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TARTALOM

AN INSTRUMENT TO ASSESS THE BASIC TECHNOLOGICAL ACTIONS OF ICT LITERACY[1]

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Ubiquitous technological devices in our environment have determined the need for the confident use of basic technology and the development of ICT literacy identified as a key competence by the European Council (2004). The study introduces an assessment instrument, which aims at measuring in an authentic way the confidence of basic technological actions (BTA) (mouse click, drag and drop functions and typing) within the technological aspect of ICT literacy. Authenticity is assured by partly simulated, but wholly computer based software delivered through eDia online platform (Molnár & Csapó, 2013) as a tool. Collecting data about the media effect caused by unpreparedness for computer based assessment (CBA) is a focal point of the research as well.

1. Introduction

Testing and assessment is one of the fastest developing research areas of learning and instruction (Csapó et al, 2008). The internet age has brought about the rapid improvement of third generation online psychometric testing (Hawkes, 2012), whose necessity is determined by the unstoppable advance of technology penetrating every area of our daily life. Without confidence in the basic technological actions (BTA: mouse click, drag and drop functions and using the keyboard) of the technological aspect of Information and Communication Technology (ICT) literacy one is left without a chance to participate actively and efficiently in society. Such basic actions are the essential elements of computer use, which facilitate access to information.

In this study a new online assessment instrument for testing the BTA will be introduced. First, within its theoretical background the concept and the ways of assessment of ICT literacy and BTA will be dealt with. Then the new assessment instrument will be introduced in detail. Furthermore, a summary of results achieved during the test development process and the remaining tasks to complete the aims to reach will be discussed.

2. Theoretical Background

Prior to introducing a new type of assessment instrument, it is essential to categorise the construct to be measured. Another indispensible step is to place the type of assessment instrument within the existing set of assessment

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instrument types. In this section both conceptual clarification of the basic technological actions of the technological aspect of ICT literacy and an outline of assessment tools related to ICT literacy will be provided.

2.1. Conceptual clarification

Since the 1980s, when the term computer literacy was introduced through the 1990s, when the term information literacy was used with extended content (Bawden, 2001), until recently, when the construct is referred to as ICT literacy by international research groups (ACARA, 2012; Katz & Macklin, 2007; Law et al 2009; OECD, 2003), digital competence (European Council, 2004) or information literacy built on ICT skills and media literacy (UNESCO, 2008), several changes have occurred both in terms of definition (Tongori, 2012) and assessment of the field (Molnár & Kárpáti, 2012; Tongori, 2013a, 2013b). The change regarding definition has been characterised by expansion from basic hardware knowledge and software applications to a set of six information handling steps identified by the American Library Association in 1989, which has been the basis of all definitions since then including (1) the recognition of the information need, (2) definition of the information need, (3) retrieving, (4) evaluating (5) managing and (6) using the information (Lankshear & Knobel, 2008).

The elements of ICT literacy have also been identified based on the above-mentioned six steps by the American Educational Testing Service, the Australian Curriculum, Assessment and Reporting Authority and other major research institutions one of which is the Centre for Information in Education of the University of Hong Kong (ACARA, 2012; ETS, 2002; Katz & Macklin, 2007; Law et al, 2010; Tyler, 2005). In addition to the information handling steps, which have further been expanded by communication and creation of information (Katz & Macklin; 2007), there has been growing concern for such aspects of ICT literacy as the individual's attitude, social competences, responsible citizenship, related legal, safety and health issues, problem solving and critical thinking and basic use of technology (European Council, 2004; NAGB, s. a.; UNESCO, 2008; UNESCO and Microsoft, 2011). ICT literacy could thus be defined as a construct involving the confident use of info-communicational tools as well as networks during which definition of the information need, retrieval, management, integration, evaluation, creation, and communication of the information is completed by the individual in order to participate efficiently in society. At the same time awareness of the technological, cognitive, social and responsibility-determined (legal, ethical, health and personal safety) aspects of ICT activity are essential qualities of an ICT literate individual (Tongori, 2013b).

The basic technological actions (BTA) dealt with in this study could be placed within the category of technological aspects of ICT literacy. In the latter

category there are further subcategories (for example, elements of word processing or creating folders) besides BTA.

2.2. Assessment

As regards assessment tools, a shift from paper and pencil (PP) to computer based assessment (CBA) could be witnessed recently (Molnár, Tóth & Csapó, 2011). Assessment of ICT literacy, which is technology-bound by nature, could not be conducted in other than a technology based environment. The most recent, third generation assessment tools use simulation to make measurement a much higher resolution one (Hawkes, 2012). Besides more accurate testing, the new generation of online assessment tools allows for a much more active role on behalf of the test-taker. Instead of simply mouse clicking their choice from among a set of multiple choice answers, the test-taker is asked to rearrange a set of items (diagrams, images etc.) by dragging and dropping them (Hawkes, 2012). A meaningful way of computer based assessment (CBA) of ICT literacy is using simulation as simulation-based testing is an authentic means of ICT literacy performance assessment (Macklin, 2007).

Contrary to the results of international research, the mode of most domestic and international research has been mainly paper and pencil and even online data collection has relied on test-takers' answers to questionnaires on accessibility or frequency of or attitudes to computer and internet use (Molnár & Kárpáti, 2012). However, major Australian, American and Chinese (Hong Kong) research institutions and projects have conducted large scale online ICT literacy assessment using simulation including measurement of the performance of basic technological actions (ACARA, 2012; Katz & Macklin, 2007; Law et al, 2010). Small scale assessment of simulation based online performance assessment of ICT literacy has also been administered (OECD 2003; Zelman, Shmis et al, 2011) (see Appendix, Table 1).

Basic technological actions incorporating moving and clicking the mouse, drag and drop functions or typing compose the core technological aspect of ICT literacy. Thus assessing students' confidence in basic technological actions (BTA) is a basic step towards gauging further aspects or components of ICT or digital literacy. The results of the assessment of BTA could be considered in online diagnostic tests aimed at collecting data in different fields for multiple purposes as the test-takers could be influenced by the assessment mode. Test results might be altered by the lack of confidence in the use of technology on behalf of the subjects of the test. Significant effect of the test mode has been detected (Bennett et al, 2008; Clariana & Wallace, 2002; Csapó, Molnár et al, 2008). In other cases the hypothesis that the computer based medium would have a different effect on students' results than the paper and pencil one has been disproven (Hülber, 2012; Poggio, 2005).

3. A Novel Assessment Instrument

The high speed of technological development causes difficulties in technologically up-to-date test development, especially, in the field of ICT literacy. The daily appearance of new digital devices challenges researchers to devise instruments and tools which are capable of assessing the abilities and competences of individuals to use them. At the same time educational authorities are also challenged to apply methods that develop individuals' digital competences, which progress needs the results of research. At the present state of the BTA test development project using the mouse and the keyboard are regarded as the basic elements of computer use. However, the extended use of touch screens of mobiles and tablets is currently putting a pressure on researchers to involve such movements as magnifying and reducing size by touching.

3.1. Task criteria of testing the BTA

During the test construction phase a major concern was to avoid to the highest possible extent making test-takers apply specific thinking skills, for example inductive reasoning (Molnár, 2006). As a result, every attempt has been made in order that no recognition of similarities or differences by comparison of characteristics or relations should be expected. The aim is to assess only the test-takers' confidence in the basic technological actions. To make the assessment motivating for the target group (grades 1-3 primary school pupils), the tasks are embedded in real life situations appropriate for the characteristics of the age group and rely on what everyday experiences they are supposed to have. Among a variety of tasks a selection of scenario-based ones are closely related to ICT activity (chat, email).

In terms of instructions, the possible differences between test-takers' reading comprehension skills also have to be considered. In order to exclude the need for improved reading comprehension skills to achieve a good result in the BTA test, the students are instructed to start the timer of each activity after having comprehended the task by reading and listening to it. This option, however, is not included in the pilot test.

The tool of delivery is eDia online platform (Molnár & Csapó, 2013), which has been devised for diagnostic assessment appropriate for 21st century purposes allowing images, audio and video files as well as multimedia content to be embedded and providing timing opportunities as well as increased levels of interactivity including immediate feedback on student activity.

In the following section the introduction to the BTA test task types in detail will commence. The subtypes of the following three types will be discussed with reference to the examples in the Appendix: (1) using the mouse, (2) using the keyboard and (3) combined tasks.

3.1.1. Using the mouse

Besides moving the mouse pointer to the right position, clicking, selection and drag and drop functions are included.

By **moving and clicking** hitting the target or targets confined to a larger or smaller area at random is meant. Random order is of high importance in order to avoid the need for reasoning skills (see Appendix, Pictures 1 and 2).

Using form elements also incorporates clicking but instead of images the mouse application focuses on buttons, radio buttons, check boxes or elements of roll down menus, which normally appear in online forms to be filled in (see Appendix, Pictures 3 and 4).

Drag and drop movement is aimed at dragging one or more elements to a certain area whose size is either identical with or smaller or larger than the object dragged (see Appendix, Pictures 5 and 6).

3.1.2. Using the keyboard

Assessing the use of the keyboard is executed by typing tasks. Students are expected to type in both short and comparatively long texts with the restriction that the term *text* means letters (letter keys of the keyboard), special characters in certain tasks (for example @), words (for example names), foreign words (for example *camelopardalis*), phrases, sentences or texts of a length of two or three lines (see Appendix, Pictures 7 and 8)

3.1.3. Combined tasks

Combined tasks where the test takers are expected to perform both mouse clicks and typing are also part of the assessment. Navigating between text fields and text areas and typing into them are typical examples of combined tasks (see Appendix, Pictures 9, 10 and 11).

4. Results and Discussion

As the assessment instrument introduced in this study is being developed, and a pilot assessment is yet to be administered, no empirical data have been collected by using it. However, the following results of the development process could be concluded. The types and subtypes of tasks to assess the basic technology actions of the technological aspect of ICT literacy have been selected, agreed on and demonstrated in this study. 40 tasks have been devised, 32 of which have been uploaded in eDia online assessment platform (Molnár & Csapó, 2013), where scoring of each task and finalisation of the test completion could be accomplished. From among the 40 tasks 11 typical sample tasks have been introduced in this study for the purpose of illustration. The total number of tasks has been declared to be appropriate for a pilot research in Hungarian educational settings regarding the 45-minute lesson length.

Conducting a pilot test and assessing its results could serve as a basis of further correction. Due to the fact that basic technological actions are an integral part of the technological aspect of ICT (or digital) literacy, valuable information could be gained in terms of the assessment of ICT literacy as well. In addition, data collected about confidence in or unpreparedness to the use of computer peripheries and computers, may contribute to our expanded knowledge of the effect of the test mode when computer based assessment is used to test variables independent of digital literacy.

5. Summary

After an outline of the conceptual and assessment-related change in the field of ICT literacy, this study has examined how a new measurement instrument can gauge grades 1-3 students' basic technological actions before computer based tests focusing on variables other than BTA are delivered to them. Comparison of the domestic online pilot BTA assessment instrument with other Hungarian and foreign ICT related tests demonstrates that the assessment instrument is a novel one in educational and especially in Hungarian educational environments in terms of testing BTA in a life-like scenario- and computer-based mode using certain simulations by which new, interactive response methods (involving drag and drop mouse actions and immediate feedback) are understood. The novelty of the instrument partly lies in the 21st century facilities offered by the eDia online assessment tool. An example of such innovation is the possibility of using a narrator record all the situations and instructions. Thus, students with low level of literacy are not hindered by their disability; therefore their result will reflect only their performance in the target field and not reading literacy. Finally, if used parallel with other online tests, the BTA test may provide information about the possible correlations between low test results and low BTA performance results, which, with further statistical analysis, could explain the effect of the test medium used on the test-takers' results.

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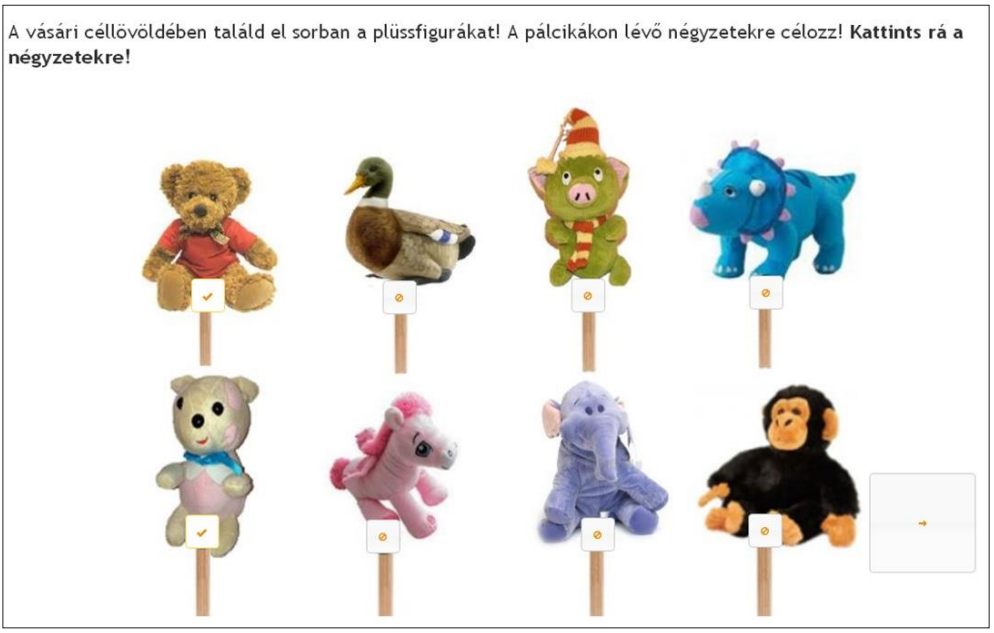
Appendix

Picture 1. Screenshot of a sample task requiring the student to use mouse clicks in order to 'count' (in an optional order) the number of fallen stars grandpa nails back.
(No accurate mouse click is expected.)

Picture 2. Screenshot of a sample task requiring the student to use mouse clicks in order to help the ranger 'repaint' the tourist signs on the trees in the forest.
(Accurate mouse click is expected to fill the circle. The last sign is 'painted' for illustration.)

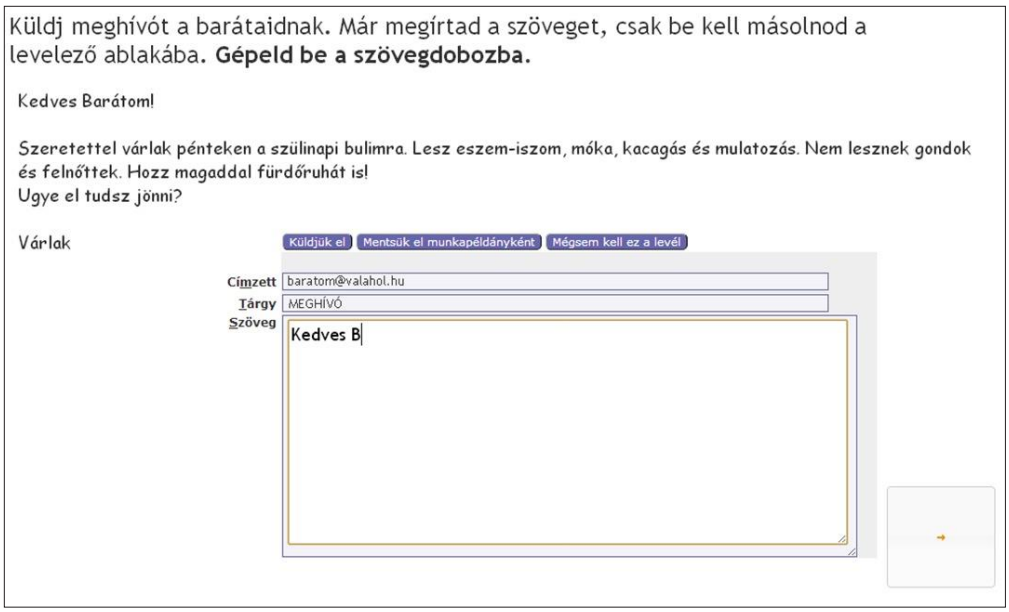


Picture 3. Screenshot of a sample task requiring the student to use mouse clicks on the form elements check boxes in order to 'hit the target toys' in the fairground shooting gallery.
(The first ones in each line have been 'hit' for illustration.)

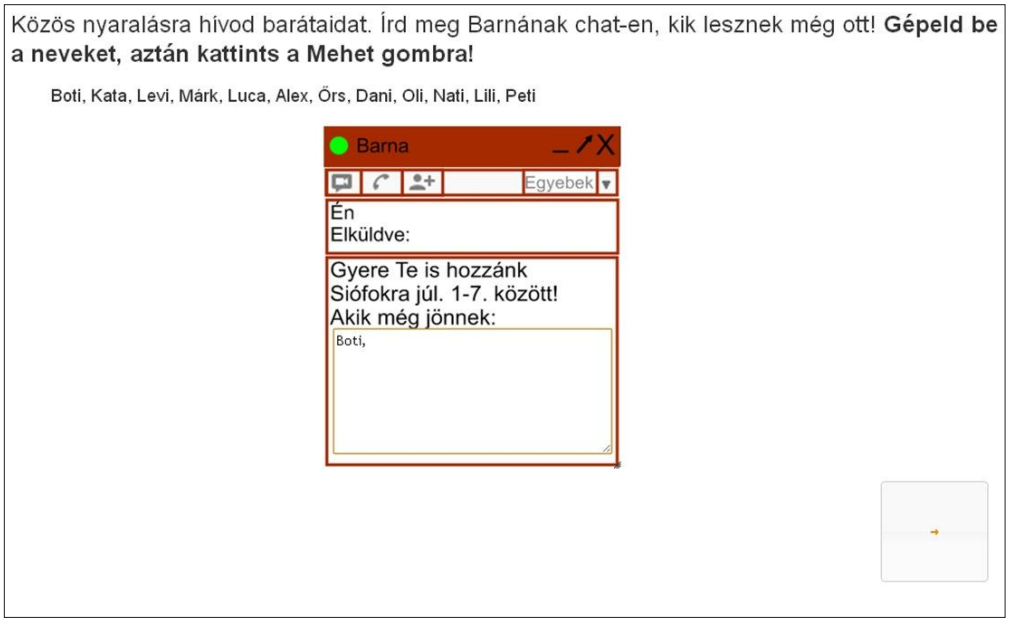
Picture 4. Screenshot of a sample task requiring the student to use mouse clicks on the form elements check boxes in order to 'tick off' on a list the ingredients of a cake to be baked for mom's birthday as they have been found in the pantry.
(The first one has been 'ticked off' for illustration.)

Picture 5. Screenshot of a sample task requiring the student to use the drag and drop function of the mouse in order to help Gardener Gordon 'plant' the flowers in the flower bed.
(No accuracy of location is expected. Six flowers have been 'planted' for illustration.)

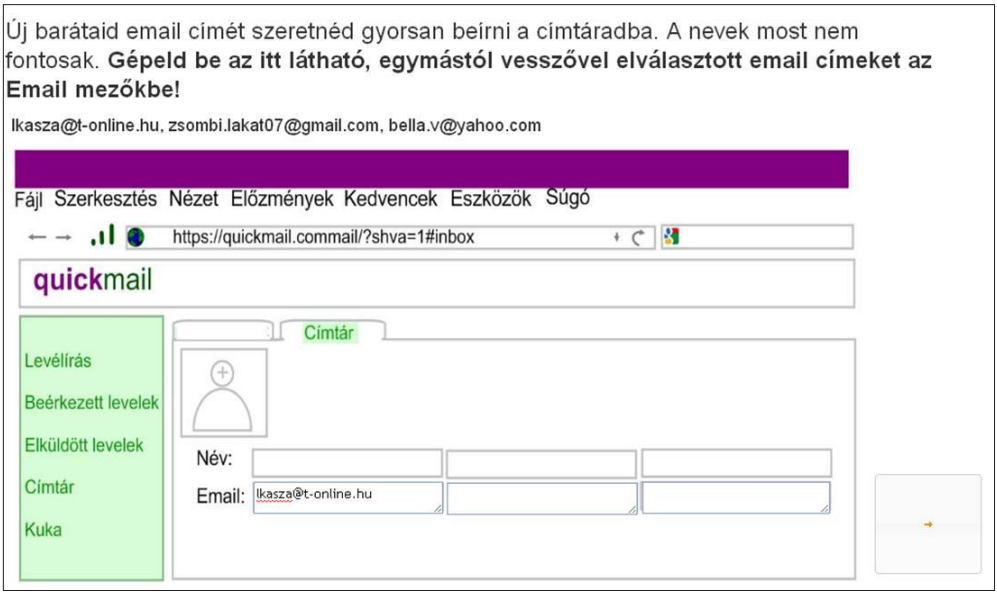
Picture 6. Screenshot of a sample task requiring the student to use the drag and drop function of the mouse in order to help Maggie the Magpie 'decorate' the Christmas tree so as to colour all the decorations.
(Accuracy of location is expected. Two of the decorations have been placed for illustration.)



Picture 7. Screenshot of a sample task requiring the student to 'copy' by typing in a text area a birthday party invitation that has been composed before to send it to a circle of friends. (Completion of the typing task has been started for illustration.)

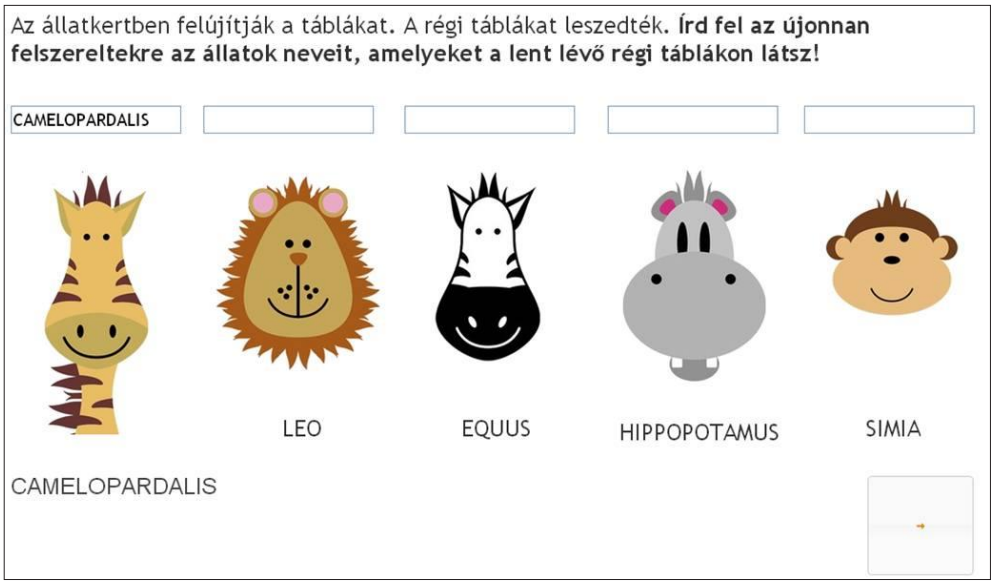


Picture 8. Screenshot of a sample task requiring the student to type into a chat box the names of people who have also been invited for a common holiday prior to chatting. The host offers to provide accomodation for all the guests in Siófok by Lake Balaton from July 1 to 7. (Completion of the typing task has been started for illustration.)



Picture 9. Screenshot of a sample task requiring the student to type in any order the email addresses of three given friends into the text areas of email addresses marked Email.
(Completion of the typing task has been started for illustration.)

Picture 10. Screenshot of a sample task requiring the student to type in the missing numbers or letters, which have been 'worn away' by intensive card game activity, in the text boxes on the cards.
(Completion of the typing task has been started for illustration.)



Picture 11. Screenshot of a sample task requiring the student to type the latin names of animals into text areas to 'make new signs' in the zoo instead of the old ones that have been removed. (Completion of the typing task has been started for illustration.)