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Math-Bridge

Report on user feedback collection process and results (first version)

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eContentplus

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¹OJ L 79, 24.3.2005, p. 1.

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Contents

1	Introduction	4
2	Why user feedback is important and what one can learn from it	5
2.1	The issue of quality	5
2.2	What we expect to learn from user feedback	6
3	Questionnaires	8
3.1	Pre-questionnaire for teachers	9
3.2	Pre-questionnaire for students	10
3.3	Post-questionnaire for teachers	11
3.4	Post-questionnaire for students	14
4	Rationale	18
5	Relation to other projects	19
6	Feedback collection process implementation	23
6.1	Math-Bridge Surveys	23
6.2	Math-Bridge Reports	24
7	Conclusion	26

1 Introduction

Work package 8 of the Math-Bridge project is devoted to the investigation of the users' satisfaction. Of particular interest are the users' opinion and judgments about the quality, appropriateness and usability of content, adaptation and service. The main types of users considered are teachers (including tutors) and students.

Section 2 describes why user feedback is important and what the Math-Bridge team hopes to learn from it.

The quality assessment of the project service in Math-Brige consists of two evaluations by users and teachers, each in terms of a pre-questionnaire to be filled in at registration and a questionnaire at the end of the training period. The questionnaires are presented in section 3, and their structure is explained in section 4.

In section 5 the relation to other projects' quality assessment is discussed.

Finally, the technical aspects of the feedback collection process and its implementation is described in section 6.

2 Why user feedback is important and what one can learn from it

2.1 The issue of quality

In the context of a rapid development of technologies and digital resources, teachers face a number of challenges linked with new perspectives of representation, modeling, simulation and access to information and knowledge technology. New teaching methods increasingly focusing on problem-solving approaches and new ways of collaborating and sharing resources between students and teachers. This evolution raises an increasing need for appropriate pedagogical resources to support teachers in their efforts of integration of technologies in their everyday practice and to foster their professional development. Thus, the issue of quality has acquired high importance, as can be seen from a number of research studies devoted to it.

Some of these studies address the issue of quality in the context of e-learning, i.e. online distance teaching material (e.g., [1]). They usually adopt a learner centered perspective. Quality indicators from this point of view are related to learners' satisfaction with the e-learning content and his or her learning success.

Other studies investigate the quality of resources collected within dedicated repositories, called learning object repositories (LOR) addressing both teachers and learners. Some LOR propose quality criteria that are to be used by authors wishing to deposit a resource. The JEM repository is an example of such a LOR. It has set up domain specific quality criteria which “have to be applicable to resources that consist exclusively of educational material covering studies in mathematics, statistics and application areas such as physics in school, college and university” [2]. Furthermore, cross-cultural validity of the criteria is required since they need to be usable at European level. Other LOR are more open, they welcome resources without any a priori evaluation, but rather allow their evaluation by peers. MERLOT [3] is an example of such LOR. Evaluation of the quality of its content follows three criteria: content quality, potential effectiveness as a teaching tool and ease of use for both students and faculty.

Noël [4] elaborated an evaluation typology based on a detailed analysis of quality evaluation means set up by various LOR offering pedagogical resources: a priori evaluation by the adherence institution; validation of resource conformity to a deposited content; peer-review by expert teachers; user evaluation; cross-evaluation both by peers and users.

The quality assessment of dynamic geometry resources in the Intergeo project (see section 5) consists of an evaluation by users and a peer review of a number of resources by a group of teachers supervised by math education researchers based on an *a priori* analysis, use in a class, and an *a posteriori* analysis of the resources. This process corresponds to the

5th type of evaluation mentioned above, rarely encountered according to the authors. This choice draws on the conceptualization of resources which tightly links a resource with its potential or effective usages.

2.2 What we expect to learn from user feedback

Collecting the feedback of users of the Math-Bridge service is important for several reasons. It serves to a better understanding of the general audience of Math-Bridge (both on the teaching and the learning sides) and shall assure the quality and usability on the levels of content, service and adaptation. In reaction to the ingoing user feedback, usability and content quality may be improved, as well as the effectiveness of adaption.

In order to develop and optimize Math-Bridge, a group of users whose feedback is most important are the teachers (including tutors). They will not necessarily be authors of the content used in their remedial courses. Their acceptance of all aspects of the service will be essential for its future. In particular, their feedback will reveal the answers to several questions:

- Before making use of learning content that was authored by someone else, teachers usually inspect it thoroughly. How easy will it be for them to gain an overview of the content and the features that the Math-Bridge service provides for students?
- Even if a teacher is not the author of the content, he or she has the possibility to generate a Math-Bridge course (out of the existing content) and customize it in many respects. How easy or how difficult will teachers find the handling of the system's course generation and customization features? To what extent will generation and customization of courses actually occur? Can usability barriers be identified?
- Do teachers find that the mathematical topics and competencies they consider essential for their courses and the learning process are in fact covered by the existing content of Math-Bridge? What are the typical items teachers are missing?
- Do teachers find that the material is presented to students in a pedagogically reasonable way and will be useful for them? To what extent is the way learning objects are presented compatible the (local) pedagogical traditions and the teachers' personal preferences? Do teachers anticipate barriers for students in this respect?
- Do teachers find the structure and realization of user models appropriate for mathematics learning? How would they rate the usefulness of search functionality, multilinguality, etc? Does the system's handling of mathematical notations comply with the (local) conventions used in remedial courses? Are there remaining discrepancies, and how do teachers typically cope with them?

- Do teachers anticipate any barrier for students regarding usability of the system in general?
- What are the changes and modifications of the service teachers typical desire?
- In addition to clarifying these specific issues, the feedback of teachers might include opinions and problems of students that would otherwise not be reported to the Math-Bridge team. In particular, one would like to gain information on students' motivation to reject working with Math-Bridge after having a brief look at it. Those students would probably not provide their feedback directly.

The second group of users are the students themselves:

- How will students cope with the system in general? To what extent will they typically use its features? Can usability barriers be identified?
- Do students think that working with Math-Bridge has helped them? Do they have the feeling that Math-Bridge has organized and supported their learning process in an appropriate and helpful way? What did they miss in this respect?
- How satisfied are students with the content offered? Did they find the content too easy/adequate/too difficult? Would they appreciate more examples? More theory? More tests?
- How much help (e.g. from teachers or colleagues) will students typically need when learning with Math-Bridge?
- Of major importance is the judgement of students about how well the content and its presentation fit (or even map) the actual remedial courses attended? Are there discrepancies, and how do students typically cope with them?

In addition to these objectives, the continuous collection of feedback also has a *monitoring function* and may help recognizing medium term *trends*. For example, major changes affecting the educational system in a country² may lead to a change in the mathematical competencies brought along by students. A typical example is an ongoing shift from analysis to stochastics. Consequently, bridging courses will adapt to the new situation, which in turn might necessitate modifications of the content provided by the Math-Bridge service.

²An example is the transition to a standardized and centralized final examination in secondary school as it is currently planned in Austria.

3 Questionnaires

During the registration both groups of users (teachers and students) will be asked several questions about their demographic dates and relevant skills (including general computer proficiency, internet experience and (for students) mathematical background. To this end, the users are requested to fill in *pre-questionnaires*.

After the users have finished working with Math-Bridge, they will be asked to fill in *post-questionnaires*. For a teacher this happens once he or she compiles the bridging course. A student will complete it once he or she finishes studying within the course. The goal of the post-questionnaires is to collect user feedback and exploit it for Math-Bridge service adjustment, content quality control and enhancement, adaptation and user modeling tuning, etc. These data together with the objective data received from the Math-Bridge logs will help to improve the Math-Bridge service.

The information gained by the combination of pre- and post-questionnaires will provide the basis for a comparative analysis of user feedback for different subcategories of users (e.g. internet-proficient vs. internet novices, high-level math background skills vs. low-level, etc.).

3.1 Pre-questionnaire for teachers

Interviewee No.: _____



Math-Bridge

Teachers Pre-Questionnaire

How old are you?	<input type="text"/> years				
What is your gender?	<input type="checkbox"/> female <input type="checkbox"/> male				
In which country do you live?	<input type="text"/>				
What is the status of your institution?	Secondary school	Vocational school	College	Technical institute	University
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How many hours per day do you use a computer?	<input type="checkbox"/> < 30 min	<input type="checkbox"/> 30 min – 1 h	<input type="checkbox"/> > 1 h – 2 h	<input type="checkbox"/> > 2 h	
How often do you browse the WWW?	<input type="checkbox"/> Less than once a week <input type="checkbox"/> Once a week <input type="checkbox"/> Several times a week				
Have you used any web-based training system before?	<input type="checkbox"/> Yes <input type="checkbox"/> No				
If yes, which one(s)?	<input type="text"/>				
In which language do you teach?	<input type="text"/>				
How many bridging courses have you taught before?	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2-3	<input type="checkbox"/> 4-5	<input type="checkbox"/> >5
How long is the duration of your current course?	<input type="checkbox"/> 1-2 weeks	<input type="checkbox"/> 3-4 weeks	<input type="checkbox"/> >1-3 months	<input type="checkbox"/> >3-6 months	<input type="checkbox"/> >6 months
How have you learned about Math-Bridge?	By e-Mail	From a colleague	On the web	From the management	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
In which teaching scenario do you plan to use Math-Bridge?	Blended Course	Distant Course	Adaptive Course	Self-assessment	Exam Preparation
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2 Pre-questionnaire for students

Interviewee No.: _____



Math-Bridge

Students Pre-Questionnaire

How old are you?	<input type="text"/> years
What is your gender?	<input type="checkbox"/> female <input type="checkbox"/> male
In which country do you live?	<input type="text"/>
How many hours per day do you use a computer?	<input type="checkbox"/> < 30 min <input type="checkbox"/> 30 min – 1 h <input type="checkbox"/> > 1 h – 2 h <input type="checkbox"/> > 2 h
How often do you browse the WWW?	<input type="checkbox"/> Less than once a week <input type="checkbox"/> Once a week <input type="checkbox"/> Several times a week
Have you taken other bridging courses before?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, which one(s)?	<input type="text"/>
Have you used any web-based training system before?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, which one(s)?	<input type="text"/>
How would you assess your knowledge of school-level Math?	Lower 20% <input type="checkbox"/> Average <input type="checkbox"/> Upper 20% <input type="checkbox"/>
In which language do you learn?	<input type="text"/>
Do you use MathBridge individually or as a part of a course?	<input type="checkbox"/> individually <input type="checkbox"/> as a part of a course

3.3 Post-questionnaire for teachers

Interviewee No.: _____



Math-Bridge

Teachers Post-Questionnaire

System Questions

Overall, I have been working with *MathBridge*... 1-4 weeks >1-3 months >3-6 months

During this course I have been working with *MathBridge* this many hours per week... 0-1 >1-5 >5-10 >10-20 >20

Please mark only one box for each answer.

	Do not agree		Neutral		Strongly agree
I think <i>MathBridge</i> provides helpful and constructive feedback for teachers.	<input type="checkbox"/>				
I think <i>MathBridge</i> provides teachers with all necessary functionality for preparing bridging courses.	<input type="checkbox"/>				
I think <i>MathBridge</i> provides students with all necessary functionality for effective learning.	<input type="checkbox"/>				
I think it is not easy to build a course in <i>MathBridge</i> .	<input type="checkbox"/>				
I think the gap detection tool of <i>MathBridge</i> is useful.	<input type="checkbox"/>				
I think the course generator of <i>MathBridge</i> did not create effective adaptive courses.	<input type="checkbox"/>				
I think the search tool of <i>MathBridge</i> is not useful.	<input type="checkbox"/>				
I think <i>MathBridge</i> didn't provide me with enough content to cover all material for a course.	<input type="checkbox"/>				
I think the content in <i>MathBridge</i> has an appropriate level of difficulty.	<input type="checkbox"/>				
I think the content in <i>MathBridge</i> is mathematically correct.	<input type="checkbox"/>				
I think the content in <i>MathBridge</i> is didactically valid.	<input type="checkbox"/>				
I think the mathematical notation used in the <i>MathBridge</i> content is valid.	<input type="checkbox"/>				
I think the quality of translation of the <i>MathBridge</i> content is low.	<input type="checkbox"/>				

Interviewee No.: _____

Please add any comments or suggestions that could be used to improve the tool. Add your concerns here, too.

System Usability Questions

Please mark only one box for each answer.

	Do not agree		Neutral		Strongly agree
I think that the navigation within <i>MathBridge</i> supports an efficient way of working.	<input type="checkbox"/>				
I think the <i>MathBridge</i> navigation is clearly comprehensible.	<input type="checkbox"/>				
I think the <i>MathBridge</i> handling / use is inconsistent.	<input type="checkbox"/>				
I feel safe / confident when using <i>MathBridge</i> .	<input type="checkbox"/>				
I think <i>MathBridge</i> reacts to input as I expected it to.	<input type="checkbox"/>				
I frequently need colleagues or experts to support me when working with <i>MathBridge</i> .	<input type="checkbox"/>				
I could imagine that most of the users would be able to learn operating with <i>MathBridge</i> quickly.	<input type="checkbox"/>				
I had to learn much before getting along well with <i>MathBridge</i> .	<input type="checkbox"/>				
I think <i>MathBridge</i> is quite poorly learnable without using other people's support or a manual.	<input type="checkbox"/>				
I enjoy working with <i>MathBridge</i> .	<input type="checkbox"/>				
I am not satisfied with <i>MathBridge</i> .	<input type="checkbox"/>				
I would recommend (the use of) <i>MathBridge</i> to my colleagues.	<input type="checkbox"/>				
I think <i>MathBridge</i> is useful.	<input type="checkbox"/>				
I think <i>MathBridge</i> is easily adaptable to individual requirements.	<input type="checkbox"/>				

D-8.2 Report on user feedback collection process and results (first version) Math-Bridge

Interviewee No.: _____

	Do not agree		Neutral		Strongly agree	
I think <i>MathBridge</i> is well suitable for occasional users as well as for professionals.	<input type="checkbox"/>					
I think <i>MathBridge</i> uses terms or abbreviations which are quite difficult to understand.	<input type="checkbox"/>					
I think <i>MathBridge</i> informs me sufficiently about which input is allowed in the respective case.	<input type="checkbox"/>					
I think <i>MathBridge</i> informs me sufficiently about the current state of the work in progress.	<input type="checkbox"/>					
I think <i>MathBridge</i> provides helpful and constructive error messages.	<input type="checkbox"/>					
I think <i>MathBridge</i> requires high correctional effort in case of erroneous / incorrect actions.	<input type="checkbox"/>					
I think <i>MathBridge</i> provides all functions needed to effectively execute / carry out my working tasks.	<input type="checkbox"/>					
I think the <i>MathBridge</i> handling is quite cumbersome.	<input type="checkbox"/>					
I think the functions offered are well-integrated into <i>MathBridge</i> .	<input type="checkbox"/>					
I think that handling <i>MathBridge</i> sometimes requires unnecessary input.	<input type="checkbox"/>					
I think <i>MathBridge</i> requires an unnecessary fix and inflexible adherence to (single) operating steps.	<input type="checkbox"/>					
I think <i>MathBridge</i> is unnecessarily complex.	<input type="checkbox"/>					
I think <i>MathBridge</i> is easy to use.	<input type="checkbox"/>					
I think <i>MathBridge</i> has some disturbing or useless functions.	<input type="checkbox"/>					
I think <i>MathBridge</i> allows for an effective, efficient and satisfying work.	<input type="checkbox"/>					
Please add any comments or suggestions that could be used to improve the tool. Add your concerns here, too.						

3.4 Post-questionnaire for students

Interviewee No.: _____



Math-Bridge
Students Post-Questionnaire

System Questions

Overall, I have been working with *MathBridge*... 1-4 weeks >1-3 months > 3-6 months

During this course I have been working with *MathBridge* this many hours per week... 0-1 >1-5 >5-10 >10-20 >20

Please mark only one box for each answer.

	Do not agree		Neutral		Strongly agree
I think <i>MathBridge</i> provides me with helpful and constructive feedback.	<input type="checkbox"/>				
I think <i>MathBridge</i> provides me with all necessary functionality for effective learning.	<input type="checkbox"/>				
I think the course generator of <i>MathBridge</i> did not present me the right learning material at the right time.	<input type="checkbox"/>				
I think the search tool of <i>MathBridge</i> is useful.	<input type="checkbox"/>				
I think <i>MathBridge</i> provides me with enough content to learn the material of the course.	<input type="checkbox"/>				
I think the content in <i>MathBridge</i> has an inappropriate level of difficulty.	<input type="checkbox"/>				
It is not easy to enter my solutions into the system.	<input type="checkbox"/>				
<i>MathBridge</i> helped me to clarify difficult concepts.	<input type="checkbox"/>				
<i>MathBridge</i> did not help me to develop problem solving abilities.	<input type="checkbox"/>				
<i>MathBridge</i> challenged me intellectually.	<input type="checkbox"/>				
Working with <i>MathBridge</i> did not contribute to my learning in this course.	<input type="checkbox"/>				
The mathematical symbols in <i>MathBridge</i> were incomprehensible	<input type="checkbox"/>				
The wording in assignments, theorems and other texts was clear.	<input type="checkbox"/>				

Interviewee No.: _____

	Do not agree		Neutral		Strongly agree	
<i>MathBridge</i> should be used again in teaching this course.	<input type="checkbox"/>					
<i>MathBridge</i> provided a meaningful learning experience for me.	<input type="checkbox"/>					
Working with <i>MathBridge</i> increased my interest in the subject.	<input type="checkbox"/>					
<i>MathBridge</i> did not provide me with opportunities for practising new skills.	<input type="checkbox"/>					
Please add any comments or suggestions that could be used to improve the tool. Add your concerns here, too.						

System Usability Questions

Please mark only one box for each answer.

	Do not agree		Neutral		Strongly agree	
I think that the navigation within <i>MathBridge</i> supports an efficient way of working.	<input type="checkbox"/>					
I think the <i>MathBridge</i> navigation is clearly comprehensible.	<input type="checkbox"/>					
I think the <i>MathBridge</i> handling / use is inconsistent.	<input type="checkbox"/>					
I feel safe / confident when using <i>MathBridge</i> .	<input type="checkbox"/>					
I think <i>MathBridge</i> reacts to input as I expected it to.	<input type="checkbox"/>					
I frequently need colleagues or experts to support me when working with <i>MathBridge</i> .	<input type="checkbox"/>					
I could imagine that most of the users would be able to learn operating with <i>MathBridge</i> quickly.	<input type="checkbox"/>					
I had to learn much before getting along well with <i>MathBridge</i> .	<input type="checkbox"/>					
I think <i>MathBridge</i> is quite poorly learnable without using other people's support or a manual.	<input type="checkbox"/>					

D-8.2 Report on user feedback collection process and results (first version) Math-Bridge

Interviewee No.: _____

	Do not agree		Neutral		Strongly agree	
I enjoy working with <i>MathBridge</i> .	<input type="checkbox"/>					
I am not satisfied with <i>MathBridge</i> .	<input type="checkbox"/>					
I would recommend (the use of) <i>MathBridge</i> to my colleagues.	<input type="checkbox"/>					
I think <i>MathBridge</i> is useful.	<input type="checkbox"/>					
I think <i>MathBridge</i> is easily adaptable to individual requirements.	<input type="checkbox"/>					
I think <i>MathBridge</i> is well suitable for occasional users as well as for professionals.	<input type="checkbox"/>					
I think <i>MathBridge</i> uses terms or abbreviations which are quite difficult to understand.	<input type="checkbox"/>					
I think <i>MathBridge</i> informs me sufficiently about which input is allowed in the respective case.	<input type="checkbox"/>					
I think <i>MathBridge</i> informs me sufficiently about the current state of the work in progress.	<input type="checkbox"/>					
I think <i>MathBridge</i> provides helpful and constructive error messages.	<input type="checkbox"/>					
I think <i>MathBridge</i> requires high correctional effort in case of erroneous / incorrect actions.	<input type="checkbox"/>					
I think <i>MathBridge</i> provides all functions needed to effectively execute / carry out my working tasks.	<input type="checkbox"/>					
I think the <i>MathBridge</i> handling is quite cumbersome.	<input type="checkbox"/>					
I think the functions offered are well-integrated into <i>MathBridge</i> .	<input type="checkbox"/>					
I think that handling <i>MathBridge</i> sometimes requires unnecessary input.	<input type="checkbox"/>					
I think <i>MathBridge</i> requires an unnecessary fix and inflexible adherence to (single) operating steps.	<input type="checkbox"/>					
I think <i>MathBridge</i> is unnecessarily complex.	<input type="checkbox"/>					
I think <i>MathBridge</i> is easy to use.	<input type="checkbox"/>					
I think <i>MathBridge</i> has some disturbing or useless functions.	<input type="checkbox"/>					

D-8.2 Report on user feedback collection process and results (first version) Math-Bridge

Interviewee No.: _____

**Do not
agree**

Neutral

**Strongly
agree**

I think *MathBridge* allows for an effective, efficient and satisfying work.

Please add any comments or suggestions that could be used to improve the tool. Add your concerns here, too.

4 Rationale

Within the Math-Bridge project the following questionnaires were developed:

- *Student pre-questionnaire*

In this questionnaire demographical data about the student, her/his computer and web usage, a self-assessment of mathematical skills, as well as the student's previous experiences with training courses is gathered.

- *Student post-questionnaire*

This questionnaire is divided in two parts: While the first part is intended to elicit information about the user's individual learning experience with Math-Bridge, the second part aims at gathering data about the usability of the Math-Bridge system.

The *learning experience part* of the questionnaire assesses the appropriateness of information presentation in Math-Bridge, the completeness of available functionality as well as the perceived learning stimulation through the system.

The *usability part* of the questionnaire builds on previous work regarding the ISO-NORM questionnaire [5] and the SYSTEM USABILITY SCALE [6] [7]. In addition to presenting an overall usability score, the Math-Bridge usability questionnaire also allows a differentiated consideration of Math-Bridge's usability on individual core usability metrics.

- The *Teacher pre-questionnaire* and the *Teacher-post-Questionnaire* are adapted versions of the questionnaires described above to take the perspective of the teacher into account.

5 Relation to other projects

The Intergeo project <http://i2geo.net> in which two Math-Bridge partners (DFKI and Université Montpellier II) are involved, has set up a quality evaluation questionnaire for participating users. Its goals differ from those of Math-Bridge: Its scope is limited to interactive geometry, and a questionnaire is attached to each educational resource for users to fill in. The questionnaire consists of 9 main themes that can be unfolded to reveal 54 more precise questions. Figure 1 shows an example of such a filled-in questionnaire.

Quality evaluation aims at improving the confidence of users in using dynamic geometry by making *good* resources more visible, and by providing evidence that fellow teachers have successfully used the resource. A second aspect is the improvement of the resource based on this feedback and the directions of evolutions pointed out by the questionnaire answers. A third benefit of quality evaluation is community building. Feeling part of an active community where one's work and opinions are valued helps the adoption of any technology, and dynamic geometry is a good representative of this situation, with groups of users forming around specific software. This aspect will be taken into consideration in the Math-Bridge project as well.

The description of the rationale of the intergeo project's quality evaluation can be found in the D6.1 deliverable <http://i2geo.net/files/D6.1.pdf>. It uses a lot of results from the eQuality project www.e-quality-eu.org/, a (now closed) European project (Action MINERVA SOCRATES) and describes the existing actors and the processes involved, as well as their life-cycles, in the creation and delivery of Open and Distance Learning courses to university students (Figure 2). It can be applied to the use of an e-learning tool in European higher education, with production of methodologies, tools and training packages. The project delivered guidelines, process charts and a software to model the processes. Whereas the main focus is Open and Distance Learning, most of its methodology is still valid for broader higher education e-learning projects such as Math-Bridge.

Figure 3 shows the modelization of the processes a teacher is involved while giving an e-learning course.

The modelization of the processes involved in planning the education content to be given to students.

Another relevant European project is the JEM project (Joining Educational Mathematics). It was an eContentPlus Thematic Network that delivered guidelines and best practices regarding evaluation criteria for eContent quality in mathematics (Deliverable D2.1): jem-thematic.net/.

These projects synthesize and generalize previous methodologies on the issue of quality management that we will not summarize here.

View resource
Reviews

REVIEW FOR "{1}"

revue après plusieurs tests ★ ★ ★ ★

Global comment: Review filed on 2009/11/11 00:08 by [ileyraud](#).

Revue après deux tests en classe de 2nde avec des publics différents. Activité très intéressante, qui demande d'y passer du temps pour bien l'exploiter (au moins deux heures de modules ont été nécessaire pour une classe avec un niveau très moyen).

This review concludes a trial in classroom.

Usage conditions

Hardware setup
Learner organization

More about the context of usage (free comments):

Educational Levels:
Update the selected educational level(s) for this resource.
Educational levels:

Radio buttons: more on the left side to say that I don't agree, more on the right side to say that I agree

▶ <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	I found easily the resource, the audience, competencies and themes are adequate
▶ <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	The files are technically sound and easy to open
▶ <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	The content is mathematically sound and usable in the classroom
▶ <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	Translation of the mathematical activity into interactive geometry is coherent
▶ <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	In this resource, Interactive Geometry adds value to the learning experience
▶ <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	This activity helps me teach mathematics
▶ <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	I know how to set my class for this activity
▼ <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	I found easily a way to use this activity in my curriculum progression
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	The activity benefits later in the classroom
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	The activity relates easily with my usual teaching
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	It helps to understand the mathematical notions at work
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	The experiments they made provide an introduction to the next topic

Comments:

▶ <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	The resource is user friendly and adaptable
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Figure 1: Example of a filled-in questionnaire of the Intergeo project.

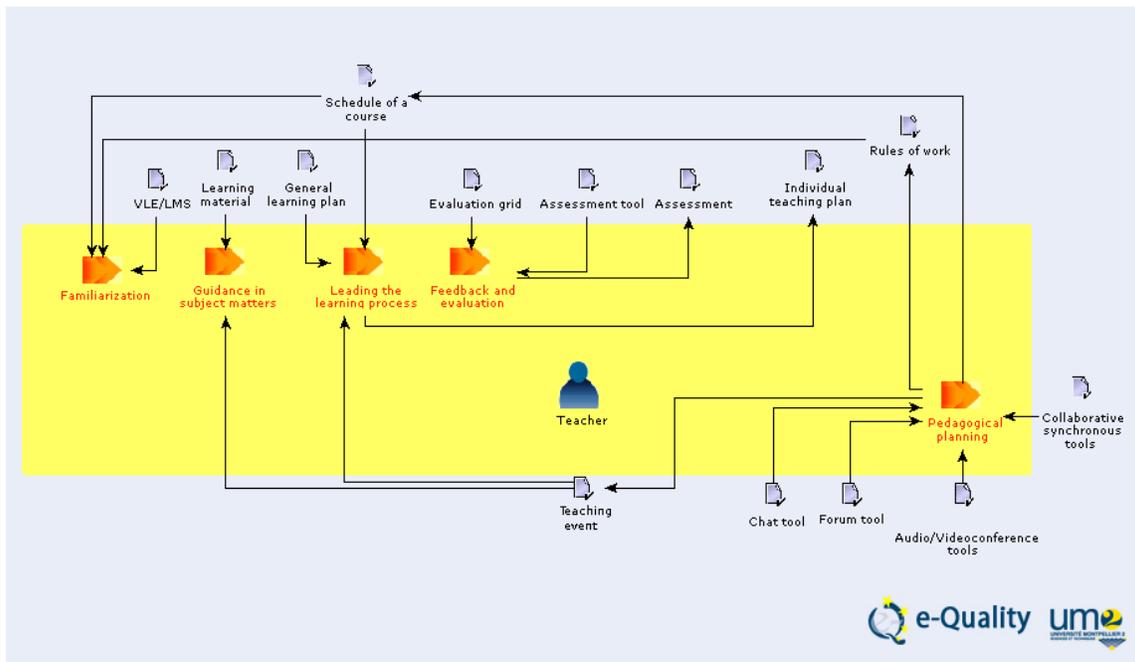


Figure 2: Processes in the life-cycle of a teacher interaction with the e-learning platform.

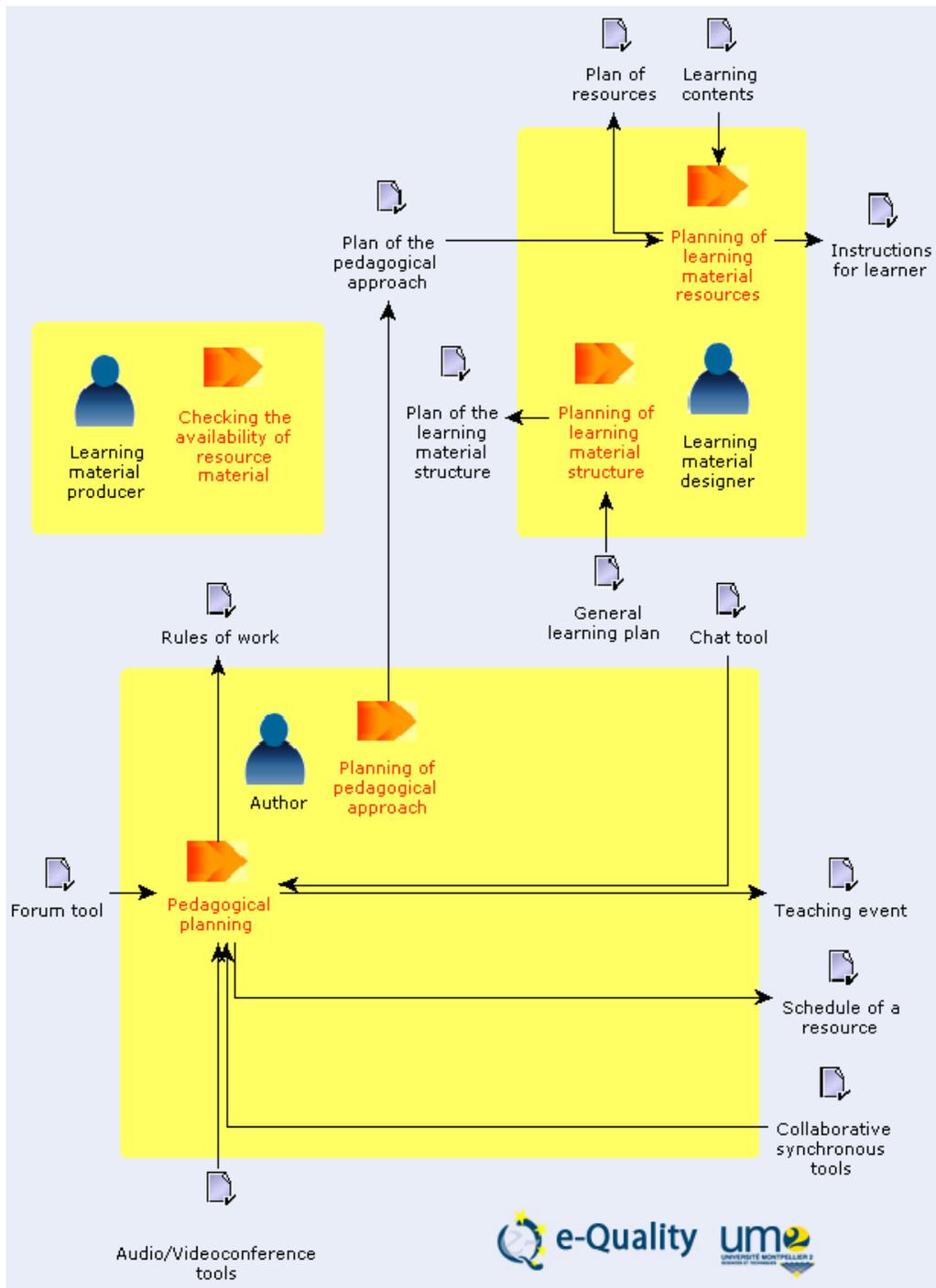


Figure 3: Modelization of processes a teacher is involved in the Intergeo project.

6 Feedback collection process implementation

For the technical realization of the feedback collection, the most relevant challenges were:

- to make the surveys as easy as possible to complete
- to separate the questionnaires into smaller parts in order to keep the length of a single survey session reasonable
- to be able to control the intervention point when to administer the survey
- to keep control over data and make it easy to upload to a central repository
- to keep the user interface design consistent with other parts of the Math-Bridge service.

In order to collect and analyze user feedback, we extended the Math-Bridge platform by a component to administer surveys and questionnaires. An alternative approach would have been to use free feedback-collection tools available on the web, such as SurveyMonkey³. However, most of these services offer only very limited functionality in the free version. Advanced functionality, for example user interface customization, requires subscription to a paid plan which can incur significant costs. Furthermore, feedback data gets always stored on the providing server, which means it needs to be exported from there before we can put it on our central collection point. In the remainder of this section, we will describe the implementation of feedback collection with Math-Bridge in more detail.

6.1 Math-Bridge Surveys

The survey component of Math-Bridge can be used to administer pre-defined questionnaires to users and to store the results for later analysis. It has a basic authoring mechanism making it comfortable to author new surveys. It is also possible to declare some items as mandatory fields. Figure 4 shows an early stage of the questionnaire implementation using the survey tool provided by Math-Bridge. Internationalization can directly be handled by Math-Bridge, thus removing the need of explicitly annotating free-form input with the language that has been used. With the survey feature, it is possible to control when the questionnaires are administered in Math-Bridge and it can be made sure that taking the survey is mandatory in order to continue working.

To make the answering of the questions as easy as possible, we will make the question items presented in section 3 unrelated to a concrete activity an integral part of the Math-Bridge

³<http://www.surveymonkey.com>

service’s new user registration. For logged users, filling the complete set of questions related to an activity will thus take less time, because they will not need to provide general information already stored in their user profile. After completion, the results of the questionnaires are sent to Math-Bridge via its event system instead of being written directly to the database. This allows to tap into all functionalities Math-Bridge provides for handling events, especially event storage and event reports. The former allows for the persistent storage of the events in a database for further processing, the latter allows to generate elaborate reports about the results of the survey.

The screenshot shows a web browser window with the title 'Math-Bridge Teacher Survey'. The address bar shows the URL: <http://commons.activemath.org/ActiveMath2/surveys/survey.cmd?survey=teacher-post-survey>. The main content area has a blue header with the text 'Your experience with Math-Bridge'. Below the header, there is a section for 'Overall, I have been working with Math-Bridge...' with three radio button options: '1-4 weeks', '>1-3 months', and '>3-6 months'. Below this, there is a table of survey questions with three columns of radio button options: 'Do not agree', 'Neutral', and 'Strongly agree'.

	Do not agree	Neutral	Strongly agree
I think MathBridge provides helpful and constructive feedback for teachers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think MathBridge provides teachers with all necessary functionality for preparing bridging courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think MathBridge provides students with all necessary functionality for effective learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think it is easy to build a course in MathBridge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the gap detection tool of MathBridge is useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the course generator of MathBridge creates effective adaptive courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the search tool of MathBridge is useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think MathBridge provides me with enough content to cover all material for a course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the content in MathBridge has appropriate level of difficulty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the content in MathBridge is mathematically correct	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 4: A survey questionnaire in the Math-Bridge Platform

6.2 Math-Bridge Reports

The administration area of Math-Bridge contains a reporting part. In this component it is possible to generate and analyze reports of students actions captures by the event system. As questionnaires generate events their analysis is possible too. It is possible to specify

in which questionnaire data we are interested, for example we can generate a report on the user inputs of a specific time period for a named user group i.e. the class of a tutor. The result of such a report will look similar to Figure 4 and can be roughly analyzed in the browser. To be able to perform a deeper analysis of the user inputs we create a CSV export which can be read by statistical analysis software like SPSS⁴.

⁴<http://www.spss.com>

7 Conclusion

This document presented the questionnaires for the collection of user feedback to the Math-Bridge service, a rationale explaining their structure, a discussion of the relation to other projects and a description of the technical aspects of the collection process.

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