INTERACTIVE PERFORMANCE-BASED ASSESSMENT OF ICT SKILLS

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ABSTRACT

In this paper we present a tool for interactive generation and implementation of performance-based assessment of basic operational word-processing learner's skills. In Section 2 the approaches to interactive ICT skills assessment are analyzed. Two basic approaches for automatic interactive ICT skills assessment could be outlined: simulation-based and real-life performance-based ICT skills assessment. Section 3 deals with the functionalities of the proposed tool for interactive performance-based word processing skills assessment. Also, we discuss the possibility for implementation of the tool within an e-learning course. In conclusion, we consider the possible trends for use and improvement of the discussed approach.

1   INTRODUCTION

The assessment of ICT knowledge and skills is an important part of the educational activities in 21-st century schools. The questions about ICT knowledge and skills assessment are: What kind of knowledge and skills to be assessed? What kind of assessment methods to be used? What kind of computer based tools to be carried out for assessment? Wide spread assessment approaches are tests, problem solving and project based methods. Performance-based assessment takes an important place in the ICT skills measurement. This method of assessment asks students to "create an answer or product that demonstrates their knowledge or skills" [3] "Performance assessment is a measure of assessment based on authentic tasks such as activities, exercises, or problems that require students to show what they can

do." [4] In fact, performance-based assessment in ICT includes problem solving, portfolio and projects developed by the learners.

The learning and assessment tasks in ICT could be divided in two basic groups:

- operational tasks – relative to mastering of skills for use of concrete software application;
- conceptual tasks – relative to mastering of principal rules for application of different ICT tools.

According to the above types of tasks, the ICT skills could be divided into operational skills and conceptual skills. The learners should master operational skills before mastering conceptual skills. When the sculptor I strained how to chisel, he/she first learns how to hold and work with chisel and hammer.

Computer based forms of the assessment approaches ensure more possibilities for knowledge and skills self-assessment, decrease the time spent by the teacher for checking and evaluation of the ICT knowledge and skills, and provide conditions for implementing of assessment activities in e-learning courses. In fact, every e-learning environment provides a tool for test creation and implementation. Every teacher has an opportunity to develop, adapt, use or reuse tests and a diversity of test items in some e-learning environment. The problems regarding automated computer based assessment of skills for using software applications and real-life problem solving with ICT are not so well solved and these are not so easily accessible by teachers.

In this paper we present the tool for interactive generation and implementation of performance-based assessment of basic operational word-processing learner's skills. In Section 2 the approaches for interactive ICT skills assessment are analysed. Two basic approaches for automatic interactive ICT skills assessment could be outlined: simulation-based and real-life performance-based ICT skills assessment. Section 3 deals with functionalities of proposed tool for interactive performance-based word processing skills assessment. Also we discuss the possibility for implementation of the tool within an e-learning course. In conclusion we consider the possible trends for use and improvement of the discussed approach.

2   ANALYSIS OF APPROACHES FOR INTERACTIVE ICT SKILLS ASSESSMENT

2.1   Simulation-based interactive ICT skills assessment

The simulation-based interactive ICT skills assessment and self-assessment is a wide spread practice in the world. This form of skills assessment is applicable for each types of assessment - pre-assessment, formative and summative assessment. The simulation-based skills assessment is used by certification and training institutions to assess learner's ICT literacy. This type of ICT skills assessment is

provided by Microsoft IT Academy [7], International Computer Driving License (ICDL) and European Computer Driving License (ECDL) certification centres [6], Internet and Computing Core Certification (IC^3) [5], etc.

Some world leading publishers offers on-line assessment products. "These products include Skills Assessment Manager (SAM) by Course Technology, SIMNET by McGraw-Hill and Train and Assess IT by Prentice Hall. In general, all of these products are geared towards the same sets of skills assessed by the Microsoft Office Specialist exams, although they also have online training portions that students may access" [2].

For development of a simulation-based assessment ICT task, Java programming or authoring tools could be used, such as Adobe Captivate, TurboDemo, Macromedia Flash, etc. These tools offer a lot of features for creating simulation-based assessment tasks, but they require special skills from the teachers.

The simulation-based ICT skills assessment tools and tasks are very suitable for formative skills assessment. They are attractive for the learners and teachers. They insure needed environment for interactive performance assessment. The learner receives results from the testing immediately. Unfortunately, in most cases the teacher does not have the opportunity to change the content of the tasks or adapt them to the needs of the learners. In some cases the teacher could arrange the assessment from repository of already prepared tasks. If the teacher wishes to modify or prepare their own simulation-based task, he/she needs additional knowledge and skills about the authoring tools.
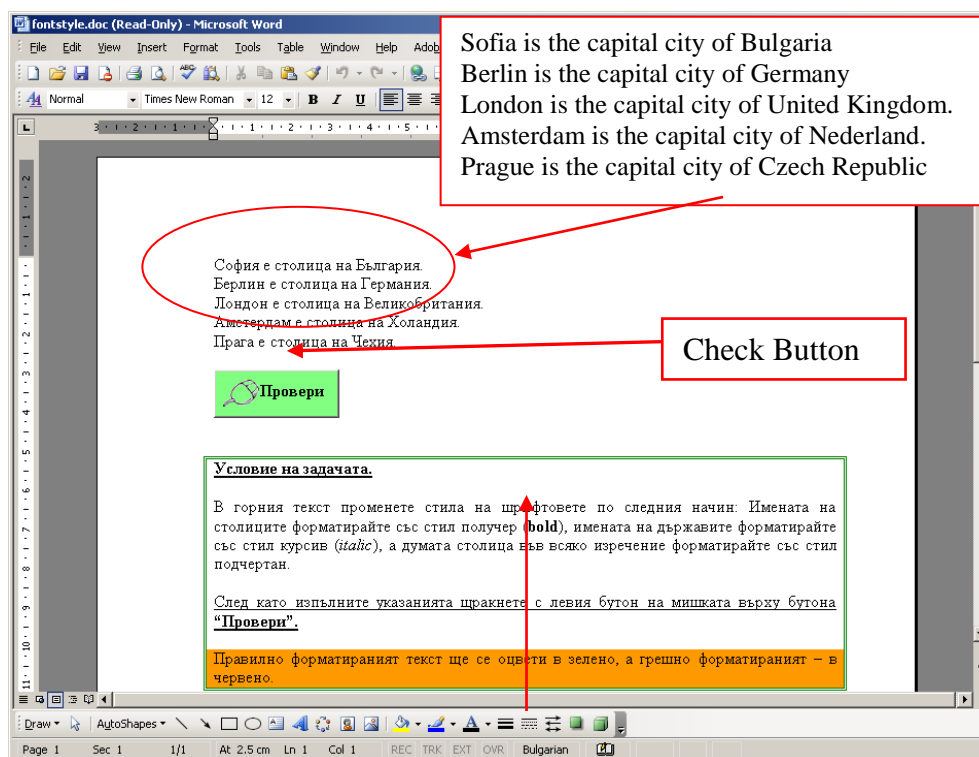
2.2   Real-life performance-based ICT Skills assessment

The real-life performance-based assessment of ICT skills requires from students to demonstrate their skills in real ICT application. Usually, in this type of assessment the teacher receives the solution of the task and checks performance by the learner document. This type of checking in most cases takes a lot of time.

For automatic assessment of basic operational skills in an MS Office application integrated Visual Basic for Application (VBA) modules could be used. For example, in a multimedia disk [1] we have been developed some interactive tasks for real-life performance-based self-assessment (Figure 1).

This type of task is attractive and helpful for the students, but when the teacher wishes to modify condition of the task he/she needs knowledge about VBA. When we offered such tasks to the teachers, they asked us for the possibility to modify them or to create new tasks.

Therefore, we began to work on the tool which could help the teachers without special knowledge of VBA or authoring tools to create real-life performance-based interactive assessment tasks. The first steps of development of an interactive tool were directed to basic word-processing skills assessment.

Sofia is the capital city of Bulgaria
Berlin is the capital city of Germany
London is the capital city of United Kingdom.
Amsterdam is the capital city of Nederland.
Prague is the capital city of Czech Republic

Check Button

Assessment task content
In the above text, change font styles as follows: format the names of capital cities in bold style, format the names of countries in italics style and the word 'capital" in each sentence format with underline style.
When you are ready, then press the Check button.
The right formatted text will be colored in green and wrongly formatted text will be colored in red.

Figure 1. Performance-based interactive self-assessment task, developed with VBA

3   TOOL FOR PERFORMANCE-BASED WORD PROCESSING SKILLS ASSESSMENT

3.1   Basic requirements and system architecture

The interactive skills assessment tool is developed with Visual Basic 2008 Express Edition and VBA. The tool requires installation of .NET Framework 3.5, MS Word 2003, MS Windows XP on the appropriated hardware.

The tool consists of 2 basic modules – teacher's module for generation and check of the task and student's module for skills self-assessment (Figure 2). Both modules are executable applications working respectively on the local computers of the teacher or of the learners.
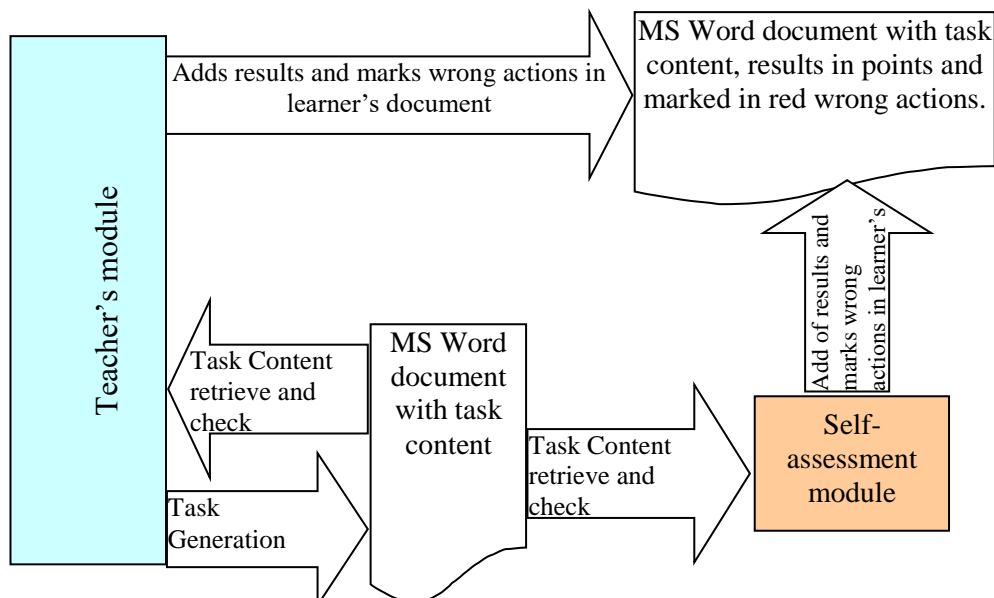

Figure 2. Architecture of the skills assessment tool

The teacher's module generates the assessment task in a new or existing word document, checks the student's document for the correct performance of the tasks. The check procedure in the teacher's module and self-assessment module in fact retrieve the needed information from the task content in the active word document and compare the performed subtask by the students. For each correctly performed subtask, 1 score point is given. After the check, the final result in score points and wrong answers coloured in red are visualized for the user (teacher or learner). The tool is easy for language localisation. At this moment, the tool has a Bulgarian and English interface.

3.2 Basic features

The users of the proposed interactive word-processing skills assessment tool are 2 types – teacher and learner.
The teacher could generate the performance-based assessment task in a new MS Word document or in an existing MS Word document. The teacher could choose the type of subtask – format of symbols and paragraphs, page setup, insert table, insert and format picture (Figure 3). After the task generation, the teacher could protect the document. The protection enables the learner to modify only the text for

assessment and not to change the task content. The teacher could specify the purpose of the assessment – evaluation assessment or self-assessment. In case of self-assessment, the teacher has to send an unprotect password to the learner.
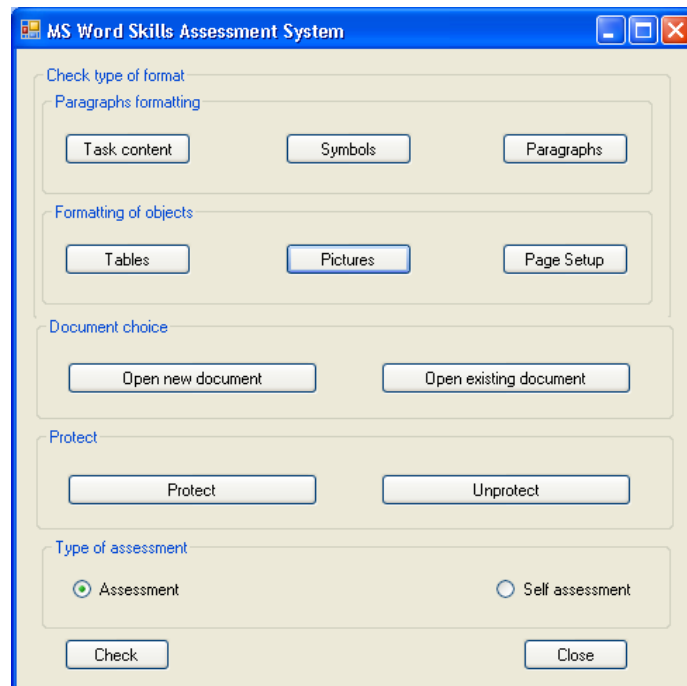

Figure 3. Interface of the teacher's module

In the process of checking the documents the teacher should unprotect it. He/she receives the results obtained by the learner in the learner's document. The results are scored in points, as the wrong subtasks are marked in red (Figure 4).

The learner could do the assessment task in a real-life MS Word 2003 application. If the task is for evaluation, she/he should save the document and give it to the teacher. In case of self-assessment, the student should save the document, run the self-assessment module and enter password to unprotect the document. The results from checking are score points and red marked wrongly performed subtask.
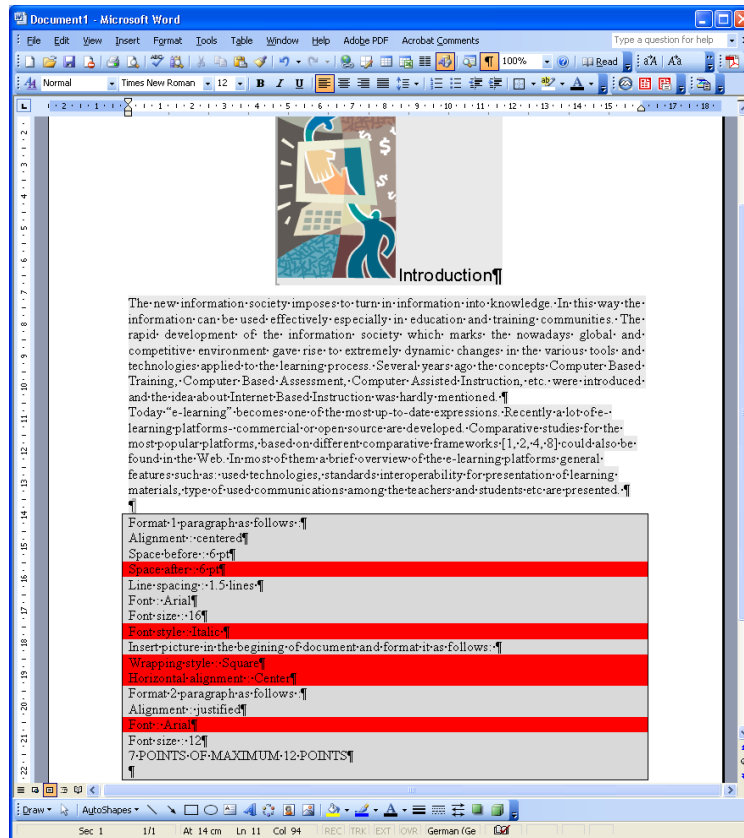
Figure 4. Task after checking

3.3 Possible Implementation of the tool within an e-learning course

The proposed word-processing skills assessment tool allows the teacher to generate different performance-based assessment tasks in word-processing. These tasks could be implemented on an e-learning ICT course and could be delivered to the students through e-mail or an e-learning environment as an assignment with an attached file. The student could download the file with the assessment task, do the task and upload the word document with completed task into the e-learning environment. In case of self assessment, the learners should start the self-assessment module installed on his/her computer and enter the password that is given by the teacher.

4 CONCLUSIONS

The developed word-processing skills assessment tool provides opportunities for carrying out performance-based interactive skills assessment. Teachers do not need special skills to develop performance-based interactive assessment tasks especially for formative assessment. This project will be improved by including of formatting of more objects in MS Word, such as numbered lists, footnotes etc. The proposed architecture of the module could also be applied to the assessment of basic operational skills in spreadsheets.

5 ACKNOWLEDGMENTS

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