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The applicability of interactive item templates in varied knowledge types

Chorng-Shiuh Koong [a,*], Chi-Ying Wu [b]

[a] Department of Computer and Information Science, National Taichung University, 140 Ming-Sheng Road, Taichung City 403, Taiwan
[b] Graduate Institute of Education Measurement and Statistics, National Taichung University, 140 Ming-Sheng Road, Taichung City 403, Taiwan

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ABSTRACT

A well-edited assessment can enhance student's learning motives. Applicability of items, which includes item content and template, plays a crucial role in authoring a good assessment. Templates in discussion contain not only conventional true & false, multiple choice, completion item and short answer but also of those interactive ones. Methods provided for answering interactive question can be click and select, drag and drop, collide, and magnetize, while operational interactive templates can include Link, Match, Classification, and Order.

During the process of item authoring, dilemma often appears since not all the same interactive item template can fit into testing for different knowledge types, and different item templates also have their limitations in assessing different knowledge types. This research intends to clarify what type of interactive multimedia item template is appropriate for a certain knowledge type, and to explore how interactive multimedia item template can integrate with Bloom's Taxonomy. The result indicates that (1) Link template is applicable for Remembering type of knowledge; (2) Match template is suitable for Understanding and Applying type of knowledge; and (3) both Link and Match template can better evaluate Analyzing type of knowledge. Furthermore, for the underachiever, testee is most suitable for Link item on Remembering, Math item on Understanding, Match item on Applying, Match and Link item on Analyzing type of knowledge. Study result is intended to provide information for teachers as to what interactive multimedia item template can best achieve the expected assessment effect.

1. Introduction

Educator Glaser proposed (1962) that a complete instructional procedure should include determining instructional goals, identifying student's entering behavior, conducting instructional activities and directing performance assessment. Assessment plays an evident role in learning since it is closely connected with each procedure. With the advancement of computer technology, e-learning has become the predominant trend in learning. However, paper-and-pencil test is still the most engaging assessment approach. The gap between learning method and assessment makes it difficult to integrate with one another.

In view of eco-friendliness, media adopted by conventional paper-and-pencil test is resource-consuming. Manual scoring after testing not only takes time, but also apt to cause errors during the process (Huang, 1999; Hsu, 2004). French and Godwin (1996) and Harmes (1999) pointed that the low stimulus materials presented by traditional paper-and-pencil have theirlimitations to test testee's higher-order cognitive competence. By incorporating e-learning approach with interactive multimedia assessment, test efficiency can be enhanced while contextualized items can also be faithfully transferred. With a better informed knowledge of items, testee is allowed to respond to items with more precision and thus helps to increase reliability and validity of assessment. Equally important, anxiety can be reduced since testee perceives more fun during the testing process (Harmes, 1999; Cheng, Shen, & Basu, 2008).

A well-edited assessment can enhance student's learning motives (Chen & Wu, 2003). Applicability of items, which includes item content and template, plays a crucial role in editing a good assessment (Parshall & Harmes, 2007). Templates in discussion contain not only conventional true & false, multiple choice, completion item and short answer but also those of interactive ones. Methods provided for

* Corresponding author. Tel.: +886 4 22183804, +886 937 311333(mobile); fax: +886 4 22183580.
E-mail addresses: csko@mail.ntcu.edu.tw (C.-S. Koong), chiying@mail.hwes.tc.edu.tw (C.-Y. Wu).

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Table 1
2001 version of Bloom's Taxonomy.

Knowledge dimension	Cognitive Process Dimension					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Factual knowledge						
Concept knowledge						
Procedure knowledge						
Meta-cognition knowledge						

answering interactive question can be click and select, drag and drop, collide, and magnetize, while operational interactive templates can include Link, Match, Classification, and Order.

In 2007, the author developed Interactive Test Item System (ITIS system) (Koong, FanJian, & Wu, 2007a) and conducted related studies on Social Studies domain (Koong, Wu, & Feng, 2007b; Koong & Wu, 2008). The result indicates that testee is in favor of interactive multimedia test. Methods provided for answering question are helpful to reflect student's competence. Evidence from the four-point scale indicates the average score is high up to 3.45 regarding to operational item interface, item meaning, and template's user-friendliness through multimedia. Study result shows that underachiever perform better on interactive multimedia testing than on paper-and-pencil test. This signifies that interactive multimedia testing allows testee, especially the underachiever, to understand item more fully regardless of their linguistic competence (Koong et al., 2007b). In 2008, the author conducted another research on student's information literacy adopting the same system. The result verifies it is test content, rather than information literacy affects student's performance (Koong & Wu, 2008). This helps to conclude that interactive multimedia testing can increase test validity and advantages we proposed.

During the course of item editing, dilemma often appears since not all the same interactive item template can fit into testing for different knowledge types, and different item templates also have their limitations in assessing different knowledge types. This research attempts to achieve two goals. Firstly, we hope to explore how interactive multimedia item template can integrate with Bloom's Taxonomy. Secondly, we intend to investigate what type of template is suitable to test testee's different conceptual competence for testee of varied competence, so that testee's authentic competence can be measured. Study result is intended to provide information for teachers as to what interactive multimedia item template can best achieve the expected assessment effect.

2. Literature review

2.1. Theory of interactive multimedia

Scoring methodology has evolved from conventional paper-and-pencil test to using computer technology in assisting testing such as computerized testing, on-line assessment, adaptive testing, and interactive multimedia testing. Interactive multimedia can be defined as combining at least two types of media including text, image, audio, video, or animation for user to input or control multimedia component effectively. "Interactive" can be interpreted as when testee is operating certain actions on computer, the computer can respond to that action.

Harmes (1999) pointed that in the domain of computerized testing, one of the most distinctive features of interactive multimedia item is to create better item template through multimedia component. This is what paper-and-pencil test is incapable of. Chen and Hsu (2005) noted computer brings more interaction and more fun into testing. Multimedia, likewise, helps testing more approaching to student's learning environment and authentic life. Cheng et al. (2008) pointed the use of creative multimedia templates can improve item's face validity and interactivity. This will help student better understand the intended meaning of items during the testing process. Parshall, Davey, and Pashley (2000) held that items integrated with multimedia can reduce dependence on reading skill, and can increase reliability and validity of test result. Recently, item content is no longer confined to text. Input methods such as keyboard, mouse, and microphone are added into testing to make it closer to testee's real life situation and also provide better options. In addition, functions such as auto-grading, scoring, and score-storing has greatly provided testing administrator with convenience.

Numerous researches have been done on interactive multimedia testing. Information technology-applied instructions are recognized by researches as capable of increasing student's learning motivation and learning effect. In recent years, great attentions have been drawn to these research results. Many scholars recognized that testing incorporating computer and multimedia can increase testee's confidence, reduce test errors, and enhance test effects (Gonzalez, Cranitch, & Jo, 2000; Parshall et al., 2000; Tuovinen, 2000; Volery & Lord, 2000; Rabinowitz & Brandt, 2001; Ivers & Barron, 2002; Zenisky & Sireci, 2002; ORhun, 2003; Yau & Joy, 2004; Cheng & Basu, 2006). We have classified the relevant analysis into four categories: system testing, new templates cultivation, theory analysis, and template application.

Table 2
Two-way chart of paper-and-pencil pre-testing.

Cognitive process dimension	Instructional Goal					
	Where is Taiwan	Weather and climate	Coastal landscape	Islands of Taiwan	Landscape and river	Total number
Remembering	17				3, 5, 11, 12, 21, 23	7
Understanding	1, 18	4, 13	8, 16, 19	9	7, 15, 22	11
Applying	6					1
Analyzing	14	2		10, 20	24, 25	6
Total number	5	3	3	3	11	25