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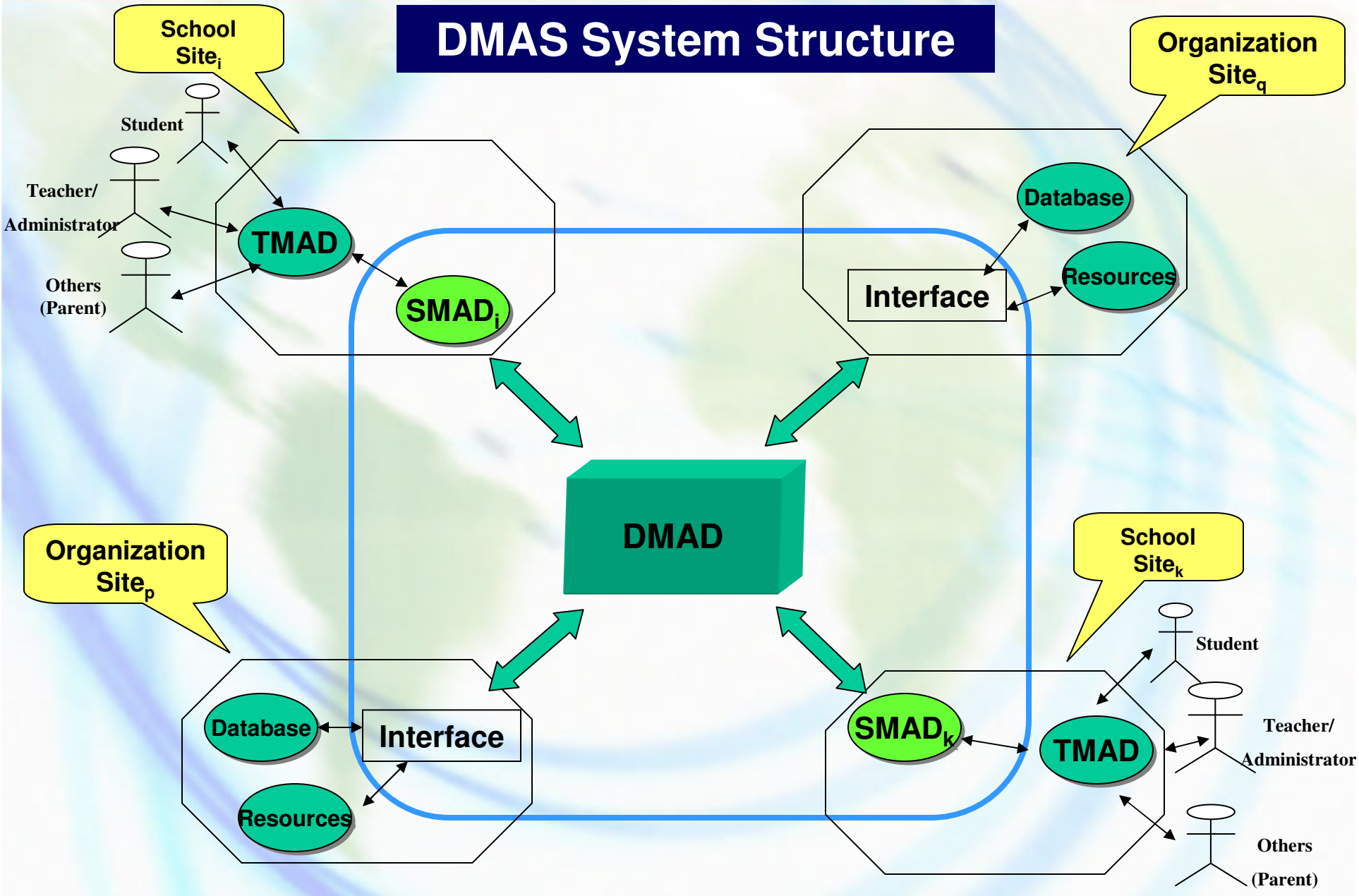
Distributed Mathematics Assessment System (DMAS) & WME

Progress and Demo

Outline

- DMAS System Structure
- DMAS System Interface to Web Applications
- DMAS System Interface to WME
- Integrating DMAS with WME
- DMAS Search Engine (DMASEngine)
- Assessment Markup Language: MAML
- Conclusions and Future Work

DMAS System Structure



DMAD -- The Core Component

- **DMAD** (Distributed Mathematics Assessment Databases): *is a distributed database with local databases at different school sites*. Within DMAD we have:

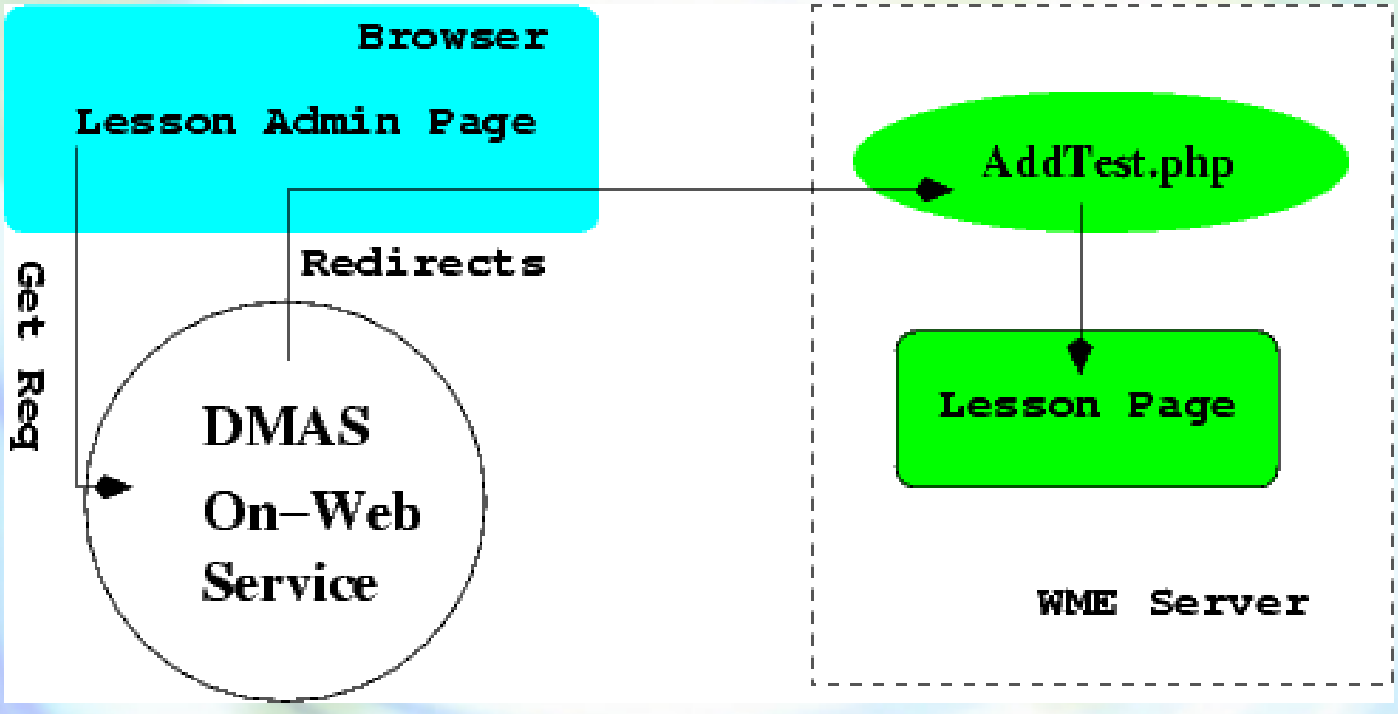
- **TMAD** (Teachers Mathematics Assessment Database): *is a database assigned to mathematics teachers of same school*.
  - It stores and manages assessment tests, homework assignments, questions, student answers, grades, statistics and other info for each individual teacher.

- **SMAD** (School Mathematics Assessment Database): *is created for individual school as part of its school site*.
  - A SMAD connects TMADs within the school and SMADs at different schools through the DMAS system.
  - The SMAD performs a critical role in enabling the sharing of assessment materials within and without a school.

DMAS System Interface to Web Applications

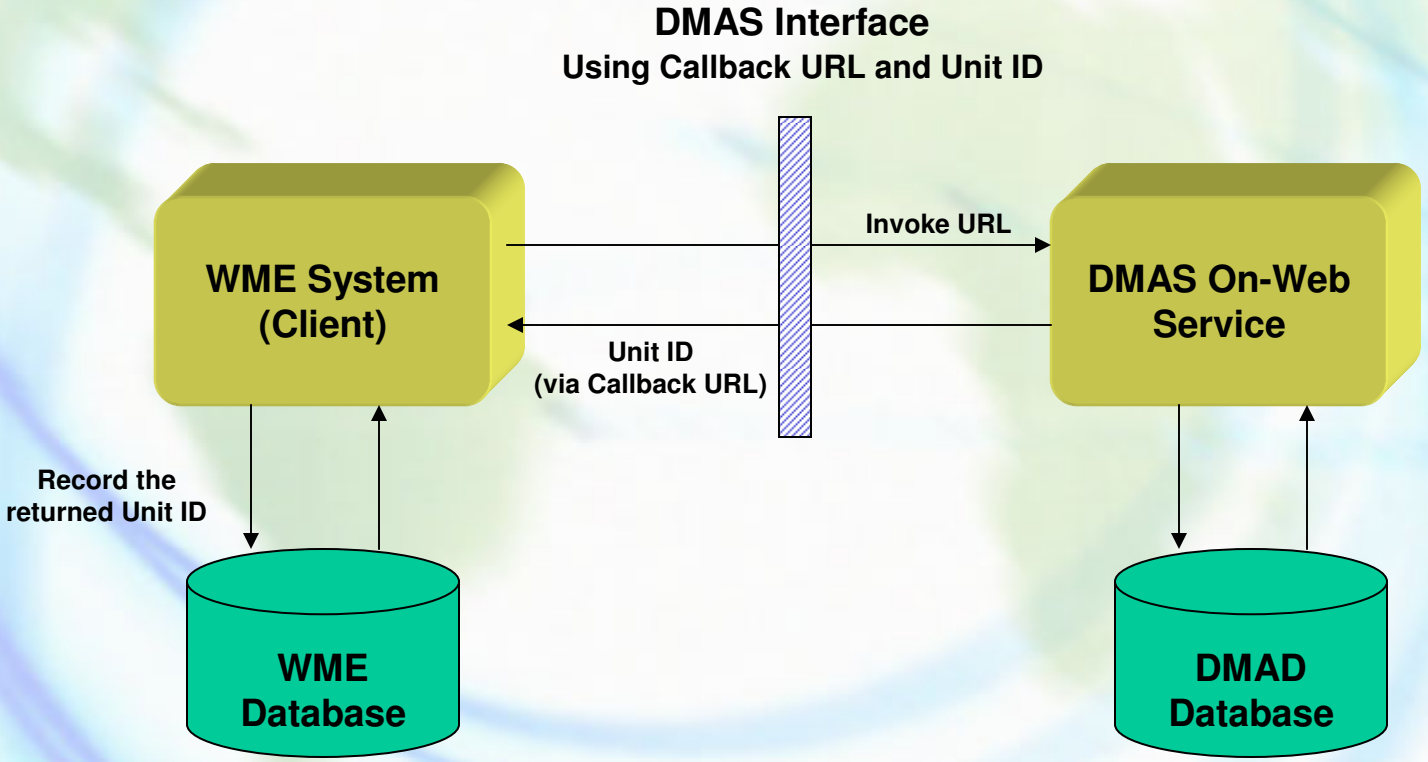
- DMAS system will provide APIs interface to other applications on the Web.
- These APIs can serve different requests either from:
  - server-to-server (i.e. from other servers such as WME server to DMAS server) or
  - client-to-server (from an Internet browser to DMAS server).
- I either case, DMAS system interface will handles all different calls in proper way.

DMAS System Interface to WME



Integrating DMAS with WME

(DMAS as On-Web Service in WME)



Integrating DMAS with WME (cont.)

➢Procedures:

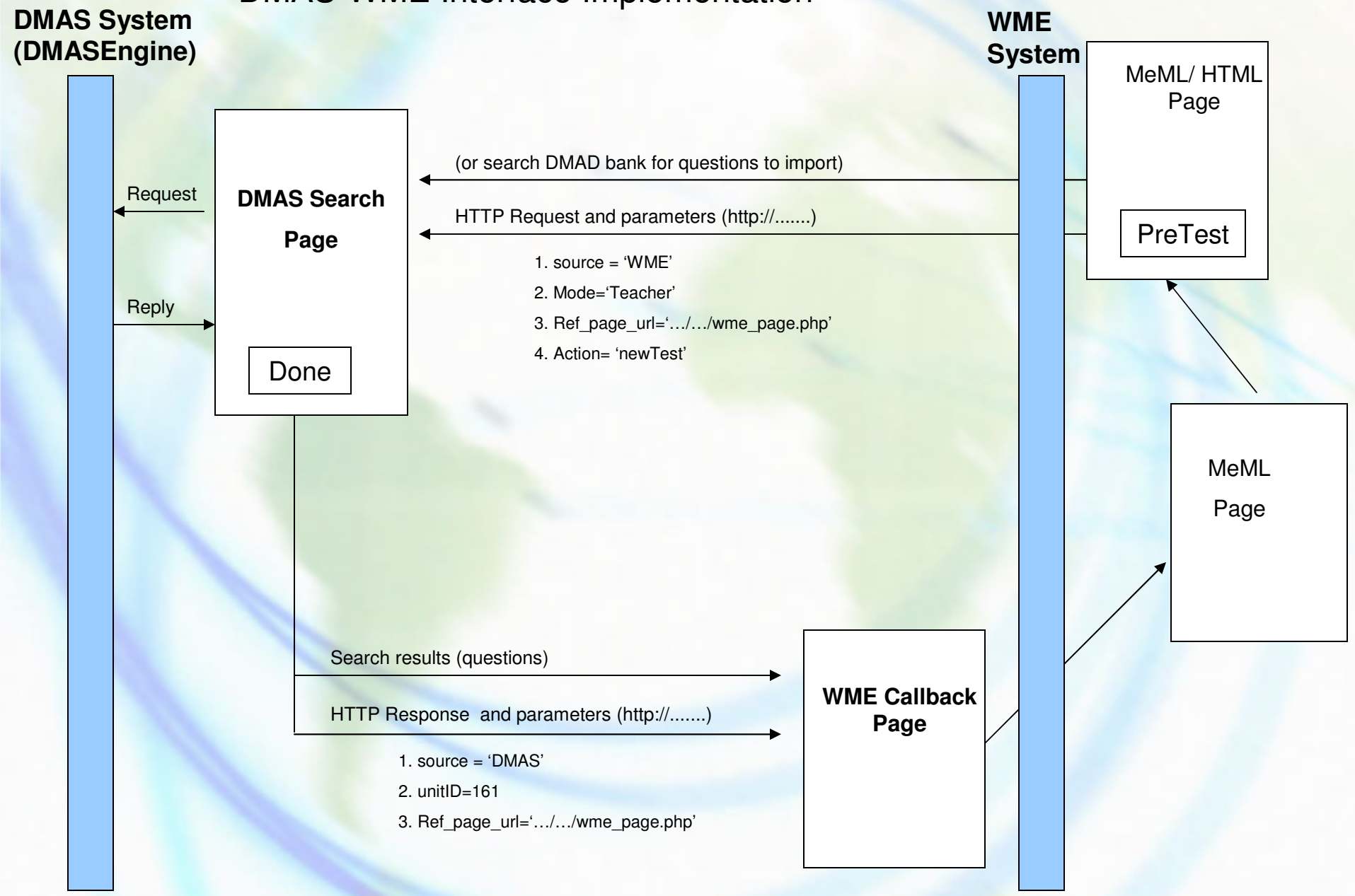
✓ DMAS system (DMASEngine) is invoked via a URL to search/import questions from DMAD bank. This URL will receive POST or GET data including a "callback URL".

✓ The user can search for (or import) questions in from the DMAD bank databases.

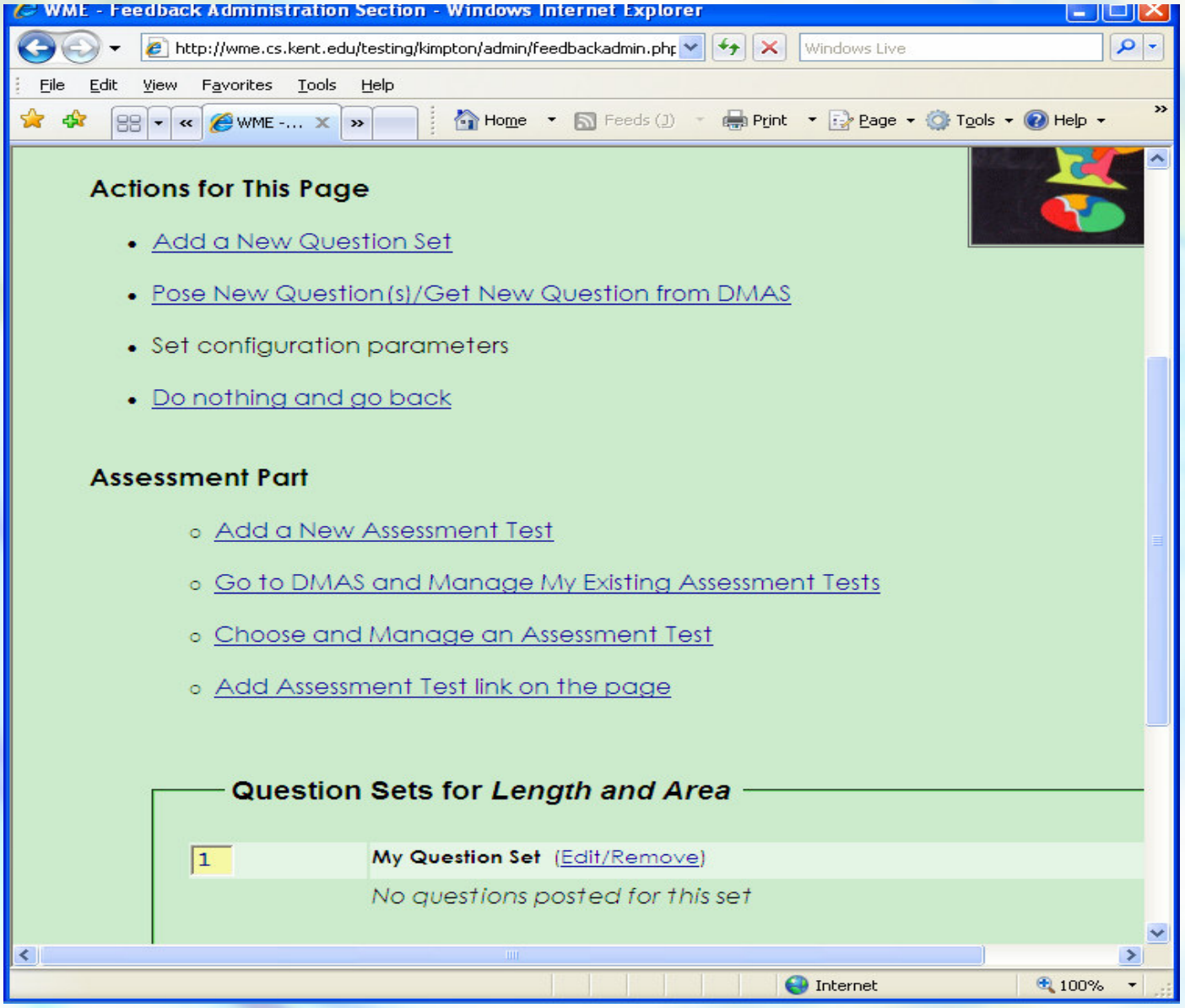
✓ When ends, the user will be redirected to the callback URL using something like (…?UnitID=…) appended at the end of it.

✓ This call back URL is a program that knows how to take the data returned and display it or records it in the database for the WME page involved.

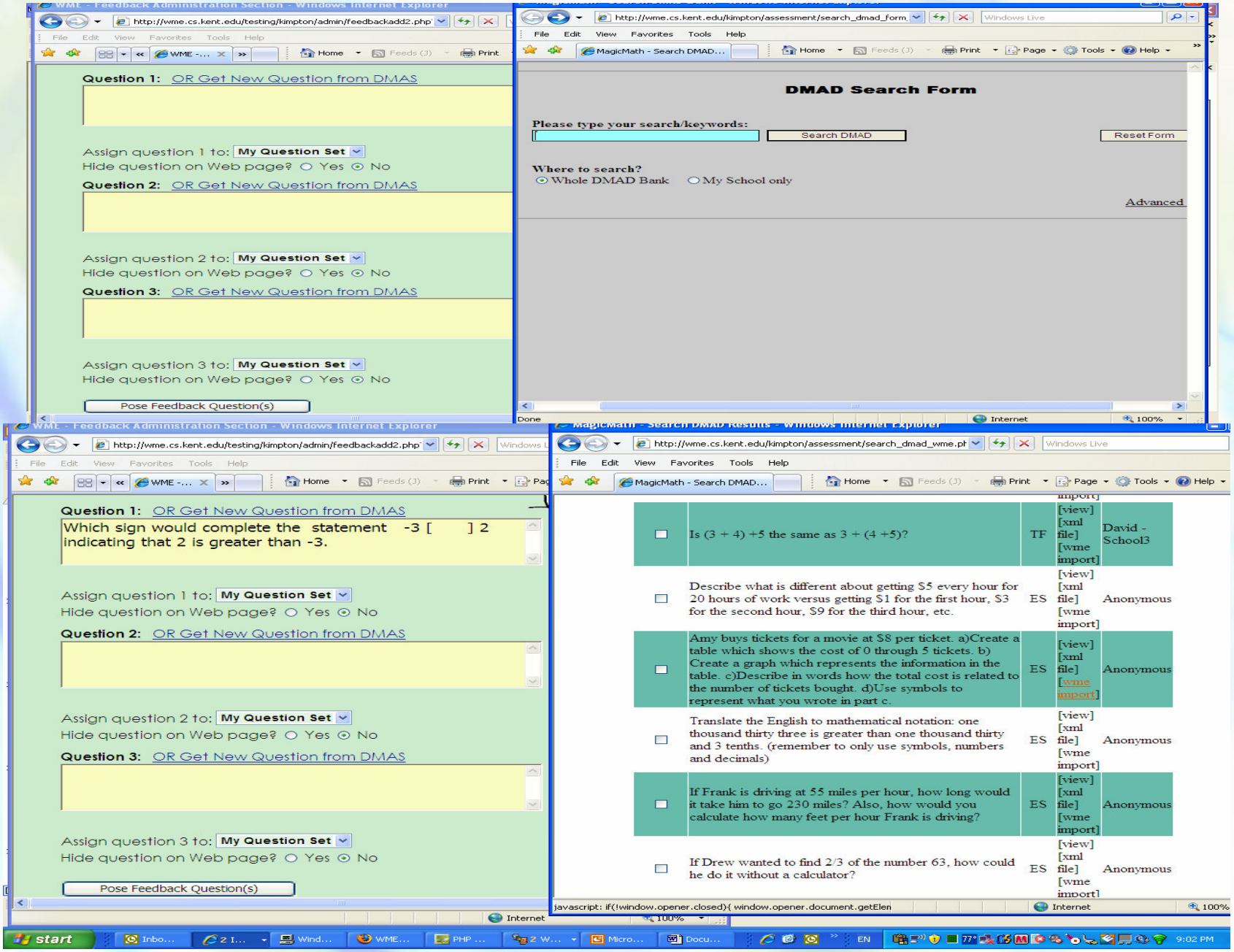
DMAS-WME Interface Implementation



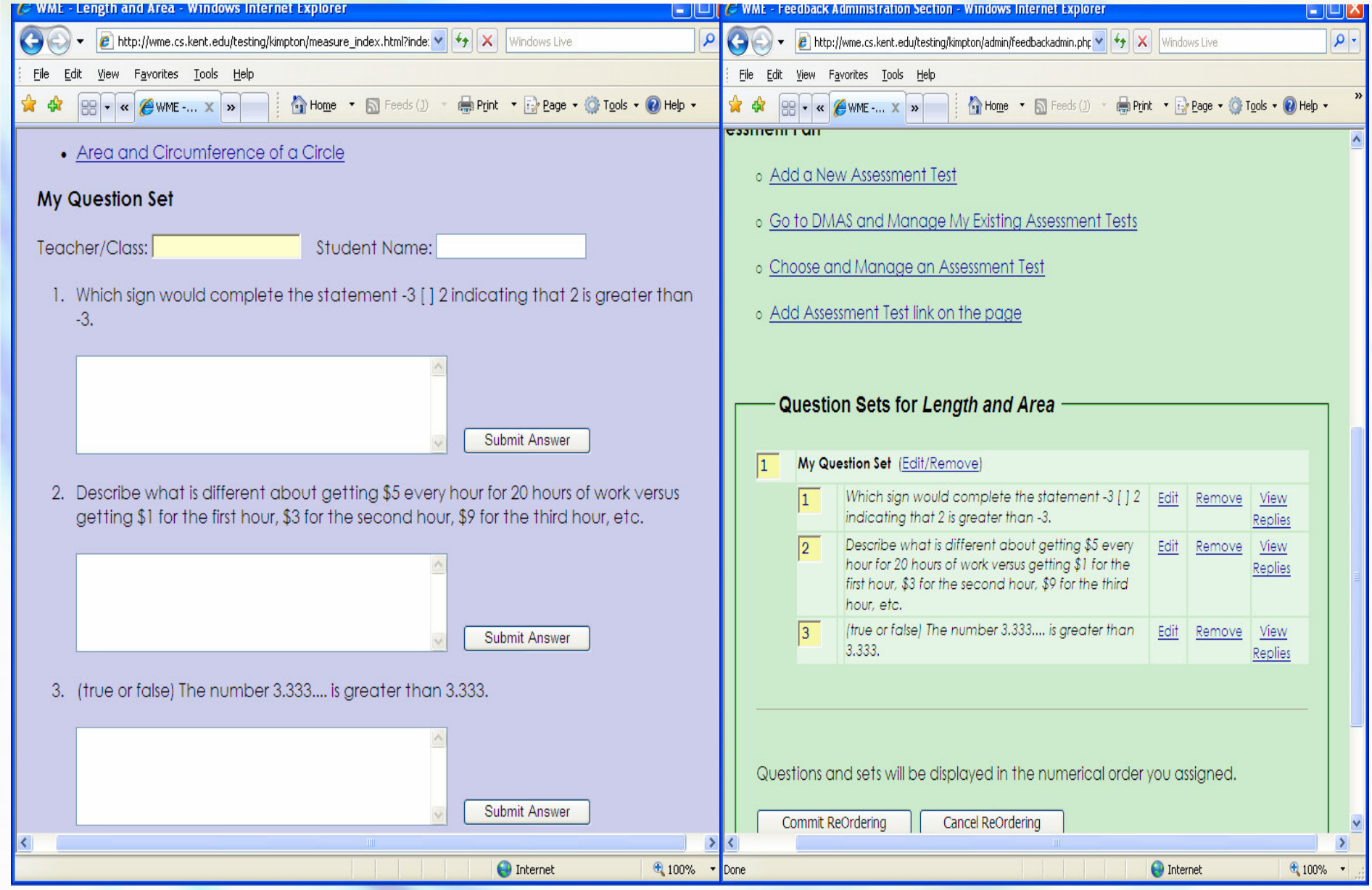
Integrating DMAS with WME (cont.)



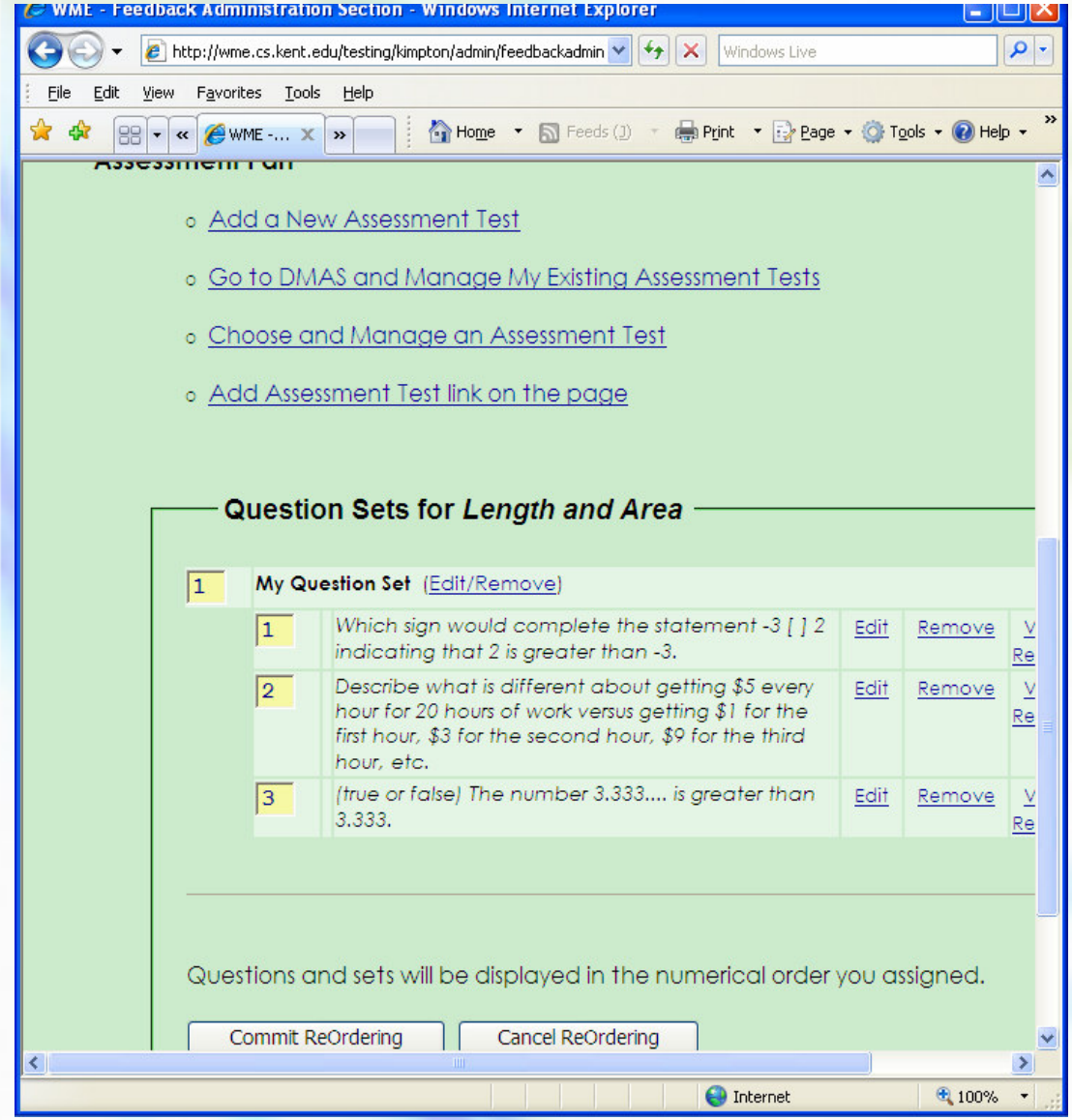
Integrating DMAS with WME (cont.)

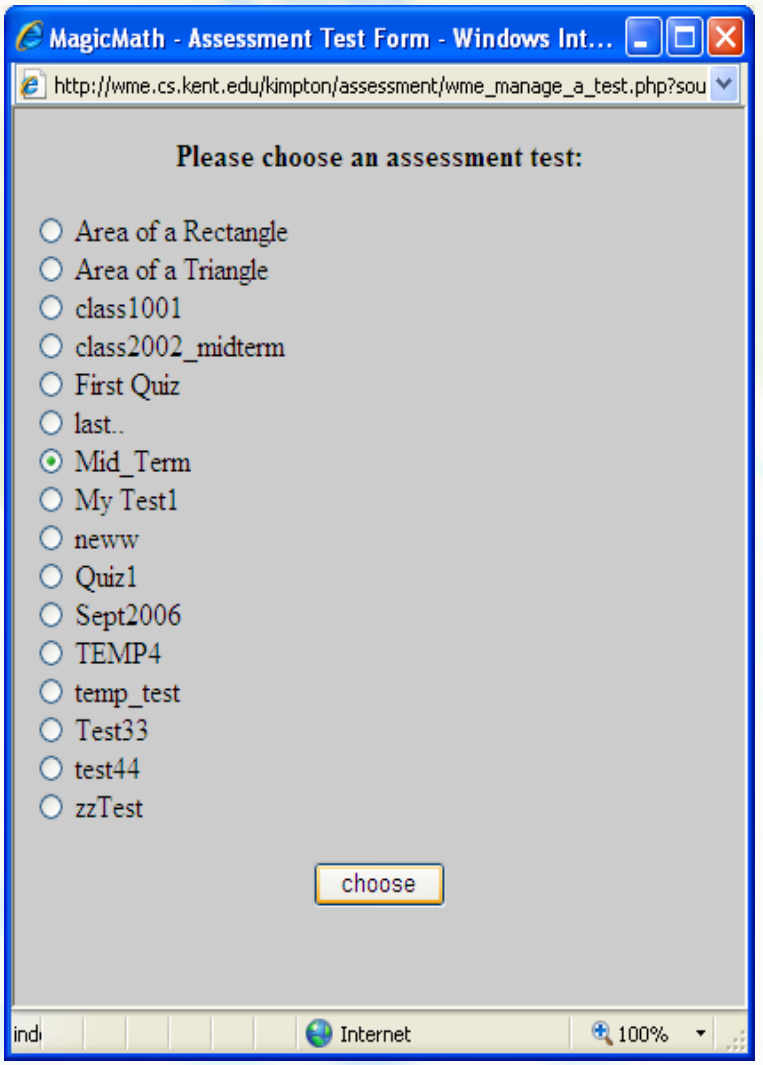


Integrating DMAS with WME (cont.)

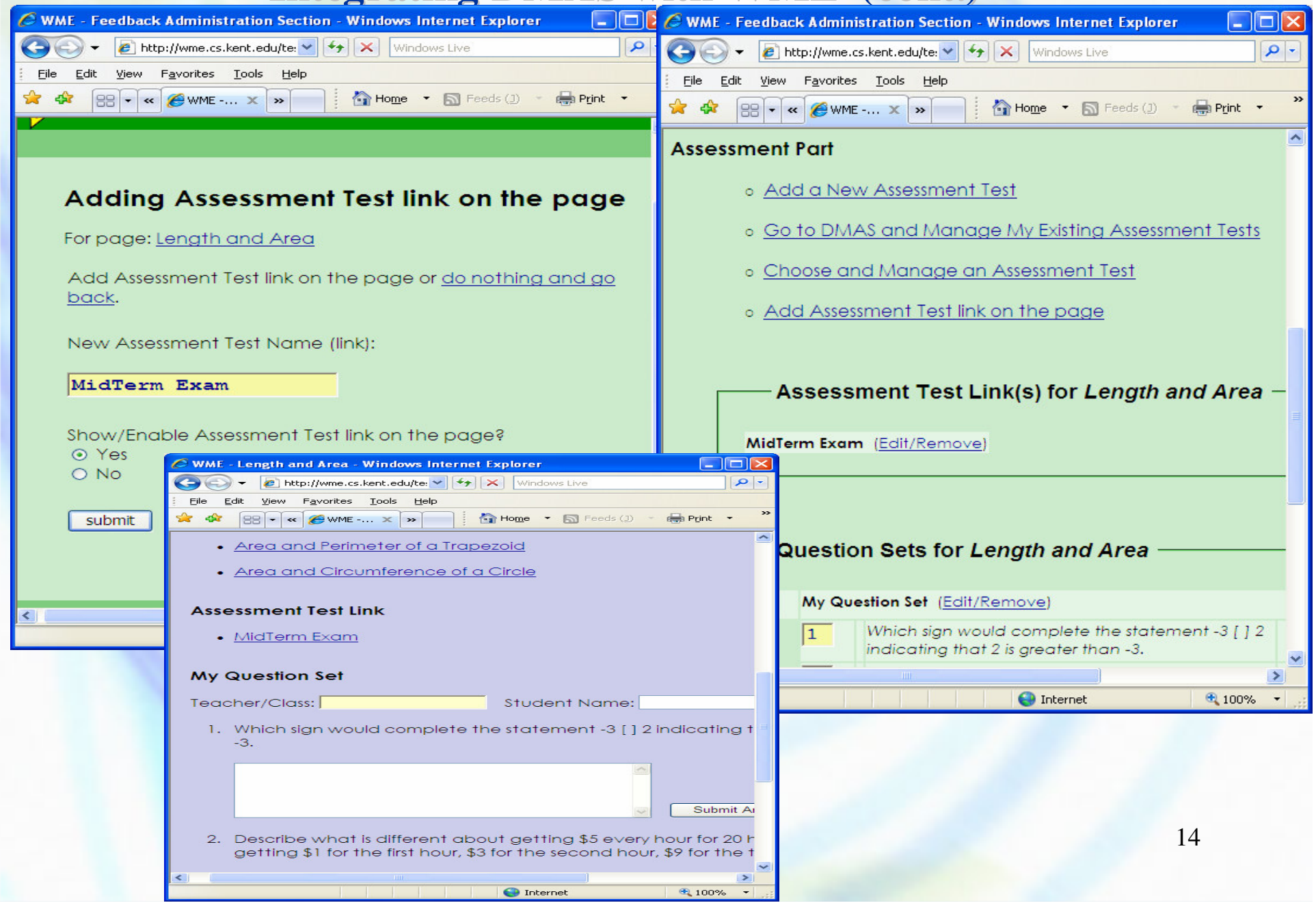


Integrating DMAS with WME (cont.)





Integrating DMAS with WME (cont.)



DMAS Search Engine (DMASEngine) - old

- First version of the DMASEngine has been produced.

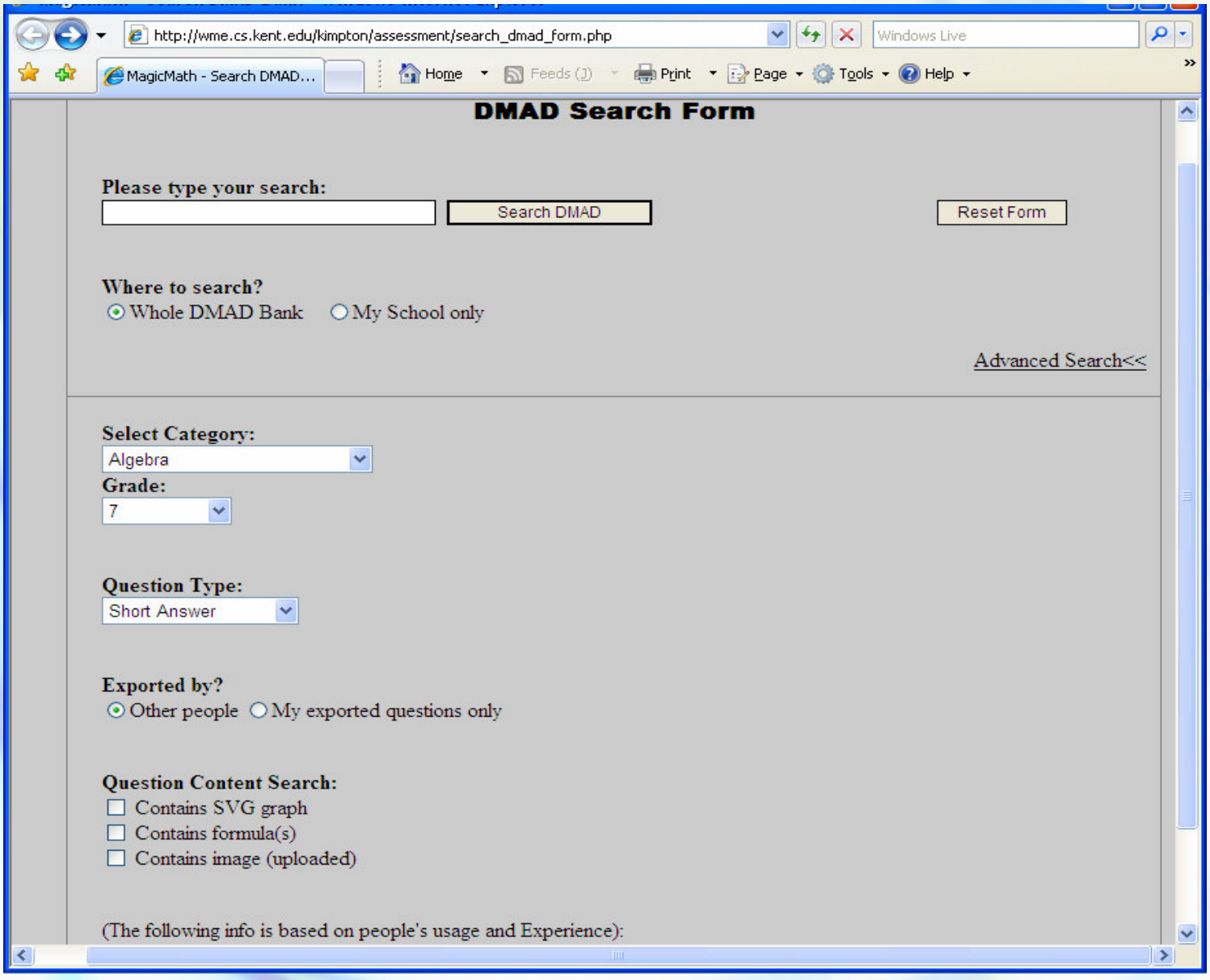
- The search covers the local SMAD and all participating DMASs of other sites the rest of DMAD – All that is transparent to the user.

- A teacher (user) can easily *search for assessment questions* on particular subjects and at specific grade levels.

- The search can be narrowed by subjects, topics (for example, fractions, algebra, geometry, and measurement), keywords, grade levels, question type and author.

- The search engine will also look for geometrical graphs, questions with formulas, and those containing images (gif, jpeg, etc.).

DMAD Search Engine (cont.) - old



DMAS Search Engine (DMASEngine)- new

- DMASEngine will use AJAX technology to get better, quicker, and more efficient search results and more interactive web applications.

-AJAX stands for **A**synchronous **J**avaScript **A**nd **X**ML. AJAX uses asynchronous data transfer (HTTP requests) between the browser and the web server, allowing web pages to request small part of information from the server instead of loading whole pages.

- AJAX is a type of programming made popular in 2005 by Google. It is not a new programming language, but a way of using existing standards and a technique for creating better, faster, and more user-friendly web applications. AJAX is based on JavaScript and HTTP requests.

Using AJAX, JavaScript can communicate directly with the server, using the JavaScript **XMLHttpRequest** object. With this object, the JavaScript can trade data with a web server, without refreshing the page.

DMAS Search Engine (DMASEngine)- new (cont.)

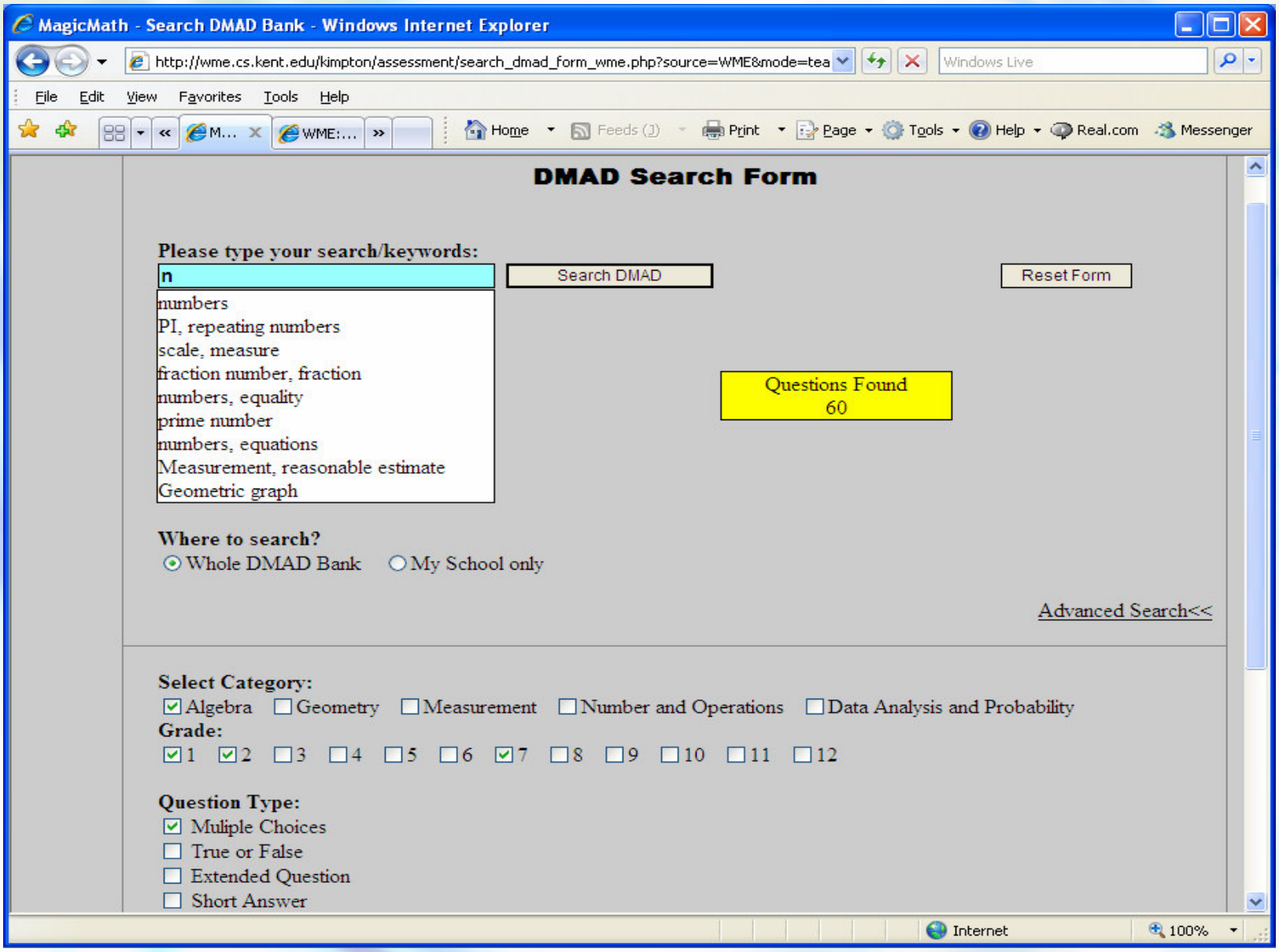
- The DMASEngine uses **ResponseXML** property that returns an XML document object, which can be examined and parsed using W3C DOM node tree methods and properties.

- The DMASEngine dynamically can fetch information from DMAS bank databases using AJAX technology.

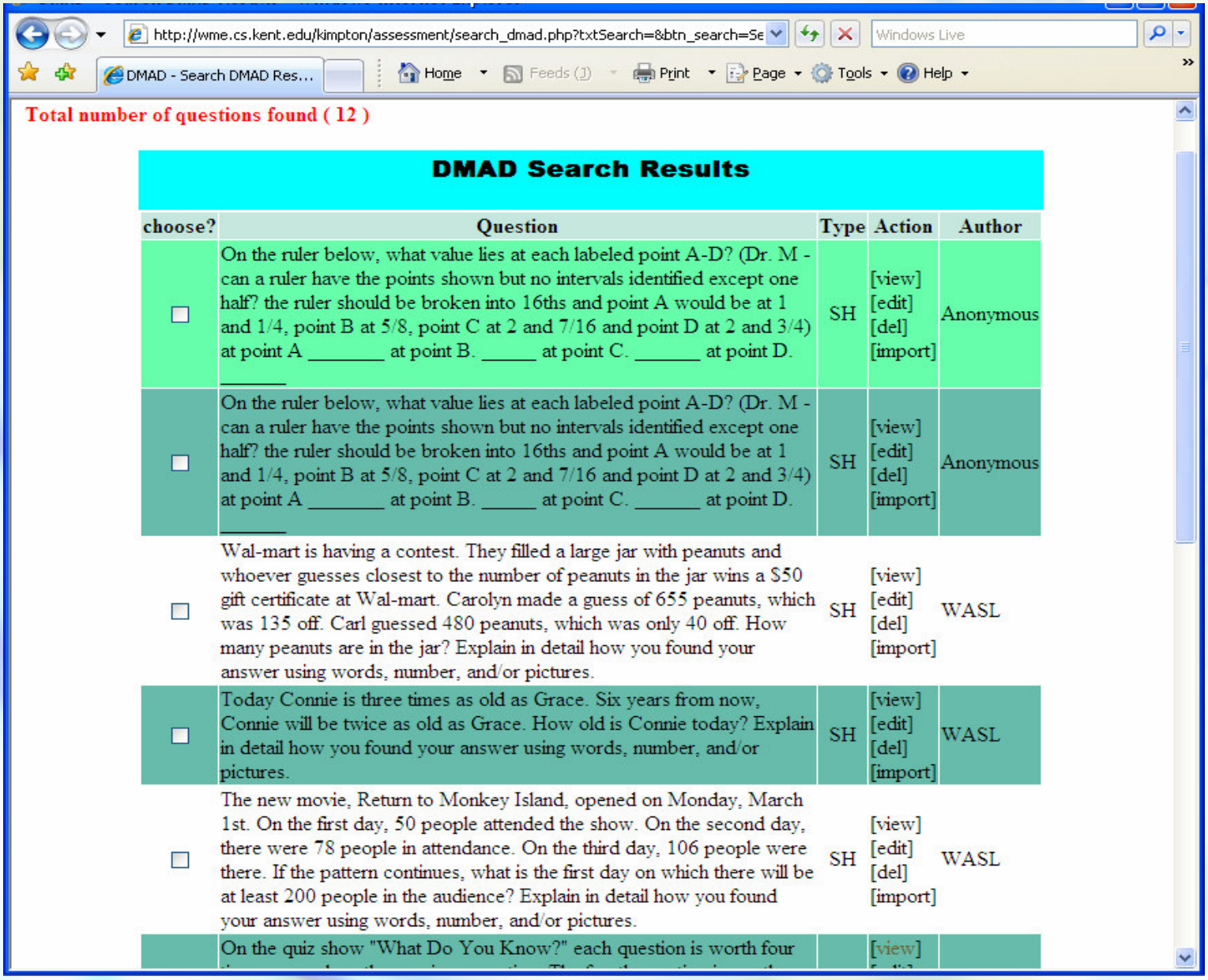
- The returned data from the server (databases) will be dynamically created and converted into an XML document format.

- Then DMASEngine will use the DOM to parse the returned XML document and extract the values to be displayed.

DMAD Search Engine (cont.)



DMAD Search Engine (cont.)



Total number of questions found (12)

DMAD Search Results

choose?	Question	Type	Action	Author
☐	On the ruler below, what value lies at each labeled point A-D? (Dr. M - can a ruler have the points shown but no intervals identified except one half? the ruler should be broken into 16ths and point A would be at 1 and 1/4, point B at 5/8, point C at 2 and 7/16 and point D at 2 and 3/4) at point A _____ at point B. _____ at point C. _____ at point D. _____	SH	[view] [edit] [del] [import]	Anonymous
☐	On the ruler below, what value lies at each labeled point A-D? (Dr. M - can a ruler have the points shown but no intervals identified except one half? the ruler should be broken into 16ths and point A would be at 1 and 1/4, point B at 5/8, point C at 2 and 7/16 and point D at 2 and 3/4) at point A _____ at point B. _____ at point C. _____ at point D. _____	SH	[view] [edit] [del] [import]	Anonymous
☐	Wal-mart is having a contest. They filled a large jar with peanuts and whoever guesses closest to the number of peanuts in the jar wins a $50 gift certificate at Wal-mart. Carolyn made a guess of 655 peanuts, which was 135 off. Carl guessed 480 peanuts, which was only 40 off. How many peanuts are in the jar? Explain in detail how you found your answer using words, number, and/or pictures.	SH	[view] [edit] [del] [import]	WASL
☐	Today Connie is three times as old as Grace. Six years from now, Connie will be twice as old as Grace. How old is Connie today? Explain in detail how you found your answer using words, number, and/or pictures.	SH	[view] [edit] [del] [import]	WASL
☐	The new movie, Return to Monkey Island, opened on Monday, March 1st. On the first day, 50 people attended the show. On the second day, there were 78 people in attendance. On the third day, 106 people were there. If the pattern continues, what is the first day on which there will be at least 200 people in the audience? Explain in detail how you found your answer using words, number, and/or pictures.	SH	[view] [edit] [del] [import]	WASL
	On the quiz show "What Do You Know?" each question is worth four		[view]	

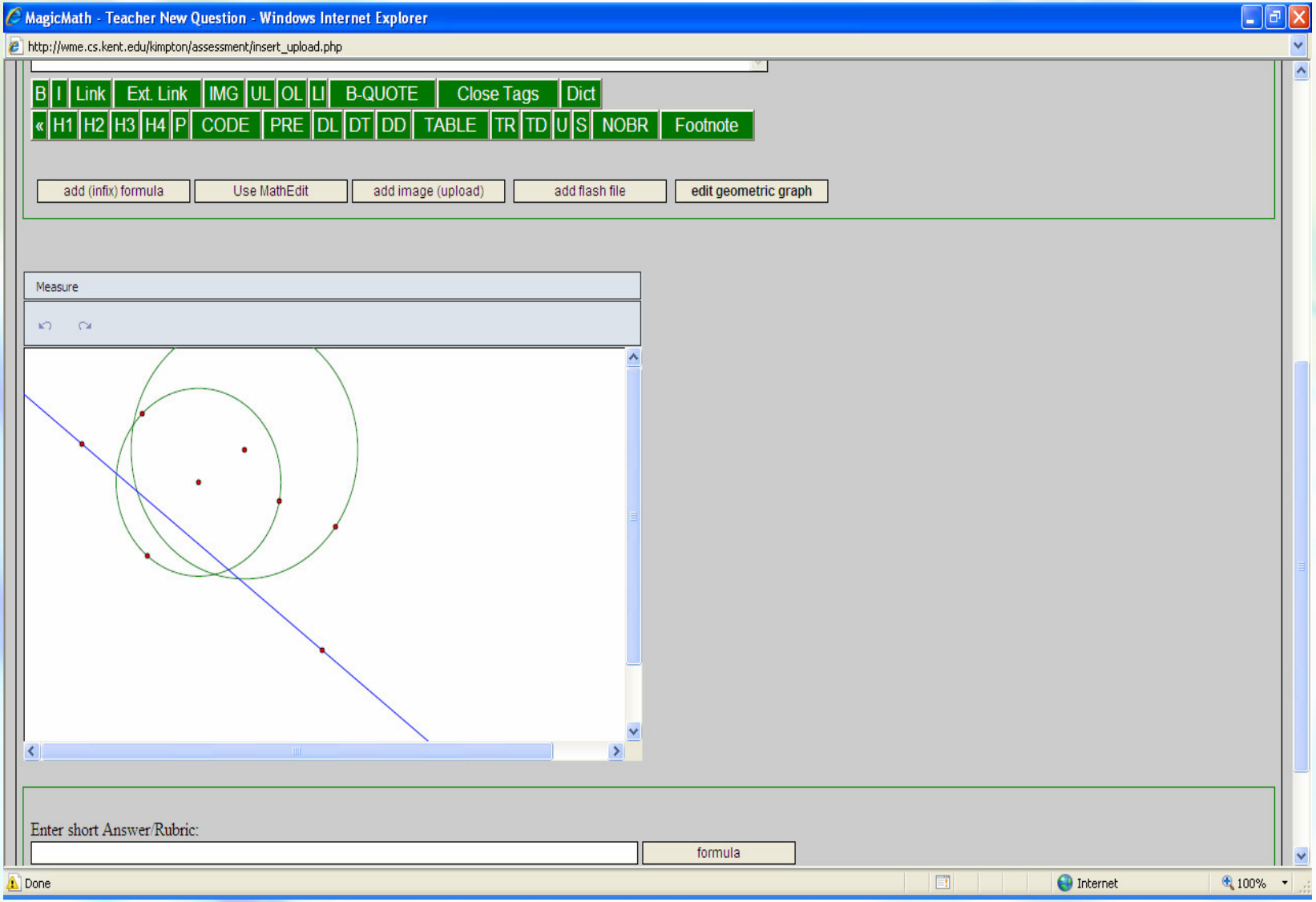
Assessment Markup Language: MAML

- ✓ MAML (Mathematics Assessment Markup Language) is an XML markup language for DMAS.
- ✓ To transmit assessment questions to and from DMAS system and to interact with outside systems.
- ✓ MAML will be used for representation/encoding of assessment questions and exams..
- ✓ MAML defines markup elements and attributes such as question head, type, classification, body, rubric, and so on.
- ✓The XSLT style sheet for MAML (maml.xsl) will be responsible to translate MAML markup into XHTML + SVG + MathML.

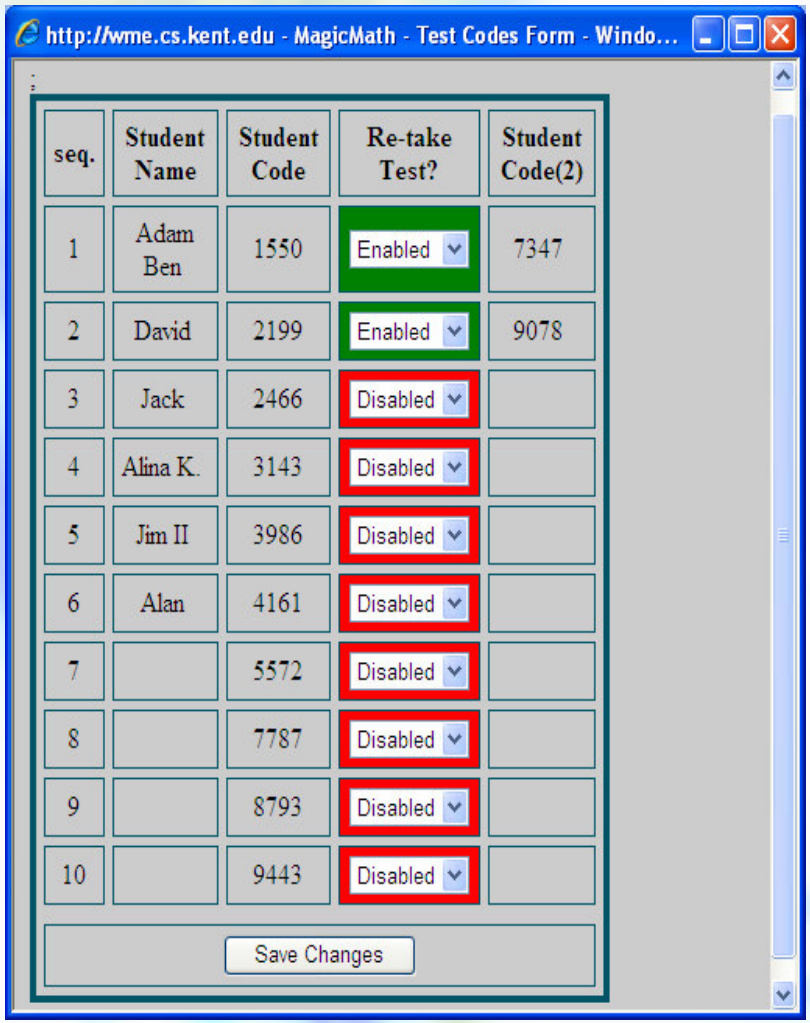
Assessment Markup Language: MAML (cont.)

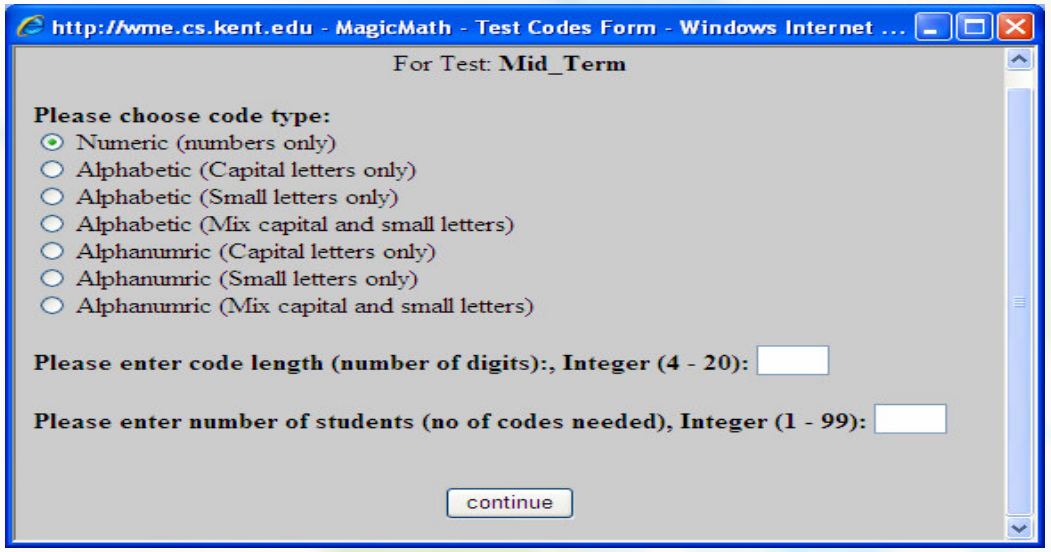
```
<?xml version="1.0" encoding="iso-8859-1" ?>
<dmad>
  <question type="Multiple Choices">
    <q_head>
          <author>Dan Alan</author>
          <keywords>fraction number, fraction</keywords>
          <classification>Algebra</classification>
          <comments>fraction number, fraction comparison</comments>
          <answer>9/12</answer>
    </q_head>
    <q_body>
          <q_text>Which fraction below is equivalent to 3/4.</q_text>
          <q_diagram />
          <q_choices>
                <choice id="1">27/36</choice>
                <choice id="2">8/16</choice>
                <choice id="3">4/8</choice>
                <choice id="4">9/12</choice>
          </q_choices>
    </q_body>
  </question>
</dmad>
```

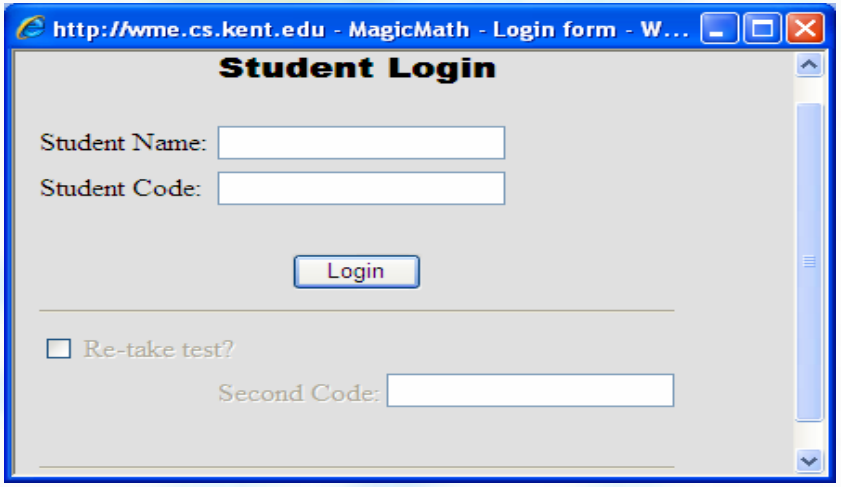
DMAS and Geometrical Graphing



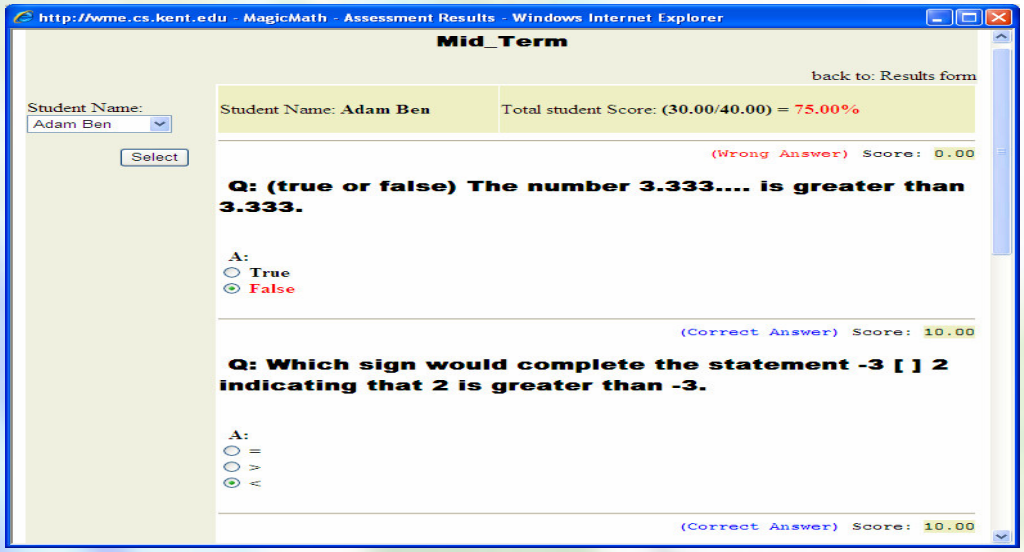
Assessment Test Giving

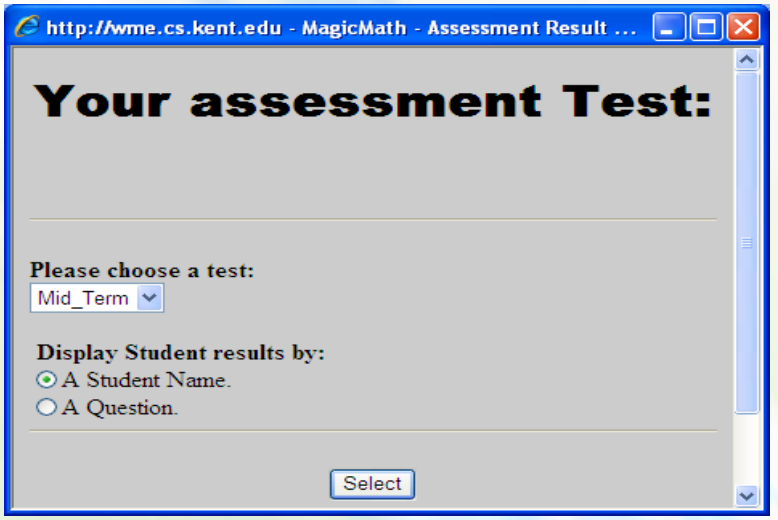


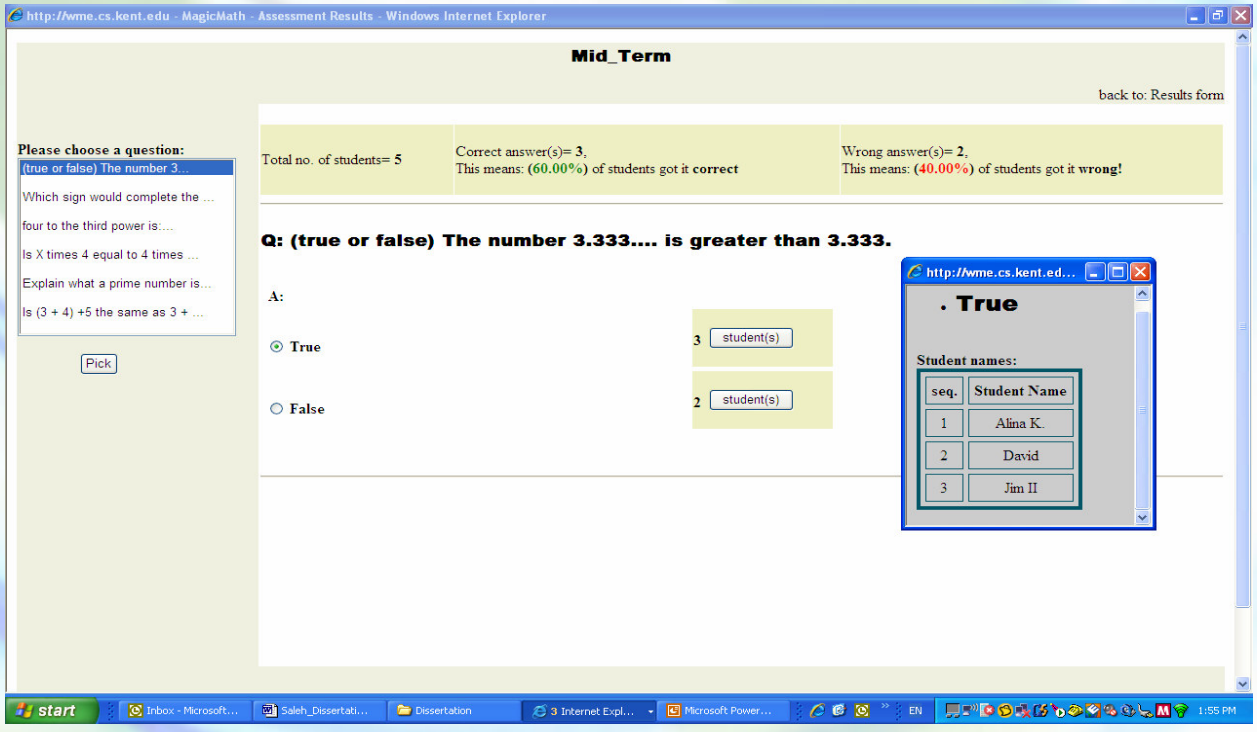




Grading Results Administration







Conclusions and Future Work

- The DMAS system aims to be an effective and easy to use assessment tool for mathematics education. A systematic way of authoring, importing, customizing, and exporting assessment materials can help create an environment in which usage and experience can accumulate and mutually reinforce.

- In fact, I have much work to do and to add features and more improvements to DMAS system to make assessment materials ready to deploy on the Web, to conduct tests online, to provide grading help, to generate performance statistics, to provide diagnostics and to suggest remedial materials, while making tests and scores private and secure, controlling access to tests and results.

- Creating the new assessment language MAML, Assessment Web service, and DMAS interface to other Web applications definitely need more investigations and much work ahead.

- My goal is to put DMAS system under extensive trial in schools and collecting feedback and suggestions from teachers, students, school administrators and education experts to help me evolve DMAS. As more schools adopt WME and DMAS, the distributed nature of DMAS will be demonstrated in realistic situations.

Demo and Q&A

- **Take a look..**

http://wme.cs.kent.edu/testing/kimpton/

http://wme.cs.kent.edu/kimpton/assessment/

http://wme.cs.kent.edu/wme_sample_page.php