The Project TEDS@wildau: TEDS Framework Integration into the Moodle Platform for User-Specific Quality Assurance of Learning Scenarios

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Abstract

Online information systems on different devices are being increasingly used in learning processes and as part of continuing education within a wide range of disciplines. However, this increase has often not been matched in and of itself by user acceptance. Emphasizing the needs of human actors (users) is a vital part of ensuring their motivation so that the use of information systems will become generally accepted in application scenarios. To achieve this, the TEDS framework, which builds on Taylor’s concept of “Value-Added Processes”, is integrated into our Moodle learning platform. In this paper we explain the background, requirements, and some preliminary results of our flexible TEDS*MOODLE integration, which is usable on different devices and which is to date the only one of its kind worldwide. It might also prove to be an innovative solution for e-government platforms, engaging citizens in policy- and decision-making processes.

1. Introduction

When media and systems are properly designed and implemented, digital media can make a sustained contribution to quality and excellence in learning- and teaching-related research. The amount of research being conducted on these information systems and tools has multiplied in the last decade. 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 [1]. Didactic scenarios are, for example, designed with e-portfolios and taxonomies to address the increasingly complex challenges of teaching and learning with modern technology [2–4]. Furthermore, the focus of attention is now on mobile devices, a gender-sensitive didactic approach, and community-building via social media [5] [6]. The research questions are not limited to the (academic) educational sector. Instead, they are part of the sum of all processes of knowledge acquisition and development – and are thus aspects of “good” technology-based e-government implementation as well. This relationship to the future needs of the world citizen is later discussed under the topic e-government: all across the globe citizens increasingly expect the possibility of interactive communication with public administrations, analogous to what they know from their private and professional lives [7].

While online information systems and platforms are being increasingly used in (academic) learning processes and as part of continuing education and advanced training programmes within a wide range of disciplines, this cannot belie the fact that this increase has often not been actively matched, in and of itself, by user acceptance, participation, collaboration, and co-design. At the University of Applied Sciences (UAS) Wildau we have been facing the challenges associated with this for a number of years [8–10]. However, taking account of the needs of human actors (users) is a vital part of ensuring their motivated and intensive use of the information systems and learning platforms in Blended Learning application scenarios. This is closely connected with the learning system’s quality assurance management and design, which should focus on the concrete needs, the individual competencies, and the specific usage contexts of the actors involved. Moreover, technical systems and measures such as platforms thus become an instrument of deliberate and targeted social intervention. It may be inferred from this that the (software) code is also a proper and effective regulatory instrument for dealing with knowledge [11]. This tie-in has already been suggested by US legal academic Lawrence Lessig with his thesis “code is law”. It is his opinion that the code as a regulatory instance, comparable to the law, the market, or social norms, lays down behavioural guidelines [12] In our context this means that the code associated with the interactive design of an information system, a learning platform, a Moodle course room, websites in general, or any other artefact has an impact on the behaviour of the user dealing with it. User behaviour and user needs are probably different depending on the target group and content. There-
fore, to ensure effective collaboration it is important to involve the target users as evaluators and co-producers in the design of online information systems.

Although learning platforms and their content are nowadays increasingly diversified and personalized, this is generally done “for” and not “with” the user. In order to gain insights into the quality of a learning platform, it should be analyzed using a clearly structured and well-organized approach that makes specific allowance for the different usage scenarios and the variety of actors involved. To achieve this, the TEDS framework is integrated into the Moodle learning environment as part of the project TEDS@wildau including the fundamental concept of full, electronic, and flexible TEDS framework (cf. [13]) integration, the adaptation of the existing TEDS evaluation toolset (TEDS*EVAL), and a major development of appropriate routines for the Moodle learning environment. The unique research TEDS*EVAL toolset was originally developed under Prof. Hans J. Scholl at the University of Washington, Seattle, USA, and is a set of routines provided under GPL. It is based on the TEDS framework [13] and built on the concept of Robert S. Taylor’s “Value-Added Processes” [14] [15], which is strongly focused on the needs of the human actors using the information systems. The acronym TEDS is composed of the initial letters of the names Taylor, Eisenberg, Dirks, and Scholl, who were responsible for generating the comprehensive framework, which represents a significant extension to the Taylor value-added model of information systems of the 1980s.

Our article explains in chapter 2 the background of the implemented integration and the assessment categories used in our elegantly designed web-based interviewing and analysis system. The TEDS*EVAL toolset is not a “system” or “program” but rather a set of research routines, which need to be configured and modified for specific use by the researcher. In chapter 3 we briefly outline the idea and the procedural steps required for the use of the TEDS framework, the previous scope of its investigation on websites of professional sports teams, and the initial usage results for our Moodle learning platform. We also address the demands and challenges associated with the integration of the TEDS framework into the Moodle learning environment, where it is intended to be used for course site evaluation at our university. We demonstrate our purpose-customized electronic system solution for the integrated TEDS framework as a contribution to the concrete development of an application that is to date the only one of its kind worldwide. We call our implementation solution TEDS*MOODLE. Our integrated application is both scalable and flexible, which means that TEDS*MOODLE can be universally applied for different scenarios on different devices and might also be an innovative solution for e-government platforms, engaging citizens in policy- and decision-making processes. This proposal is outlined in chapter 4, which also includes a final discussion of our research questions, a preview of further application scenarios, and our summary.

2. Human-centred evaluation of information artefacts and the TEDS framework

2.1. Further literature review and research questions

In terms of quality management, the question arises as to whether the evaluation of e-Learning courses can enhance the quality of these courses and solve the various challenges relating to gender, didactics, organization, legal issues, security, and technology. Classical learning methods (such as behaviourism) have mostly been focused on the learning content and the learners perceived as a group rather than as individuals – as a result, learning content and learning process were not individualized. This view has gradually changed in the last decade with the extension of the behaviourist approach to include constructivist learning methods and the incorporation of experience from the use of online information systems and learning platforms in the field of Blended Learning (cf. [16–18]).

Simultaneously, research has been conducted that focuses on the active role of the digital technologies that shape learning processes and interact with didactical features. Technology itself becomes a didactical actor that influences, mediates, and fosters the behaviour of teachers and learners [19]. Moreover, an interaction can be surmised: “the need for learning adaptive behaviour from users and the importance of formal methods within the engineering design process” [20] is clearly indicated for miniaturized ubiquitous systems of the future (cf. [21]), which have to be adaptive, autonomous and self-managing.

Although learners are still perceived as groups, the needs and perspectives of single actors have gained more attention in recent years. Fischer et al. identify four types of e-Learning users: discovery-oriented, research-oriented, teaching-oriented and networking-oriented [22]. According to these findings, learning

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1 The project TEDS@wildau receives 75% of its funding from the European Regional Development Fund (ERDF) as part of the “e-Learning and e-Knowledge” programme; the remaining 25% is paid by the UAS Wildau. Personnel costs are limited to 30% of the total costs. The programme, which is managed by the Ministry of Science, Research, and Culture of the State of Brandenburg, serves to strengthen an innovation-oriented use of multimedia at the universities of Brandenburg. The project must be completed by 31 March 2014.
Our framework-based evaluation complements their concrete needs of both learners and teachers.

Under the scientific approach of the “critical theory of technology”, which combines insights from the philosophy of technology and constructivist technology studies, a framework is proposed for analyzing technologies and technological systems at two different levels. One level takes into account the natural objects and people, and there is a complementary second level to include the social circumstances. For this more general view “the technical code is the rule under which technologies are realized in a social context with biases reflecting the unequal distribution of social power” [23].

However, clearly defined quality and sustainability standards are also required if we are to develop a proper understanding of the quality of learning platforms and gain broad acceptance for them (cf. [24] [25] [26]).

If we want to obtain detailed knowledge with which to improve (learning) platforms and their contents, the analysis of digital media in (learning) processes needs to take into account various technical and didactical user-scenarios (cf. [27] [28] [29]).

The sociologist Anthony Giddens, a contemporary of Robert S. Taylor [14] [15], had pursued a similar line of research with his theory of structuration [30], in which he refers to the fact that pre-existing structures (be they technological or organizational) both enable and limit human action. Scant attention was paid to this work in the research on human-computer interaction (HCI). This is all the more surprising as the work Giddens did allows us to understand why technology-centred IT developments frequently fail to function as desired or find the proper acceptance among users.

This is where the TEDS framework [13], which was published in 2011, comes into its own. Taylor [14] [15] had evolved six criteria for evaluating human needs when dealing with IT. The TEDS framework, as developed by H. J. Scholl et al., has taken these criteria a great deal further, presenting a finely structured, analytical instrument for evaluating information artefacts with specific emphasis on actors and usage. Put another way, it is an analytical tool for formulating design specifications that have the ability to ensure acceptance on a person to person basis and makes provision for user-oriented quality management. The TEDS framework comprises a series of procedures that can be summed up as follows [13]:

- Identification of personae and their concrete wants, needs, values, and beliefs.
- Identification of specific scenarios of utilization as hypothesized archetypes of human action in context.
- Evaluation of an information artefact in a clearly defined thirteen-step procedure.
- Discussion and production of detailed recommendations for designing and redesigning the chosen information artefact.

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 exclusively in the last two years to evaluate the websites of professional sports teams (cf. [31] [32]). This demonstrated its functionality and generated recommendations for sports managers for fan acquisition from an information management perspective.

We know from research on e-Learning that didactical and technical factors are of equal importance in ensuring the success of e-Learning software [33]. It is particularly important that a platform designed for virtual communities and learning scenarios offers ease of use, a satisfying range of content and a high level of reliability. Moodle-based platforms and learning activities, which have featured in teaching at universities, have so far mostly been evaluated using standard methods, primarily questionnaires [34]. Another way is for teachers to integrate feedback questions or entire questionnaires directly into the Moodle course. Long-term evaluations can also be carried out when, for example, teachers take regular part in training events for Moodle learning platforms. However, there are often didactical and technical problems that occur both with evaluations conducted across the university and with teachers wishing to evaluate their courses themselves. The questions are: What are the goals of course evaluation? Is it enough to ask about the level of competence the students attain, the teacher’s skill in applying methods and media, their social competence, and their subject expertise? Might a student feedback process that is limited to a few questions achieve a greater degree of individualization and activity-related orientation in teaching and learning procedures? How are students invited to take part in the survey? What method is used to release the results to the students? What happens to the results? How can the amount of time required for the evaluation (which can be significant) be reduced when dealing with a Moodle learning platform? How can a lack of staff interest in the process be addressed? Our framework-based evaluation complements and expands such existing feedback by focusing on the “Moodle course room” information artefact itself.

Our idea is to use the TEDS framework to improve...
our Moodle platform and the various course rooms. We also want to make it possible for users of this evaluation method to be able to run a simple computer-supported process. In the TEDS*MOODLE system integration (which is so far the only one of its kind) we have implemented the analytical instrument and procedure of the TEDS framework in an application that can be called up as an “activity” in the Moodle learning platform.

TEDS*MOODLE thus enables the design of Moodle-based learning, information, or collaboration platforms and their respective content to be assessed and improved on an ongoing basis. The underlying assumption is that the increasingly important evaluative challenges can be met and that key recommendations for software development, technical didactics, online moderation and user support can be derived from user evaluation results. With TEDS*MOODLE the long-standing demand for participative software design methods can be addressed.

This integration gives us a high-definition application for evaluating the Moodle course room using a sound and didactically motivated approach. In this way the individual target groups (teachers and learners, e.g. students from different disciplines or different users within a single discipline) can assess the learning scenarios and course rooms, and the Moodle space and general websites can be adapted to the needs of users and steadily improved. This integration is of particular value for the post-hoc analysis of existing information systems, although it can also be an effective instrument in the process of defining functional specifications and designing, building, and developing systems. While, traditionally, IT research for the most part has its sights focused on technology, organization, and systems, the integration of TEDS*MOODLE reflects our prioritization of the needs of human actors and of the people themselves, whose actions are invariably framed by specific contextual settings.

Our specific research questions (RQ) for the project TEDS@wildau, and especially for our integration product TEDS*MOODLE, are as follows:

RQ#1: How can we implement the analytical power of the TEDS framework into an effective application on different devices for the user-specific quality assurance of learning scenarios? How can we design the computer-based integration of TEDS*MOODLE so as to make it easy, self-described, human-centred application that can be used flexibly for different evaluation scenarios and target groups?

RQ#2: What didactic and technical support needs to be done to establish TEDS*MOODLE as a continuously used evaluation method to improve electronic environments?

RQ#3: Which existing categories and sub-categories of the original TEDS framework should be used unchanged and which should be modified or removed for our electronic learning environment?

2.2. Procedures and evaluation categories for the Moodle application in accordance with the TEDS framework

According to the methodology of the TEDS framework (cf. [13]), the first step in the process is to identify precisely which information artefact is to be evaluated. In our usage case it is possible, for example, to evaluate only the examinations within the learning platform or only the PDF documents that form part of a course. So, in this first step of the TEDS procedure, which consists of a total of thirteen steps, one has to determine the overall goal of the evaluation or comparative study and clarify the evaluation’s research questions.

The next step involves the identification of the different personalities evaluating the information artefact. Highly individualized types, e.g. all left-handers with hearing difficulties, can be considered according to requirements; it is equally possible, however, to simply pool broad categories of personae as target groups. The TEDS framework also distinguishes the different usage scenarios of the information artefacts on the basis of the various entities involved. Once again clear specifications can be established here so that only targeted usage areas are covered or differentiation is made into broad user groups. The second step of the TEDS procedure thus involves the identification of personae and scenarios drawn from selected objects of study.

In the next stage the personae and scenarios are refined and then verified by surveying potential evaluators. The fourth step is also extremely important: this involves locating an information artefact to be taken as a reference that can be used as a meaningful basis for comparison. This is known as an “anchor”. The anchor may, for instance, be a comparable website belonging to another learning platform, one that has been identified as an outstanding success (a positive anchor) or as especially poor (a negative anchor). This anchor (e.g. a learning platform’s homepage) is assessed by users by means of intricately designed evaluation criteria so that there is a basis of comparison for all criteria. All the evaluations are subjected to statistical analysis in order to identify discrepancies and assessment differences. Those performing the evaluations then discuss any points of variance and use this to make the basis of comparison more solid.

This is followed by the actual evaluation of the selected artefact, with the evaluators once again submitting their assessments independently of one other. These evaluations are also subjected to statistical ana-
ysis and any inconsistencies between the evaluators’ votes are flagged up. Afterwards there is further discussion of the variances and, where necessary, adaptations are made to the evaluations.

Finally the anchor assessment and the assessment of the information artefact actually under scrutiny are compared and contrasted using the statistical data. The strengths, weaknesses, and problems need to be discussed and detailed recommendations developed and documented to provide suggestions for improvements, based on the findings arising from the evaluations.

The TEDS framework distinguishes the following six main evaluation categories – these are then divided up using what is known as a score card into a further forty sub-criteria to be applied in the actual assessment of the information artefact:

- **Ease of Use**
- **Noise Reduction**
- **Quality**
- **Adaptability**
- **Performance**
- **Affection**

### 2.3. First usage outcomes for the Moodle platform at the UAS Wildau

The procedure and the forty criteria used in assessing an information artefact are clearly specified by the TEDS framework. In March 2013 these were taught to eleven staff members from various Blending Learning areas as part of a four-day training at the UAS Wildau. The current homepage of our Moodle platform was used as a practical example for performing the evaluation. This had been redesigned after the system had migrated to Moodle 2.0. One group of six staff, comprising IT specialists, designers, sociologists of technology, and educational academics, took part in the concrete evaluation process, which was carried out in thirteen steps.

The students were given procedural training in conformity with the first four steps and the objective, the personae (target groups), the scenario, and the research question were defined as follows:

- Our Moodle homepage is to be considered in isolation as an information artefact.
- In terms of personae the target group is defined as students at the UAS Wildau, in particular first-year students.
- We have limited ourselves to a single scenario for the target group: “A student is searching the homepage of the learning platform – they log in and obtain information about their courses and other resources on offer.”
- For the purposes of the training, the research question is: How well do the target group find their way around the homepage and how successful are they in obtaining the information they require?

The homepage of the Moodle learning platform at an equivalent university in Berlin was chosen as an “anchor” and reference artefact. This was taken as a “model” and assessed as the evaluation proceeded. The evaluation was set up according to the Likert scale: “Strongly agree” (5), “Agree” (4), “Neither agree nor disagree” (3), “Disagree” (2), “Strongly disagree” (1).

At the time of the TEDS framework training our TEDS*MOODLE had still not been developed and integrated into our system, so the statistical analysis was performed with the help of Google Docs. Using the individual qualitative evaluations taken together as an aggregate, the strengths and weaknesses of this reference page became not just transparently obvious but capable of being communicated intersubjectively, thus allowing objective judgements to be made. Thus equipped, the team of six began the task of assessing the actual artefact – the homepage of the university’s own Moodle platform – and then making a comparative evaluation of it. Using the training scenario provided, the team conducted the evaluation from the point of view of a (first-year) student. Subsequently the users of Moodle will submit these kinds of course room evaluations themselves.

When we look at the results (not shown) of the first main category, *Ease of Use*, we can clearly see that the UAS Wildau’s Moodle homepage scores particularly well (4 on the Likert scale) in terms of browsability, order, and simplicity. In the second main category, *Noise Reduction*, our homepage achieved the best results with regard to the degree of selectivity it offered and the subject summary. In the third main category, *Quality*, our homepage performed poorly in terms of accuracy and scored negatively since instructions are given in a mix of two languages in some places and the terminology behind some links is not explained at all, e.g. for the Etherpad Activity. On the other hand, the reliability and validity of the information presented on the page obtained a high score (an average of 4.5 to 4.67). The next main category, *Adaptability*, ultimately won the most positive evaluation for “Trust”. At the same time there was the greatest variance in the evaluations here and the discrepancies in such areas as contextuality/closeness to problem, simplicity, trust, and individualization were quickly clarified in concerted discussion with all the evaluators. In the fifth main category, *Performance*, our Moodle homepage achieved the highest score for the sub-category “Safety”.

The most significant variances were found in the final main category, *Affection*. Aside from the fact that, overall, the items – which included aesthetics, entertainment, engagement, stimulation, and satisfaction –
were given a more or less neutral assessment (a 3 on the Likert scale), there were major variances here, in particular in the evaluations by designers and IT specialists (cf. table 1).

<table>
<thead>
<tr>
<th>Affect</th>
<th>C.</th>
<th>S.</th>
<th>D.</th>
<th>P.</th>
<th>Average</th>
<th>St. Deviation</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>601 Aesthetics</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3.5</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>602 Entertainment</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2.33</td>
<td>0.44</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>603 Engagement</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3.33</td>
<td>0.44</td>
<td>3</td>
<td>2</td>
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<tr>
<td>954 Simulation</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2.83</td>
<td>0.83</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>955 Satisfaction/reward</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2.83</td>
<td>0.83</td>
<td>2.5</td>
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</table>

Table 1: Example of the TEDS evaluation of the Moodle homepage (here we see the sixth main category) using the Likert scale “Strongly agree” (5) to “Strongly disagree” (1)

Major variances of this kind that are found in separately conducted evaluations need to be discussed afterwards. It may be that individual members of the evaluation group change their evaluations and this then leads to an adjustment in the assessment. But this need not be the case. In the example shown here (table 1) the discussion did not result in any change in positions: the designers and IT specialists did not achieve consensus. This emphasizes the importance of the anchor evaluation – even there, there may be fundamental assessment differences so that any discrepancy in the evaluation of the actual information artefact is put into perspective.

For the overall result it should be noted that the discussions of the individual main categories and sub-category items led to a clear sensitization of all those involved, the immediate result of which was a point-by-point reworking of the homepage; based on this, a sound improvement of our Moodle learning platform is already in the offing. The sensitization also affects the search for answers and solutions to the research questions laid out above. This will be addressed in the next section.

3. The TEDS*MOODLE Integration

3.1. Requirements for system integration

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 that is simple, self-explanatory and runs fluently with the aid of auxiliary notes. This also applies to the forty evaluation criteria that need to be largely self-explanatory for future evaluators. For this purpose concrete user questions have been developed for each criterion and with their help users can easily make sense of the evaluation (see table 2, right-hand column).

Beyond this we believe that it is essential to have multilingual capabilities in place for our target groups in order to make the process more comprehensible. In what was now the initial implementation, the languages German, English, and Spanish were chosen. This means that all the evaluation criteria and questions were offered to the user in these three languages. The users can select one of the three languages when they start the TEDS*MOODLE evaluation activity (see fig. 1).

Furthermore, as a result of the integration, the routines of the TEDS*EVAL toolsets – as enhanced by us – function independently of our Moodle learning platform and are made available as an “activity evaluation”. The transition from the Moodle platform to the evaluation system must be designed in such a way that there are no technical hurdles for future evaluators.

Table 2: Questions designed to simplify the operation – here the first main category, “Ease of use”

Figure 1. Multilingual TEDS evaluation start screen in the Moodle learning platform

Because the individual evaluation criteria and the “subtle distinctions” that differentiate them are somewhat complex and open to interpretation, the questions and revamped definitions have been stored in the system in an easily accessible way. Technically and didactically speaking, this needs to be designed in such a way that future users can submit a complete evaluation of one of the selected scenarios in the TEDS*MOODLE system after a short orientation and without
the need for additional external assistance. This operation should be carried out without further need for user authentication as their identity has already been verified and, in terms of design, it should be geared to the Moodle learning platform.

3.2. Flexibility within TEDS*MOODLE: Customization of the evaluation criteria

One should not view the forty categories of the TEDS framework as open to being used arbitrarily, although it is certainly possible that the categories may need to be customized, particularly in the evaluation steps 1–5. This is because not all the evaluation criteria that were previously applied in assessing major sports websites can be transferred equally well to a course. As a result of this and due to the specific standardized formatting of the UAS Wildau’s corporate design, it makes sense to adapt these criteria to make them a better fit, in practical terms, with the existing Moodle system. As part of our systematic implementation of the TEDS criteria, some of the categories were given greater emphasis and looked at in more detail, while other criteria were identified as being less relevant for the artefacts under review in Moodle (see table 2, centre column). We have proposed the following concrete changes for the initial implementation of TEDS*MOODLE:

In the first main category, Ease of Use, “Browsability” (#101, cf. [13]) and “Orientation” (#104) have been combined as have “Formatting” (#102) and “Order” (#105) (cf. table 2).

In the second main category, Noise Reduction, “Order” (#207) has been removed as this was already adequately covered in other parts of this section (not shown).

In the third main category, Quality, “Currency” (#303) has been combined with “Novelty” (#208) and “Validity” (#305) with “Linkage” (#204) as these items go hand in hand and there is very little variance to be anticipated here in the Moodle courses.

In the fourth main category, Adaptability, all the items have been retained, although “Feedback” (#406) has been re-categorized under Quality and inserted there as a new evaluation criterion (#307). In the learning system there are always a number of ways of providing feedback and so the quality of the feedback options plays an important role.

In the fifth main category, Performance, the items “Cost savings” (#501) and “Time savings” (#502) have been combined, as have “Security” (#503) and “Safety” (#504), since here too in the detailed sub-items we may expect little or no variance within the Moodle course evaluation.

The sixth main category in the TEDS framework, Affection, has been left as it was.

Our currently implemented proposals for the evaluation criteria are focused on practicality of usage; as the TEDS@wildau project proceeds, these will be reviewed with the help of other comprehensive evaluations.

3.3. TEDS*MOODLE: Technical customization and enhancement

The TEDS*MOODLE integration should not involve any fixed interlocking that would result in technical remodelling of the actual Moodle system. If a Moodle migration is envisaged, it should be possible for the TEDS framework to be easily integrated – and also removed – simply and in a modular way with little administrative effort. This for us is the only way TEDS*MOODLE can be easily adapted when required for another area or linked with other learning platforms. The safety concept of the integration TEDS*MOODLE should be strongly oriented towards Moodle in its current form, i.e. it should be able to manage without its own user administration. We have decided that only the course trainer will be in a position to enable the activity. This also applies to the visibility and availability of the course evaluation data. Ultimately, though, the learners are the potential evaluators of the course rooms.

The trainers should be furnished with the course evaluation data so that they can improve their course rooms and the information should be provided in a conventional format to allow further analysis by the trainer using standard office applications. In the same way, it should also be possible for the evaluations to be corrected. To ensure this in as straightforward a way as possible, the personae, artefacts, and scenarios should be identified automatically and each evaluator should automatically be given an overview of the course evaluation he or she has performed. For implementation purposes the system should be divided up into different modules (see fig. 2). A standardized plug-in is required for the Moodle system. The TEDS extension is added by the instructor or administrator as an activity in a course, making it possible for users to initiate the evaluation. This means that within a course an evaluation can be offered to students as an activity. The students are provided with a link to the TEDS system where they can carry out their evaluations. The course trainers and administrators can also activate or deactivate the evaluation. This can be used to prevent course participants from adding further evaluations at a later date. The course trainers are also given a link to the evaluation module.
As soon as a course participant in the Moodle system starts the TEDS*MOODLE evaluation (fig. 1), they are referred to the evaluation module. Here they can run through all the evaluation criteria defined in the system. A brief explanation and video are provided for each criterion. This lightens the load of the course instructor and there are fewer ambiguities and miscalculations. If a user (persona) has already submitted an evaluation for this particular course (artefact) and (learning) scenario, he or she is automatically referred to the evaluation correction module.

In the evaluation correction module, the evaluator is shown his or her completed evaluation and given the option of correcting individual items in it. This follows essentially the same procedure as the one laid down in the TEDS*EVAL toolset and its evaluation matrix (fig. 3). These are already in operation but have now been updated based on the weighting given to the evaluation criteria (cf. table 2 with fig. 3).

The administration module (cf. fig. 2) provides a simple interface where you can make global changes to the assessment criteria for all evaluations. It is also possible to completely delete all the evaluations of an artefact’s scenario here if a serious error has occurred in the evaluation and a restart is required.

In the evaluation module the data from all the evaluations of one scenario and one artefact are collected together and made available in a viable way in a transferable data format. Here, for example, the CSV format can be used since it is an open standard and is supported by all the standard office applications, such as MS Excel and OpenOffice Calc. As an adjunct to the evaluation module, exemplary documentation is required so that the course trainer can process the data simply and easily.

The interface information must be defined more precisely prior to the actual technical implementation. Because the TEDS*EVAL toolset does not include any user management, when the Moodle activity is started, information like the user ID, course group (persona), artefact (e.g. Course Business Administration IV / BWL IV), scenario (Business Administration IV – summer semester / SS 2013) with semester input (SS 2013) and the operation’s target module are transferred across. The interface and its definition will be subject to frequent enhancements all through the process of technical implementation up to the final version of TEDS*MOODLE. The concluding evaluations with students and course trainers will add the finishing touches.

4. Discussion, flexible application scenarios, and the proposal for usage in electronic government, with conclusions

4.1. Discussion of the research questions and usage of TEDS*MOODLE at the UAS Wildau

In our paper, we outlined the didactical and technical implementation of the TEDS framework into the Moodle learning platform at the UAS Wildau. While evaluating and improving the homepage of our Moodle learning platform as a first case study using the TEDS framework, we reworked and adjusted the sub-categories of TEDS and offered clear specifications for making them both self-explanatory and flexible in the context of our Moodle learning platform. We also identified and designed the specific technical requirements for the system integration (modularity, interfaces, activation, deactivation and correction of evaluation, safety concept, video tutorials, and submission of course evaluation data for trainers and evaluators) and made the routines of the TEDS*EVAL available as an integrated, but nevertheless independent, simple working feature called “activity evaluation”.

With the integration of TEDS*MOODLE by winter
term 2013/14, the TEDS*MOODLE integration product will be fully operational with didactical and technical support and will be deployed in a variety of training courses, representing different subject areas and a range of target groups. The empirical question of how future users generate and submit scenario-based evaluations after a short orientation and without intensive additional help will be answered on the basis of new data from these training courses. This will also enable specifications for the didactical and technical support that is required for continuous use of the TEDS*MOODLE integration.

As a result, the lack of evidence showing positive improvements in learning outcomes and scenarios (due to the current state of the project) will be balanced, and a description of the methods and experiences of learning scenario improvements will be made available. One of the challenges will be to find the proper anchor in each case as, in the past, the various UAS Wildau course rooms have been set up along very different, subject-specific lines. However, we have the impression that this has not been done by the lecturers/trainers to suit the different target groups but rather for pragmatic reasons. It will thus be necessary to carry out measures to sensitize all our colleagues at the beginning of the winter semester and explain the value added of an informed reworking of their course rooms.

This should make it possible to develop the TEDS*MOODLE evaluation instrument in an appropriate way so as to enable sustained usage on different devices in the future. We are assuming that we will have comprehensive and sound test results and evaluations fully processed in spring 2014 and will be able to enter them in the final report of the TEDS@wildau project.

Moreover, TEDS*MOODLE will be available to all the departments at the UAS Wildau, be it personnel management, budgeting, service, or marketing. This is designed to facilitate the evaluation and improvement of all the information offered on the university’s website. Our TEDS*MOODLE electronic implementation of the TEDS framework provides an application that can, in addition, always be used in other contexts where it is necessary to increase the acceptance level of users in dealing with information artefacts. This also applies wherever online information systems or software products need to be compared, for instance project management (PM) or document management (DMS) software or enterprise resource planning (ERP) applications, etc. TEDS*MOODLE is easy to use as it can be activated in parallel to the software product under review, can be deployed immediately, and is based on a sound human-centric evaluation method. With this in mind we will continue to work on new project ideas.

4.2. Promises for electronic government

It would seem that citizens increasingly expect the range of options for interacting and shaping their experience that are on offer in the modern world and available to them in their private and professional lives to be also available in their communication with the authorities. The current international Zukunftsstudie (Study of the Future) 2013 [7], which contained a poll of regular Internet users between the ages of 18 and 70, classified future worldwide needs in the area of electronic government (e-government) in five categories of requirement and two general needs:

- Simple and reliable process
- Individual information service
- Secure and confidential usage
- Personal and active involvement
- Peer-level participation
- Prevention of corruption, and
- Reliable data.

Global differences notwithstanding, a general trend can be determined towards simple, quick, and trustworthy processes. Increasing customer friendliness thus remains an important challenge in future interactions between administrations and members of the public. According to the authors of the study, it is necessary to review “what new, innovative services or organizational changes will enable this wish on the part of the administration to be fulfilled and the extent to which social networks can be integrated in this” [7].

However, emanating from traditional electronic government research, a new smart governance research will encompass broader fields of interest such as smart administration, smart interaction with stakeholders, smart security and safety, and smart infrastructures, which in turn are enclosed in the larger contexts of the society and environment of the twenty-first century [35]. This requires not only structural changes within public administration and a greater level of media competence on the part of all those involved but also a review of the instruments being used.

As pointed out above for the TEDS evaluation method, an information artefact could be anything that provides information. As a first implementation step we are using the “Moodle course room” information artefact; it could, however, be any of a number of other platform webpages. And, like learners using a learning platform, citizens must, in future, feel comfortable with electronic systems and find their way through e-government platforms, if electronic participation in decision-making processes is to take place more easily. Citizens, like learners, represent different types of users. An integrated and (video-) supported evaluation tool like our TEDS*MOODLE activity might help to
determine how the e-government platform could be better designed to enable administrations to conduct open consultations with different target groups within the society using electronic means. The benefit of the TEDS*MOODLE system integration for e-government platforms is that, at this stage of the project, it allows us to achieve a better understanding of citizens’ needs and gain acceptance for the electronic participation process.

Although the effectiveness of the TEDS framework application in e-government remains an open question, our TEDS*MOODLE integration product could act as a promising solution for e-government platforms to increase citizens acceptance levels: its implementation would enable the development of scenarios for specific areas, to be evaluated by individual target groups on an ongoing basis or in targeted campaigns, and this citizen evaluation could then be used as a basis for adjustments and changes to be made in the policy-making processes. The administration would receive concrete, informed indications about the enabling and limiting factors in their information artefacts and citizens would become active co-designers of the information supply and collaboration partners. The needs and knowledge of members of the public would become an online benefit. As pointed out in [11], the term “distributed knowledge work” is deemed to be an activity that requires knowledge and produces knowledge, and is characterized by the fact that it is considered to be permanently in need of revision and is viewed as a resource.

4.3. Conclusion

By implementing the TEDS framework as an integrated TEDS*MOODLE application, we have, with the help of didactical and technical support, made it possible to easily involve various target groups in an informed and ongoing evaluation of the information artefacts on offer, which can then be put through a sustained process of improvement.

In the case at hand, TEDS*MOODLE allows user-oriented evaluation technology to be flexibly designed. The results of these evaluations can be used to develop the UAS Wildau Moodle platform as a “didactic actor” capable of facilitating and structuring the educational processes of learners and students in line with their needs. Using the evaluation application generates results that can then lead to key improvements in the acceptance and quality of electronic teaching.

The translation of the forty TEDS evaluation criteria and the customization of their definitions to suit the UAS Wildau Moodle platform represent the first context-sensitive operationalization and concretization of this flexible instrument to have been performed to date. TEDS*MOODLE is also flexible in a range of other contexts and can be used for all kinds of other information artefacts.

5. References


