existing services and administrative networks.

On the basis of the preliminary empirical results of the TEDS*MOODLE evaluation activity we developed, we can illustrate the possibilities of our integration application. The results of the evaluated Moodle course rooms and the project reports and papers point to other areas of deployment in administrative networks and e-Government and thus address the core need for acceptance in these fields. We interpret these results as showing that citizens want a different kind of communication with administrative systems, the details of which do not conform to expectations. If they are involved as evaluators and co-producers in the design of e-Government IAs (both platforms and their contents), administrations are given concrete indicators as to the limiting and facilitating factors in their information systems. Not every category in the TEDS framework can be directly adapted for administrative networks and e-Government services and some customization will certainly be required. However, it should now be clear that the acceptance of IA and IS can be increased with this flexible and comparatively usable approach, which is both sophisticated and user oriented.

If these challenges are to be met, not only is a higher level of media competence required in all participants but the instruments that are deployed and the interaction between them must also be reviewed. As Büschenfeldt et al. have noted, the term distributed knowledge work refers in this context to an activity that both requires and produces knowledge and is thus defined by the fact of its permanent redefinition [22]. This also points to a continuous survey of users of the IS. Moreover the use of TEDS*MOODLE as a crowdsourcing tool via the Internet needs to be examined: our TEDS*MOODLE integration product could also be used as an IA for e-Government platforms (and their content) with the appropriate administrative services so that these services can be subtly evaluated in terms of specific individual usage areas (scenarios) and defined target groups (personae) as part of a campaign or on an ongoing basis. Valid improvements can then be made. The administration would receive concrete suggestions for enhancing its IAs and citizens would become active co-designers of the informational services. Their needs and knowledge would be put to creative and productive use online.

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