

A mobile application for user regulated self-assessments

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E-assessment

- is the process of using ICT tools to perform assessment related activities.
- The basic benefits:
 - lower long-term costs
 - enhanced interactive and multimedia question styles
 - greater flexibility with respect to location and timing
 - instant feedback to students
 - improved reliability
 - enhanced learning and assessment process

Formative assessment *and* self-assessment

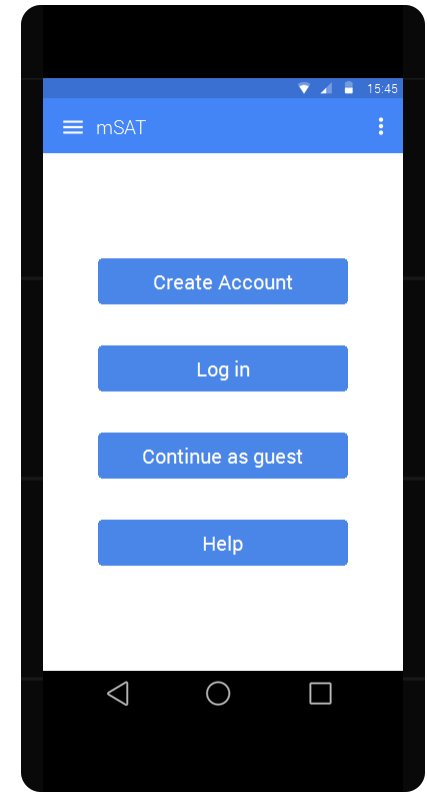
- **Formative assessment** is defined as "*the process used by teachers and students to recognise and respond to student learning in order to enhance that learning, during the learning*" (Cowie & Bell, 1999).
- **Self-assessment** is a form of formative assessment, which is an important part of learning.

In our work...

- we are interested in supporting self-assessment by:
 1. allowing students to adjust the process to their needs, goals, and preferences
 2. improving the technological means of running self-assessments

mobile Self-Assessment Tool

- An app with the aim to help users to prepare for their exams through the self-execution of tests
- The application exhibits an adaptive behavior, meaning that the question items are not predefined, but users regulate the process by defining a number of criteria



Adaptive/individualized/personalized

- Is the process of automatically adapting the e-learning/e-assessment process to the performance, knowledge, needs, weaknesses and preferences of the individual.
- Simple adaptation could mean the adjustment of the learning environment (colors, font size, etc.) but with these terms we actually refer to the *adaptation of the content to pedagogically assist learners*

Main entities (data categories)

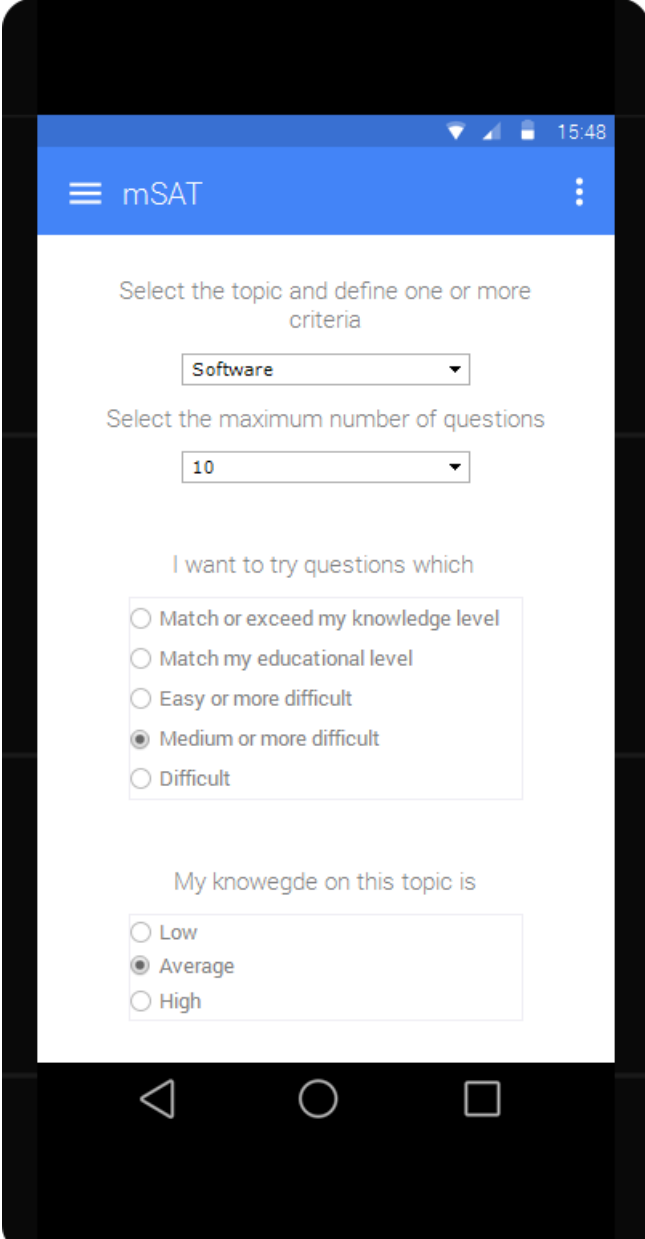
- Users: where the details of the registered users of the application are stored.
- Topics: the details of the topics of the testing items.
- Question Items: contains the text, the type, the choices and the correct answer(s) of the testing items, the difficulty level, the educational level etc.
- User Results: where the results for each attempt are stored.

Questions are selected based on

- i. The difficulty level and/or the educational level of the questions
- ii. The learner's knowledge level
- iii. The learner's educational level

Selection of questions

- *(Learners may provide some identification data)*
- They select the topics
- They define their knowledge level on these topics
- They define their preferences



The screenshot shows the mSAT mobile application interface. At the top, there is a blue header with the text "mSAT" and a menu icon on the left and a three-dot menu icon on the right. The status bar at the top right shows the time "15:48" and icons for signal strength, Wi-Fi, and battery. The main content area is white and contains the following elements:

- A heading: "Select the topic and define one or more criteria"
- A dropdown menu with "Software" selected.
- A heading: "Select the maximum number of questions"
- A dropdown menu with "10" selected.
- A heading: "I want to try questions which"
- A list of radio button options:
 - Match or exceed my knowledge level
 - Match my educational level
 - Easy or more difficult
 - Medium or more difficult
 - Difficult
- A heading: "My knowegde on this topic is"
- A list of radio button options:
 - Low
 - Average
 - High

The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps icons.

Presentation of the questions

- The presented items are grouped based on the subtopic they relate to.
- More questions within a topic are grouped at the end of the assessment items under a “Similar questions” button.
- Groups of items that have higher difficulty level than the user’s defined knowledge level, are presented first.
- Visual clues are attached to items that the system believes a user has to attempt.

Estimation of the results

- The knowledge level per topic is based on the average test score on the specific topic.
- The erroneous items with the available feedback are given by the system.
- Statistics per question are stored to be used by the system and the test creators.

Please fill your data (* required)

*Name:

*Email:

Science

- Computer Science
- Binary system
- Div
- Mod
- Expressions
- Operators

Physics

Educational level:

Knowledge level:

I wish to try questions

Easy Medium Difficult
and/or are for:

Are my knowledge level

Are my educational level

Automatic selection based on my data

The image shows a smartphone displaying the mSAT mobile application. The interface is clean and user-friendly, with a blue header bar containing the app name 'mSAT' and a menu icon. The main content area is white and contains several sections for user input. At the top, there's a status bar with the time '15:48'. Below the header, the text 'Select the topic and define one or more criteria' is followed by a dropdown menu showing 'Software'. The next section asks for the 'maximum number of questions' with a dropdown set to '10'. A third section titled 'I want to try questions which' has five radio button options: 'Match or exceed my knowledge level', 'Match my educational level', 'Easy or more difficult', 'Medium or more difficult' (which is selected), and 'Difficult'. The final section, 'My knowegde on this topic is', has three radio button options: 'Low', 'Average' (selected), and 'High'. The bottom of the phone shows the standard Android navigation bar with back, home, and recent apps buttons.

Evaluation (of the web based tool)

- 106 high school students (aged 17 to 18)
- 49 students used a version with a version with no adaptation options
- 57 students used a version of the system with adaptation options
- The distribution of students was based on their stated knowledge level, so that students of various knowledge levels were equally distributed in the two groups.

Evaluation (of the web based tool)

- The evaluation showed that
 - the students used and liked the options of the system (against a system that had no adaptation options)
 - it motivated students to try more questions
 - students seemed to have performed better

Evaluation of the current mobile version

- to measure the potential improvement on the performance of the learners in regular in-class assessments, *and*
- to understand if the mobile version of the tool prompts users to be more engaged in the process.

Evaluation (1)

- The trials run between September and December 2016.
- Students (aged 15 to 16) were randomly divided into two groups of 44 (Group A) and 43 students (Group B).
- With a pre-test on CS topics we ensured that the average knowledge level was similar to both groups

Evaluation (2)

- Three paper & pencil in-class tests have been planned for both students groups.
- Group A (experimental group) had the ability to utilize the android application for one day prior to each test.
- Group B (control group) did not have access to the application.

First run

Table 1. Scores of the student groups in the first in-class paper & pencil test

Score	Group A	Group B
0-50%	9	8
50%-75%	27	30
75%-100%	8	5

- Group A average: 64.55%
- Group B average: 62.69%
- Similar averages (t-test)
- Low utilization of the application (approx. 25% of the students of the experimental group)

Second run

Table 2. Scores of the student groups in the second in-class paper & pencil test

Score	Group A	Group B
0-50%	8	5
50%-75%	25	30
75%-100%	11	8

- Group A average: 67%
- Group B average: 63.4%.
- Different averages (t-test)
- High utilization of the application (approx. 75%)

Third run

Table 3. Scores of the student groups in the third in-class paper & pencil test

Score	Group A	Group B
0-50%	7	6
50%-75%	24	27
75%-100%	13	10

- Group A average: 71%
- Group B average: 64.3%.
- Different averages (t-test)
- High utilization of the application (approx. 88%)

Individual interviews

- The application helped the students to get a better mark
- It prompted users to be more engaged in the process of evaluating their understanding
- Students found the application easy to use
- They liked the fact that it supports various options

Conclusions

- A tool for self-assessment which can be adapted to various goals
- The mobile version is more user friendly and close to the usual student operations with respect to self-assessment
- Students provide limited data
- The evaluations showed that
 - the students used and liked the options
 - it motivated students to try more questions
 - students who used the application have performed better

Future work

- More tests are needed to test its pedagogical value
- More flexible options are considered (e.g. pre-assembled tests for specific classes, or peer-assistance etc.)
- An option for preserving the learners' data has already been added

Thank you

