# On Assessment of Teaching A Mathematical Topic Using Neural Networks Models (with a case study)

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## ABSTRACT

This piece of research belongs to a rather challenging interdisciplinary approach adopting realistic and fairly assessment of educational processes based on Computer-Assisted Learning (CAL) module(s). This trend is confirmed by the strong connections between two of the most prosperous research areas of educational psychology, and cognitive sciences. Recently, an assessment approach considering output achievement as learning parameter of a mathematical learning topic [1]. Conversely, comparative and fairly assessments for three different experimental educational methodologies are presented. Herein, those assessment processes are performed exploiting realistic modeling of time response parameter (learning convergence time) rather than output achievement parameter presented at [1]. In more details, two carefully (CAL) modules are designed for development of a multimedia tutorial packages. Both modules designed for teaching "How to solve long division problem" by sequential processes as: Divide, Multiply, Subtract, Bring Down, and repeat (if necessary) [2].

It is worthy to note that designed modules are concerned with effective utilization of visual and/or auditory tutorial multimedia materials. They are provided for teaching adopted mathematical topic (Long Division Problem) to children at the fifth grade class level (in a primary school), with average age about 11 years old. Obtained assessing results show that optimal teaching methodology reached if both materials (visual and auditory) have been applied simultaneously to reinforce the retention of long division mathematical learned topic. This interesting conclusive remark agrees likewise the cognitive multimedia theory revealing that simultaneous application -in practical educational field- of visual and auditory tutorials is highly recommended [3]. Moreover, obtained practical case study results are supported by recently published simulation results of learning time response by Artificial Neural Networks modeling [4]. Furthermore, suggested tutorial CAL modules motivated by Multi-Sensory associative memories and classical conditioning theories. In below, three given figures to illustrate output print screen samples of fairly designed assessment computer program.

**Keywords:**
Associative memories, Computer Assisted Learning, Multimedia Learning Theory, Neural Networks Modeling.

[1] H.M. Hassan, Ayoub Al-Hamadi, "On Teaching Quality Improvement of A Mathematical Topic Using Artificial Neural Networks Modeling" (With A Case Study)", published at 10th (Anniversary!) International Conference Models in Developing Mathematics Education" held in Dresden, Saxony, Germany on September 11-17, 2009 .
[2] Interactive practice with long division with no decimals: Daisy Maths - Long Division http://Argyll.epsb.ca/jreed/extras/longdiv/
[3] R. Lindstrom, The Business Week Guide to Multimedia Presentations: Create Dynamic Presentations That Inspire, New York: McGraw-Hill, 1994.
[4] H.M. Hassan, "On Simulation of E-learning Convergence Time Using Artificial Neural Networks" published at the 7th International Conference on Education and Information Systems, Technologies and Applications (EISTA) held in Orlando, USA, on July 10-13, 2009.

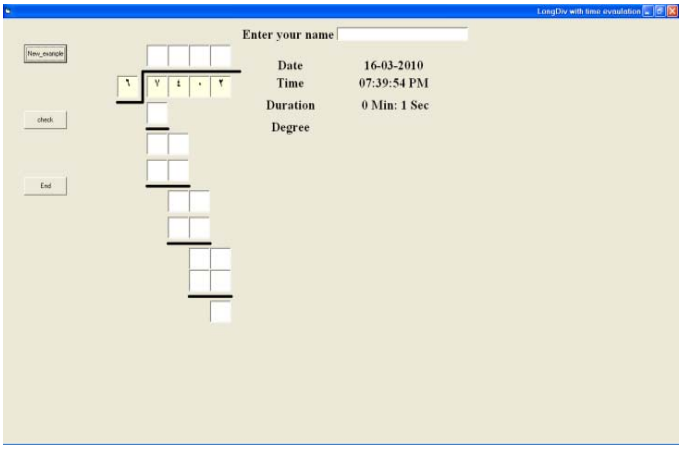


Fig.1. Basic print screen sample for initial mathematical Long Division process.

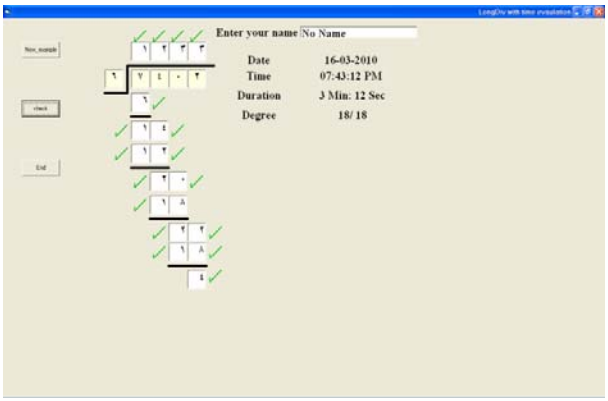


Fig.2. A print screen for fairly assessment processes results with no mistake.

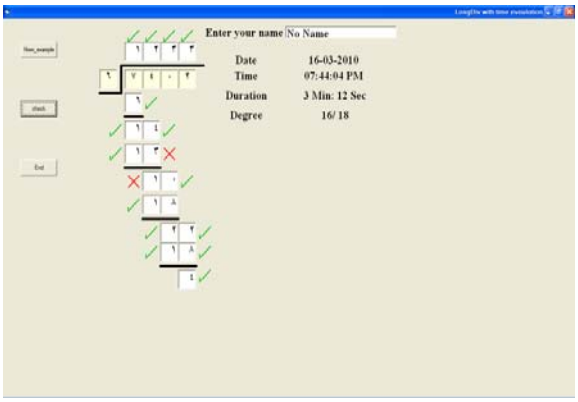


Fig.3. A print screen for fairly assessment processes results with two mistakes.