Quickscan QTI addendum #1

Usability study of QTI for *De Digitale Universiteit*

Pierre Gorissen

12 November 2003

DU
Digitale Universiteit

Colophon

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Quickscan_QTI_en_add_1

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Summary

De Digitale Universiteit (DU) performed a quickscan to determine the usability of the IMS Question and Test Interoperability (QTI) specification as a format to store questions and tests developed for and by the consortium. The quickscan was carried out by Pierre Gorissen (P.Gorissen@Fontys.nl) and the original report is available in Dutch from the website of *De Digitale Universiteit*: http://www.digiuni.nl/publicaties/
The unofficial English translation of that report can be downloaded from http://www.gorissen.info/Pierre/QTI/ (PDF-version) or http://www.digiuni.nl/ (Word-version).

In October 2003, Canvas Learning Ltd., developers of the Canvas Canvas Learning Author and Canvas Learning Player responded to the Quickscan by sending their Canvas Flash player which could also render the test questions developed for the Quickscan. The Canvas Learning Player hadn't been tested as part of the original Quickscan because none of the partners within *De Digitale Universiteit* was using the application at that time.

This addendum contains a short overview of the results of the tests for the Flash player as it was provided by Canvas Learning Ltd. All tests have been conducted by the author of the quickscan using the original test set. The set and the player used can be downloaded as a SCORM compliant package. Even though the player can be used within a SCORM compliant runtime environment, it can also be run standalone.

During the SURF SiX expert group meeting about the exchange of questions and tests on October the 30th the player was demonstrated as part of the presentation about the original Quickscan. Slides and demo set are available online: http://e-learning.surf.nl/six/toetsen_en_assessment/2030 (note: though the page itself is in Dutch, all the slides of the day, which you can find linked to on the bottom of the page, are in English).

1 Introduction

This addendum contains a short overview of the results of the tests for the Flash player as it was provided by Can Studios. All tests have been conducted by the author of the quickscan.

The unofficial translation of the original Quickscan report can be still be downloaded from http://www.gorissen.info/Pierre/QTI/ (PDF-version) or http://www.digiuni.nl/ (Word-version).

1.1 Structure of this addendum

Where possible, the original section numbers and structure have been kept similar to the original Quickscan report. Unchanged parts however have not been duplicated. For an introduction of QTI for example, see the original Quickscan report. It also means that sometimes the section numbers 'jump', for example there is no chapter 2, since that was the unchanged introduction into QTI.

1.2 Acknowledgements

Like for the first Quickscan, this addendum wouldn't have been possible without the help of others.

- Russell Grocott, Canvas Learning Ltd. provided the player evaluated in this addendum.
  He, together with Paul Hilton and Sam Easterby-Smith, also from Canvas Learning answered the numerous questions I asked in the e-mail conversation we had during the weeks after they'd send me the player.

3 The test set and the testing process

This chapter covers the structure of the test set, the application that has been tested and the test cycle itself.

3.1 What is in the test set

The test set for this addendum was the same as the original test set. An overview of the set can be found in Annex B on page 30 of the original Quickscan. To make testing of the player easier, the name of the file has been added to each question using plain text. This does not influence the test results however.
The zip file that is available for download contains a ADL SCORM complaint package and can be imported into a SCORM compliant runtime environment. The SCROM package has been successfully imported and run using N@tschool! 7.1 RC2 (see: http://www.threeships.nl/). The tests for this addendum have been conducted using the player in standalone mode, so not inside a SCORM compliant runtime, to make sure that wouldn't influence the results.

3.2 The application that has been tested

Only one application has been tested for this addendum: The Canvas Learning Flash player:

3.2.1 Canvas Learning Flash player

The Canvas Learning website offers download options for a trial version of the Canvas Learning Author and the Canvas Learning Player. The Player available there is build using Macromedia Shockwave and is **not** the version tested here. The Flash version tested is not available yet for download from the Canvas Learning website. It is expected to be released in the very near future. The tested player is included in the test set provided with this addendum. For further questions about using this player please contact Canvas Learning directly: Russell Grocott (mail: Russell@the-can.com).

Website: http://www.canvaslearning.com/

3.4 Overview test cycle

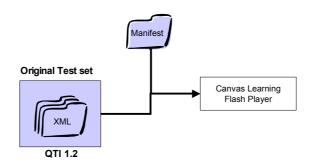Figure 1 shows an overview of the test cycle for this addendum. As you can see it is a fairly simple cycle this time:

Figure 1 overview test cycle

The test set contains about twenty, in XMLSpy created and validated, files with single items, a couple of files with sections and a single assessment file. For the tests the single item files were described in the clpmanifest.xml used by the player. The structure of the clpmanifest.xml file is identical to that of a manifest as defined by the IMS Contentpackaging specification[1]. Since created a file like that by hand is much work, the free RELOAD editor[2] was used to construct the clpmanifest.xml file. When the player is run, the QTI files get loaded and rendered by the player during runtime.
Even though in the package the clpmanifest.xml was located at a fixed location, in the same folder as the player, it is also possible to store the manifest file in a different location, or feed the location in a parameter to the player using clpplayer.swf?clpmanifestpath=http://foo.com/bar/clpmanifest.xml

All test files, the 'optimized files' from the original Quickscan and the Flash player, can be downloaded as a single SCORM compliant zip file from the DU website: http://www.digiuni.nl/publicaties/.

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[1] See: http://www.imsglobal.org/content/packaging/index.cfm
[2] See: http://www.reload.ac.uk/

4 Test results

This sections describes the results of the test with the Canvas Learning player. Annex C on page 10 show a summary of the test results enabling you to compare the Canvas Learning player with the other previously tested applications. Annex D, starting on page 14 goes into more detail. In that annex, it also is explained, where possible, what failed and why in case of a failure to import the file.

4.1 Canvas Learning Flash Player

As you can see in Figure 1 on page 6, the QTI files are being imported during runtime using the manifest that was described in the clpmanifest.xml file. This makes sense because of the way the application was build. i.e. without its own database or other facilities to store the rendered files. That also keeps the player itself lightweight, less than 100 kB for the player and the support files (the HTML file to run it in the browser, the clpmanifest file and some images) and no need to install it.
Rendering of the test files is fast enough, though the questions with images take some noticeable loading time, which might be caused by the need to retrieve the images themselves.

The Canvas Learning player has no real problems with HTML. The rendered fonts are however not what I would expect from the HTML code in the question. Instead of 'Arial' the player apparently used 'Times new Roman'. Images can be used in both the question body as in the answer options. The original pictures caused a surprising problem however. One of the jpeg images had apparently been saved using 'progressive scan'. Because Macromedia Flash doesn't have support for that, the Canvas Learning Player which has been build using Flash, also can't display those images. After resaving the image, the problem was gone.

Compared to the other applications the player had support for a number of additional features the others lacked:
- it handled the ordering of the answer options in the multiple choice questions in the correct way, in this case meaning that the first four answer options had to be displayed in a random order while the fifth answer option ('none of the above') always had to be displayed as last option.
- it has support for 'rubric', 'learning-objectives' and 'hints' and allows the learner to actually read them. Annoying was though that, when present, they were displayed by default sometimes cluttering the screen and obstructing the initial view of the question
- it handles fill-in-the-blank questions with multiple 'blanks' and is able to process the multiple answers it gets returned from that.

5 Summary of the results

The next section gives an overview of the possibilities of the tested player.

5.1 Overview of possibilities

5.1.1 Assessments, Sections and Items

Just like the other applications in the original quickscan, the Canvas Flash player has no support for assessments or sections.

5.1.2 Case texts

No known workaround is available for the Canvas Flash player.

5.1.3 More than one item in the same file

The Canvas Flash player uses a manifest file to structure the items that are being displayed.

5.1.4 Multiple Choice questions

The player could display all Multiple Choice questions in the test set. It did also display *MC_QTI_Optimaal_03.xml*, which can be found in the test set.

5.1.5 Multiple response questions

The player could display all Multiple response questions in the test set. It also as able to display file *MR_QTI_Optimaal_01.xml* (with HTML in the question wording and the feedback).

5.1.6 Essay questions

The player displayed the essay question, but the worked out example was not available during runtime.

5.1.7 Fill in the blank

The player rendered all Fill in the blank questions without a problem..

5.1.8 True/False questions

True/False questions are basically multiple-choice questions with two answer options: "True" and "False or "Yes" and "No". Because of that the remarks made for multiple-choice question in section 5.1.4 apply here also.

5.1.9 Matching questions

Matching questions were not part of this quickscan.

5.1.10 Use of hotspots in questions

The use of hotspots in questions was not part of this quickscan.

5.1.11 HTML

Rendering of the HTML code was not completely as expected, a different font than expected was used. According to Canvas Learning that is due to the limitations Macromedia Flash MX, which was used to build the player, has when dealing with fonts. It did manage to display all questions with HTML however.

5.1.12 Audio, video and other objects

The use of audio, video and other objects in the question was not part of this quickscan. It is expected that the problems here are in line with what is being said for images (see 5.1.13) and case texts (see 5.1.2).

5.1.13 Images

The player displayed questions with images correctly. Because of the limitations of Macromedia Flash, it won't be able to display jpeg images witch have been save using progressive scan.

5.1.14 Feedback for items

The player supports feedback per answer option for multiple-choice questions. The QTI <solution> element, meant to store the correct answer, isn't supported by the player, even though it is displayed in the editor.
It was the only player that had support for hints during runtime.

5.1.15 Metadata for items

None of the other applications in the quickscan had support for metadata for items. This player is no exception.

5.1.16 The order of answer options for items

QTI enables you to set the order of answer options for multiple choice and multiple response questions to fixed or to random. This is the only player that correctly supported the mixture of random order and fixed order, like in this example:

> Which of the following people has not yet been prime minister of the Netherlands?
> A)   Wim Kok
> B)   Ruud Lubbers
> C)   Wouter Bos
> D)   Dries van Agt
> E)   None of the above

Example 1 Multiple Choice question

Here answer options A – D are to be shown in a random order, while answer op E always should be displayed as the last answer option. This is common practice in the IMS examples and all questions in the test set use it were applicable.

5.1.17 Response processing

Response processing works ok, even with multiple response questions. There is no scoring displayed when run as standalone player. According to Canvas Learning this is by design.
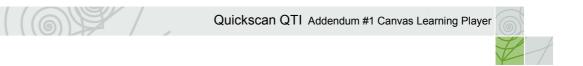
5.1.18 Rubric for items

This player was the first and only one that enabled display of rubric elements during runtime.

5.1.19 Learning-objectives for items

This player was the first and only one that enabled display of learning-objectives during runtime.

Annex C   Summary of the test results

	Functionality	QTI file…	Respondus 2	QuestionMark Perception 3.4	N@tschool! 7.0	Blackboard 5.5	Blackboard 6.0	WebCT 4	Learn eXact 1.7	Canvas Learning Flash Player
1	Items									
1.01	multiple choice question (one question option)	QTI_MC_101	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
		QTI_MC_110	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		QTI_MC_101b	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.02	use of multiple response questions	QTI_MR_102	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
		QTI_MR_102b	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.04	use of essay questions	QTI_Essay_104	Yes	Yes	No	Yes	Yes	Yes	No	Yes
		QTI_Essay_108	Partial	Partial	No	Partial	Partial	Partial	No	Partial
1.05	use of fill in the blank questions	QTI_FIB_105	No	Yes	No	No	No	No	No	Yes
		QTI_FIB_105b	Partial	Yes	No	Partial	Partial	Partial	No	Yes
		QTI_FIB_105c	Partial	Yes	No	Partial	Partial	Partial	No	Yes
1.07	use of hints in a question	QTI_MC_107	No	No	Partial	No	No	No	No	Yes
1.08	showing the correct answer for a question	QTI_MC_108	Partial	Partial	Partial	Partial	Partial	Partial	Partial	Yes
		QTI_Essay_108	No	No	No	No	No	No	No	No
		QTI_MC_109	Yes	Yes	No	No	Yes	Yes	Yes	Yes
		QTI_MC_115	No	No	Partial	No	No	No	No	Yes
1.09	being able to have different feedback for each possible answer option	QTI_MC_109	Yes	Yes	No	No	Yes	Yes	Yes	Yes
1.10	being able to have feedback for correct answers	QTI_MC_110	Yes	Yes	No	No	No	Yes	No	Yes
		QTI_MC_109	Yes	Yes	No	No	Yes	Yes	Yes	Yes
		QTI_MC_115	Yes	No	No	No	No	Yes	No	Yes
1.11	being able to have feedback for incorrect answers	QTI_MC_111	No	No	No	No	No	No	No	Yes
		QTI_MC_111b	No	No	No	No	No	No	No	Yes
		QTI_MC_109	Yes	Yes	No	No	Yes	Yes	Yes	Yes
		QTI_MC_115	No	No	No	No	No	No	No	Yes
1.12	being able to assign different scores to each answer option	QTI_MC_108	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
		QTI_MC_108b	Partial	Yes	No	Partial	Partial	Partial	No	Partial
		QTI_MC_109	Yes	Yes	No	Yes	Yes	Yes	Yes	Partial
		QTI_MC_110	Yes	Yes	No	Yes	Yes	Yes	Yes	Partial
		QTI_MC_111b	Yes	Yes	No	Yes	Yes	Yes	Yes	Partial
		QTI_MC_115	Yes	Yes	No	Yes	Yes	Yes	Yes	Partial
1.13	the use of plain text in a question of the feedback	QTI_XX_XXX	Partial	Partial	Yes	Partial	Partial	Partial	Yes	Partial
1.14	the use of HTML code text for a question and/or the feedback	QTI_MC_114	Yes	Yes	Partial	Yes	Yes	Yes	No	Partial
		QTI_MC_114b	Yes	No	Partial	Yes	Yes	Yes	No	Partial

	Functionality	QTI file…	Respondus 2	QuestionMark Perception 3.4	N@tschool! 7.0	Blackboard 5.5	Blackboard 6.0	WebCT 4	Learn eXact 1.7	Canvas Learning Flash Player
1.15	the use of images in a question and/or the feedback	QTI_MC_115	Yes	No	No	Yes	Yes	Yes	Yes	Partial
		QTI_MC_114b	Yes	No	No	Yes	Yes	Yes	No	Partial
1.19	the use of metadata for an item	QTI_MC_119	No	No	No	No	No	No	No	No
1.20	being able to store the learning-objective of an item	QTI_MC_120	No	Yes	No	No	No	No	Yes	Yes
		QTI_MC_114b	No	Partial	No	No	No	No	Yes	Yes
1.21	being able to store the rubric for an item	QTI_MC_121	No	Yes	No	No	No	No	Yes	Yes
		QTI_MC_114b	No	Partial	No	No	No	No	Yes	Yes
1.22	being able to have the answer options displayed in random order	QTI_MC_101	No	Partial	Partial	No	No	No	No	Yes
2.	Sections									
2.01	use of sections	QTI_S_MC_201	Partial	Partial	No	No	No	No	No	No
2.02	being able to store learning-objectives for a section	QTI_S_MC_202	No	No	No	No	No	No	No	No
2.03	being able to store the rubric for a section	QTI_S_MC_203	No	No	No	No	No	No	No	No
2.04	being able to store text for a section	QTI_S_MC_204	No	No	No	No	No	No	No	No
		QTI_S_MC_203	No	No	No	No	No	No	No	No
2.05	being able to calculate a score for a section	-	No	No	No	No	No	No	No	No
2.06	being able to give feedback based on the calculated score for a section	-	No	No	No	No	No	No	No	No
2.07	being able to store metadata for a section	-	No	No	No	No	No	No	No	No

	Functionality	QTI file…	Respondus 2	QuestionMark Perception 3.4	N@tschool! 7.0	Blackboard 5.5	Blackboard 6.0	WebCT 4	Learn eXact 1.7	Canvas Learning Flash Player
2.08	the ability to display the questions in a random order	-	No	No	No	No	No	No	No	No
2.09	the ability to display a question based on the answer for a previous question	-	No	No	No	No	No	No	No	No
3.	Assessments									
3.1	being able to exchange assessments	QTI_A_MC_301	Partial	Partial	No	No	No	No	No	No
3.2	being able to store learning-objectives for an assessment	-	No	No	No	No	No	No	No	No
3.3	being able to store the rubric for an assessment	-	No	No	No	No	No	No	No	No
3.4	being able to store text etc. that is relevant for the complete assessment	-	No	No	No	No	No	No	No	No
3.5	being able to calculate a total score for the assessment	-	No	No	No	No	No	No	No	No
3.6	being able to give feedback for the assessment based on the calculated total score	-	No	No	No	No	No	No	No	No
3.7	being able to store metadata for the assessment	-	No	No	No	No	No	No	No	No

	Functionality	QTI file…	Respondus 2	QuestionMark Perception 3.4	N@tschool! 7.0	Blackboard 5.5	Blackboard 6.0	WebCT 4	Learn eXact 1.7	Canvas Learning Flash Player
3.8	being able to have sections and/or items in an assessment displayed in random order	-	No	No	No	No	No	No	No	No
3.9	the ability to display a question based on the answer for a previous question	-	No	No	No	No	No	No	No	No

Annex D Detailed test results

Canvas Learning Flash Player

The test results for Respondus determine to great extend the results for both Blackboard and WebCT because Respondus is being used for the import there.

Canvas Learning Flash Player

		Functionality	**QTI file...**	**Display?**	**Comments**
1		**Items**			
1.01		use of multiple choice questions (one answer option)	QTI_MC_101	Yes	
			QTI_MC_110.XML	Yes	
			QTI_MC_101b.XML	Yes	
			QTI_MC_XXX.XML	N/A	For the results of all XXX files, see their specific test results.
1.02		use of multiple response questions	QTI_MR_102.XML	Yes	
			QTI_MR_102b.XML	Yes	
1.03		use of drag and drop questions	-	-	
1.04		use of essay questions	QTI_Essay_104.XML	Yes	
			QTI_Essay_108.XML	Partial	The solution element wasn't available.
1.05		use of fill in the blank questions	QTI_FIB_105.XML	Yes	
			QTI_FIB_105b.XML	Yes	
			QTI_FIB_105c.XML	Yes	
1.06		use of hot spot questions	-	-	
1.07		use of hints in a question	QTI_MC_107.XML	Yes	
1.08		showing the correct answer for a question	QTI_MC_108.XML	Partial	The contents of the <solution> element wasn't available.
			QTI_Essay_108.XML	No	The worked out example wasn't available.
			QTI_MC_109.XML	Yes	
			QTI_MC_115.XML	Yes	Though the contents of the <solution> element wasn't available.
1.09		being able to have different feedback for each possible answer option	QTI_MC_109.XML	Yes	
1.10		being able to have feedback for correct answers	QTI_MC_110.XML	Yes	
			QTI_MC_109.XML	Yes	
			QTI_MC_115.XML	Yes	
1.11		being able to have feedback for incorrect answers	QTI_MC_111.XML	Yes	
			QTI_MC_111b.XML	Yes	
			QTI_MC_109.XML	Yes	
			QTI_MC_115.XML	Yes	
		(continued on next page…)			

Canvas Learning Flash Player

		Functionality	QTI file...	Display?	Comments
1.12		being able to assign different scores to each answer option	QTI_MC_108.XML	Partial	In standalone mode, no score is displayed. In SCORM mode the score is calculated and saved.
			QTI_MC_108b.XML	Partial	
			QTI_MC_109.XML	Partial	
			QTI_MC_110.XML	Partial	
			QTI_MC_111b.XML	Partial	
			QTI_MC_115.XML	Partial	
1.13		the use of plain text for a question and/or the feedback	QTI_XX_XXX.XML	Partial	Special characters like "é", "ë" are not being imported properly for plain text questions.
1.14		the use of HTML code text for a question and/or the feedback	QTI_MC_114.XML	Partial	Incorrect font
			QTI_MC_114b.XML	Partial	Incorrect font
1.15		the use of images in a question and/or the feedback	QTI_MC_115.XML	Partial	No progressive scan
			QTI_MC_114b.XML	Partial	No progressive scan
1.16		the use of video in a question and/or the feedback	-	-	
1.17		the use of audio in a question and/or the feedback	-	-	
1.18		the use of other objects (for example Flash) in a question and/or the feedback	-	-	
1.19		the use of metadata for an item	QTI_MC_119.XML	No	
1.20		being able to store the learning-objective of an item	QTI_MC_120.XML	Yes	
			QTI_MC_114b.XML	Yes	
1.21		being able to store the rubric for an item	QTI_MC_121.XML	Yes	
			QTI_MC_114b.XML	Yes	
1.22		being able to have the answer options displayed in random order	QTI_MC_101.XML	Yes	
			QTI_MC_XXX.XML	Yes	
2.		**Sections**			
2.01		use of sections	QTI_S_MC_201.XML	No	The manifest file is for individual items only.
2.02		being able to store learning-objectives for a section	QTI_S_MC_202.XML	No	
2.03		being able to store the rubric for a section	QTI_S_MC_203.XML	No	
2.04		being able to store text for a section	QTI_S_MC_204.XML	No	
			QTI_S_MC_203.XML	No	
2.05		being able to calculate a score for a section	-	No	
2.06		being able to give feedback based on the calculated score for a section	-	No	
2.07		being able to store metadata for a section	-	No	
2.08		the ability to display the questions in a random order	-	No	
2.09		the ability to display a question based on the answer for a previous question. (continued on next page…)	-	No	

Canvas Learning Flash Player

		Functionality	**QTI file...**	**Display?**	**Comments**
3.		Assessments			
3.1		being able to exchange assessments	QTI_A_MC_301.XML	No	The manifest file is for individual items only.
3.2		being able to store learning-objectives for an assessment	-	No	
3.3		being able to store the rubric for an assessment	-	No	
3.4		being able to store text etc. that is relevant for the complete assessment	-	No	
3.5		being able to calculate a total score for the assessment	-	No	
3.6		being able to give feedback for the assessment based on the calculated total score	-	No	
3.7		being able to store metadata for the assessment	-	No	
3.8		being able to have sections and/or items in an assessment displayed in random order	-	No	
3.9		the ability to display a question based on the answer for a previous question	-	No	

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