

Using wikis as a learning and assessment tool in Economics
ECON30631 Labour Economics
School of Social Sciences
Economics

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Outline

The aim of this document is twofold: first to examine the institutionally supported “Confluence wiki” within the Blackboard VLE and consider whether it is the best choice for allowing 3rd year UG students enrolled on the Labour Economics ECON30631 unit in order to create a collaborative labour economics encyclopaedia or textbook online. This document will also consider some of the externally provided wiki alternatives and attempt to weigh up the pros and cons of each. Second, it will examine how mathematical formulae can be created by both staff and students to be used within wiki pages and discussion posts.

A number of possible approaches to this provision are suggested with an assessment of which assessment methods might be appropriate.

Wiki choices

There are a huge number of wiki systems to choose from, all of which could be used to create an environment suitable for students to collaboratively create an online labour economics encyclopaedia. The important considerations are not really about whether the end product can be achieved, but more to do with a) whether the chosen environment can be successfully managed and maintained by the academic and support staff and b) where the wiki will ‘live’. Is it going to be institutionally hosted, hosted with the wiki supplier, or with a commercial hosting company. This document weighs up the pros and cons of three of the most popular wikis systems, Confluence, MediaWiki and PBwiki (now PBworks) and uses these to highlight some of the main issues. A number of resources are available that show the comparative merits of a large number of wiki applications^{1 2}.

Confluence

Confluence is The University of Manchester’s wiki system of choice and is integrated through a ‘powerlink’ to the University’s VLE system Blackboard (Bb). Setting up a Confluence wiki is simple. A wiki can be created by anyone with Build permission within Blackboard by clicking the **Add Content Link >> Confluence Wiki Space**. Once the wiki is set up, students can automatically access it (an account is created the first time they access it), and then they will not need to enter their log in details again. The Confluence wiki can be set up to appear within the Blackboard frameset or in a new browser tab/window.

It is not currently possible for Section Designers and Principal Instructors in Bb to customise the appearance of Confluence; the look and feel of Confluence can be changed through the wiki administrator’s console, but this level of control is not given to Bb Principal Instructors at the moment. Similarly the level of control that the Bb Designer/Instructor has over the student experience of Confluence is limited; for instance, they cannot control the availability of specific tools (Add Page, Attachments etc.) to students. *Note: all users have a little control over the way their **personal pages** appear within the wiki system (position of menus, colour schemes from a restricted palette etc).*

The University of Manchester’s Confluence wiki has been set up, within the institution, to look as similar as possible to the Blackboard environment. The navigation between pages in Confluence works differently to most websites and new users need to become familiar with the idea of page hierarchies.

¹ http://en.wikipedia.org/wiki/Comparison_of_wiki_software

² <http://www.wikimatrix.org/>

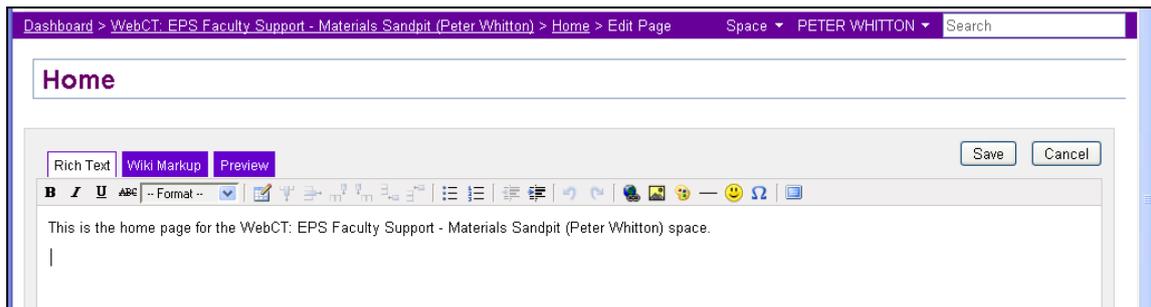


Figure 1: Confluence wiki editing interface (The University of Manchester)

MediaWiki

MediaWiki is open source and free, it was originally developed as a platform for Wikipedia online encyclopaedia. The software uses a MySQL database, which can be downloaded and hosted on any server that supports php. WikiMedia has a rich core feature-set, plus an active developer community producing extensions, which can be used to add greater functionality (e.g. embedding video and flash, using LDAP authentication).

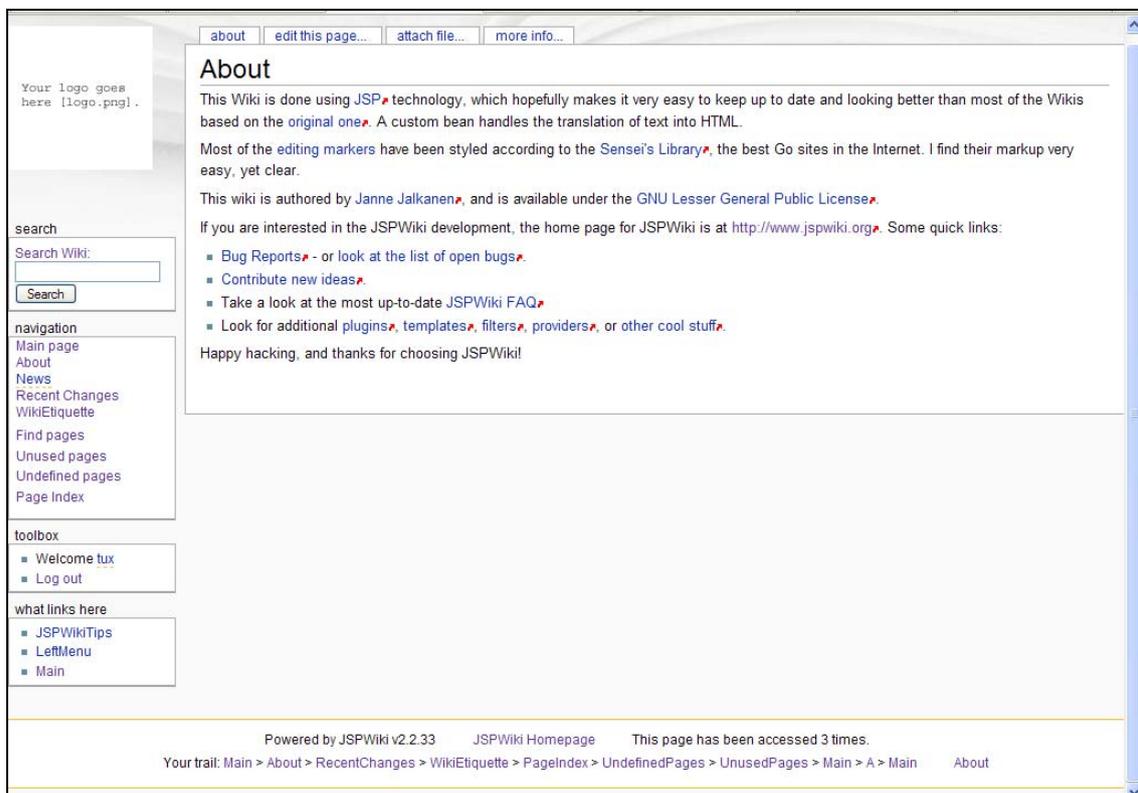


Figure 2: Screen shot of MediaWiki

In order to use MediaWiki successfully in an educational context, a number of factors need to be considered. First hosting (how the wiki will be made available to students and staff over the World Wide Web), there are a couple of options as to whether the wiki space is hosted with the University of Manchester or through an external (commercial) supplier.

The University of Manchester Faculty web services teams would be responsible for hosting a wiki using University servers; however, the level of support that you receive would need to be negotiated with web services on an individual basis. Depending on workload, web services may be willing to install MediaWiki and create an appropriate

URL for the service; however, administrative and technical support beyond this may be more difficult to secure.

There are a number of companies who offer commercial hosting packages specifically for MediaWiki³ ⁴, and some of these companies even offer free start-up packages with limited support in the hope that users will upgrade to paid packages and use them to purchase and register domain names. Typical start-up prices are around £5-£10 a month + VAT. Potential problems may arise in using commercial hosting services regarding data security; because these hosting services operate in the commercial sector, they are always at risk of take-over and closure due to external market factors.

PBwiki/PBworks

This is a one-stop solution, in that both the wiki software and its hosting are controlled by PBworks. The basic wiki is simple to set up, requiring only registration and reply to an authentication email. The initial set up is as shown below, which gives first-time users a good idea of how a wiki works. The company offer free, advertising-free wikis for educational purposes. The basic free package has limited space allocation at 2GB, and only wiki-level permissions, rather than page and folder level permissions, which may be more useful for groups of students all contributing to different areas of a single wiki. The other choices include a classroom edition at \$99 a year (for fewer than 100 users) and the campus edition at \$799 a year (1000 users)

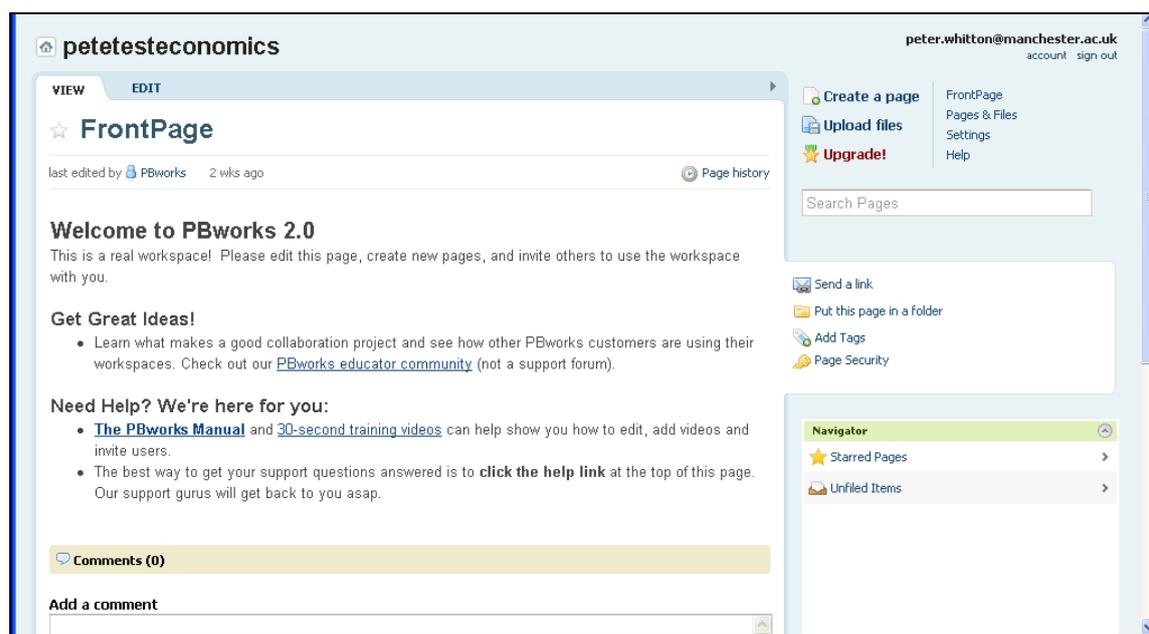


Figure 3: Screen shot of PBWorks / PBWiki

Externally hosted Wikis and personal data

There are problems associated with the transfer of student information between the University and the host, which would need to be taken into account if using either and externally hosted instances of MediaWiki or PBworks. The University of Manchester will not pass student data (e.g. the names of students) to external agencies that do not adhere to the EU Directive 95/46/EC on the protection of individuals with regard to the processing and movement of personal data and /or subscribe to the US State

³ <http://www.siteground.com/mediawiki-hosting.htm>

⁴ <http://www.dreamhostapps.com/free-mediawiki-hosting.html>

Department's *Safe Harbor*⁵ certification scheme - hosting companies who adhere to these are few and far between. In other words, students need to be in control of their own data and sign up to the wiki as individuals rather than any integration with the LDAP authentication system (the system that the University uses for usernames and passwords making bulk enrolment of students possible).

Comparison of the three wikis

	Bb Confluence	MediaWiki	PBwiki
Hosting	Hosted externally but part of the University Bb tool set	Hosted with external supplier or with University webservices by negotiation.	Hosted with PBwiki
Integrates with Blackboard	Yes	No	No
Recognises Bb groups	Yes	No	No
Editable maths equations in wiki pages as standard	No, MathML not supported see detailed notes. Equations as .gif or .png images only. Plugins are available to allow ASCII MathML and TeX to be rendered as MathML on screen	No, but there are extensions to MediaWiki to allow expressions written in ASCII MathML and TeX to be rendered as MathML on screen as TeXvc	No, but there is an Equation plug in that supports LaTeX
Administrator able to customise user experience	No, this facility is not available to Blackboard Instructors/Designers	Yes, anyone with an admin account can modify this	Yes, anyone with an admin account can modify this
Administrator able to customise look and feel	No, this facility is not available to Blackboard Instructors/Designers – users can only modify their home area	Yes, anyone with an admin account can modify this	Yes, anyone with an admin account can modify this
Administration of student data	Even though it is externally hosted Confluence has signed up for Safe Harbour	Students would have to self register if hosted externally	Students would have to self register as it is hosted externally
Backups and data loss	Confluence is backed up in the same way as Blackboard so data is difficult to loose.	You would need to take backups at regular intervals especially before updates of the wiki software.	Would be backed up by PBwiki, data loss is very rare. Occasional server down time for repairs and upgrades. Data could be at risk because PBworks are a commercial company
Limitations	User interface not ideal. Students are still able to see the dashboard feature which a bit of a distraction (to me anyway) and they can still browse hundreds of test users. Lack of customisability at Developer/Instructor level	Have not signed up for <i>Safe Harbor</i> certification programme. So student data could not be passed between us and the wiki host if externally hosted.	Have not signed up for <i>Safe Harbor</i> certification programme. So student data could not be passed between us and the wiki host.

⁵ http://en.wikipedia.org/wiki/Safe_Harbor_Principles

	annoying		
General administration/ set up	Confluence is powerlinked to Blackboard and understands Blackboard "users" and "groups". There is still a certain amount of set up within the wiki space to make sure that student groups can only view and edit the appropriate spaces.	There is an extension which provides LDAP authentication and some authorization functionality for MediaWiki (so that students could use their University username and pass). This would require a technical set-up by web services.	There is an advanced feature available by special arrangement with PBworks which provides LDAP authentication.
Support	Supported by Faculty eLearning teams and eLAT (eLearning applications team)	Application may be supported by web services by negotiation. Users would be supported by the academic or possibly the eLearning teams by negotiation	Application would be supported by PBwiki. Users would be supported by the academic or possibly the eLearning teams by negotiation. At risk because PBworks are a commercial company
Cost	Free	Open source and free, may have substantial hidden technical and administrative costs	Free for Basic edition see pricing policy for other academic packages ⁶ . May have hidden admin costs

⁶ <http://pbworks.com/academic-pricing.wiki>

Wiki assessment strategies

Wikis offer a great many opportunities for educators to encourage their students to work on complex and authentic tasks. However, because each student can contribute to, as well as edit many wiki pages, this can make assessment challenging. Gehringer⁷ (2008) suggests a number of possible assessment strategies including:

Summarised self-assessment

Students write up a summary of their individual contribution to the wiki and submit them to their instructor. This has benefits for the students in that they would have the opportunity to critically reflect on the value of their contribution to the completed wiki. A set of marking criteria or rubric may be necessary to focus the student on the areas that the educator has placed most value upon. In addition, a method of checking that the individual student has not overstated his or her contribution to the finished wiki would also be required (e.g. checking individual contribution sheets against each other, checking against the wiki its self).

Group based-assessment

Students work in groups and rate the contributions of each group member, as well as suggesting a grade for the group as a whole. This approach is very much in keeping with the enquiry-based learning ethos of encouraging students to take control of their own learning. In an ideal scenario, groups would negotiate amongst themselves and realistically assess each member's effort and assign a fair mark for his/her overall performance

Peer review

Each student is assigned two or three other students' contributions to assess, based on a rubric. This has benefits in that students could be asked to assess students outside their own group allowing them to read and measure the work of other groups against their own. Peer review is scalable but requires an element of extra administration on the part of the educator.

Each of these methods could be used in conjunction with an overall marking structure/rubric for the group effort; the *Hitchhikers Guide to Course Development* provides some excellent resources about using wikis in the curriculum⁸ and sample rubrics⁹ for assessing students' wiki contributions.

⁷ http://research.csc.ncsu.edu/efg/teaching/papers/2008-1484_Wiki.pdf

⁸ http://hitchhikers.midsolutions.org/course_design/blackboard/wikis/curriculum.php

⁹ http://hitchhikers.midsolutions.org/course_design/blackboard/wikis/wikiRubrics.php

Mathematical Formula and the web

When considering how to place mathematical equations within web pages, there are a number of initial considerations:

- How do I create the equation?
- How do I place the equation in the web page?
- Do I want the equation to be editable?
- Do I want the equation to be readable by assistive technologies?
- How many software applications am I prepared to use to create the equation and get it into the webpage?
- Am I prepared to use a mark up language to describe the equation?

In the early days of the World Wide Web, there was no real choice about how to display mathematical content online; it was simply achieved by rendering each symbol, equation and formula as a gif image. This was problematic in terms of accessibility and had a considerable maintenance overhead for those involved in creating and looking after websites with a lot of mathematical/scientific content.

MathML is the World Wide Web consortium's (W3C) preferred method of putting mathematical content on the Web. MathML has a number of advantages: it can be interpreted by assistive technologies (screen readers, etc.); it renders correctly in Firefox (Firefox is the University's preferred browser for viewing the VLE and especially the Confluence wiki); and plug-ins exist to help IE display it correctly¹⁰.

Much work has been done on the technical issues involved in integrating mathematical equations in web pages and VLE systems^{11 12} and the options open to academics and content developers producing online content containing mathematical, statistical and scientific content¹³.

Mathematical Formula in Bb Content Pages, Discussion Posts and Assessment

The simplest way students and staff can use mathematical formulae in Blackboard content, discussion and assessment, is by using the built-in Equation Editor, and many tutorials exist on the Web¹⁴ that explain how to create and edit equations using this tool (Figure 4: note: this does not work with the Confluence wiki system).

¹⁰ <http://www.dessci.com/en/products/mathplayer/>

¹¹ http://www.math.clemson.edu/~bmoss/math_on_web/math4.htm

¹² http://www.dessci.com/en/reference/webmath/status/status_Sep_02.htm

¹³ <http://mathforum.org/>

¹⁴ http://help-online.murdoch.edu.au/students/stu_guide_equation.html

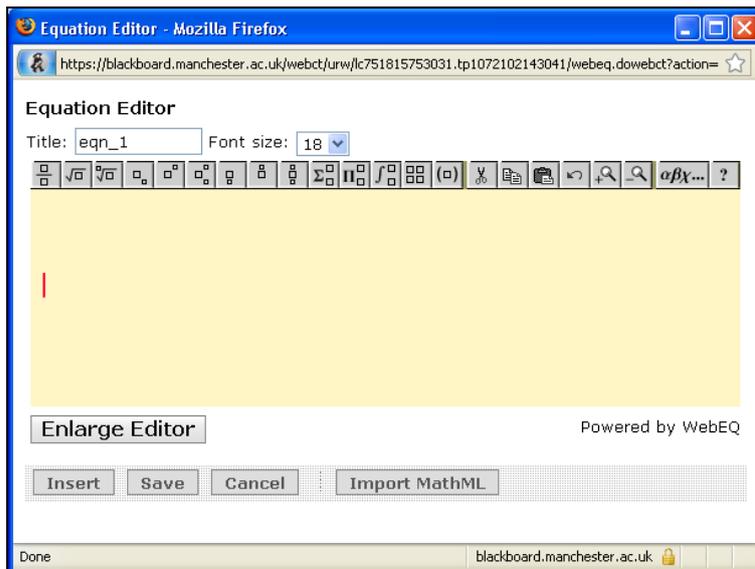


Figure 4: Blackboard's built in equation editor

Using Mathematical Formulae in Confluence

Using mathematical formulae in the Confluence is problematic and currently the only way of accurately showing formulae in the University of Manchester build of Bb is to revert back to using images (either .gif or .png) for each piece of mathematical text; equations images of this type can be created by anyone with access to the pieces of software described below (Equation 3.0, MathCast and MathType).

Future developments

Currently the University's Bb Confluence build does not support any mathematical mark up directly; however, Edinburgh University have produced an unsupported plug-in that would allow use of the `{math}` wiki markup and enable experienced users to type mathematical expressions directly into a Confluence wiki page (while in Wiki Markup mode)^{15 16} using ASCIIMathML.

There is also an unsupported plug-in that would enable experienced users to display LaTeX equations directly in a Confluence page using `{latex}` wiki markup. This plug-in requires TeX to be installed on the Confluence server and for system level variables to be altered¹⁷.

¹⁵ [http://confluence.atlassian.com/display/CONFEXT/Math+\(ASCIIMath\)+plugin](http://confluence.atlassian.com/display/CONFEXT/Math+(ASCIIMath)+plugin)

¹⁶ <https://www.wiki.ed.ac.uk/display/CONF25/ASCII+Math+Help>

¹⁷ <http://confluence.atlassian.com/display/CONFEXT/LaTeX+Plugin>

Software for Creating Mathematical Equations

In addition to the software applications described below, many other equation editors exist,¹⁸ including MathMagic¹⁹, Maple 13²⁰, MATH (for Open Office)²¹; however, these have not been considered in this document.

MathType

MathType²² is a powerful equation editing software made by Design Science that enables the creation of mathematical equations for web pages, and word processed documents, which allows users to output equations in a number of image formats and as TeX, LaTeX and MathML.

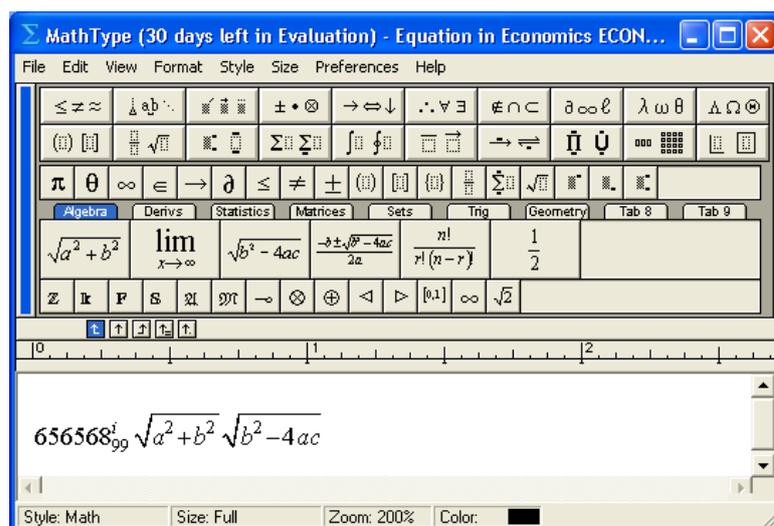


Figure 5: Screenshot of MathType (evaluation version)

Equation 3.0

Equation 3.0 is a stripped-down version of Design Science's MathType editor. Unlike MathType it is free with Microsoft Word and can be accessed through the menu **Insert>Object>Create New> Microsoft Equation 3.0**

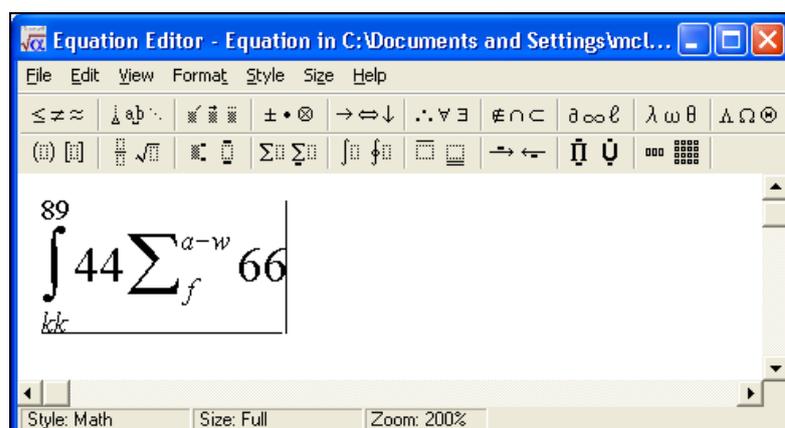


Figure 6: Screenshot of Equation 3.0 (in MS Word)

¹⁸ http://www.w3.org/Math/Software/mathml_software_cat_editors.html

¹⁹ <http://www.mathmagic.com/>

²⁰ http://www.maplesoft.com/products/maple/features/feature_detail.aspx?fid=5907

²¹ <http://www.openoffice.org/product/math.html>

²² <http://www.dessci.com/en/products/mathtype/>

MathCast (formerly Math Edit)

MathCast²³ is an open source (free) equation editor that enables users to create mathematical equations which can be exported in a number of formats, rendering them to screen, to picture files or to MathML.

The main advantage/disadvantage is MathCast's use of a "Rapid Mathline", which allows users to input formulae in a very straightforward calculator-like way, because the system automatically styles formulae in the appropriate way (see Figure 7 below)

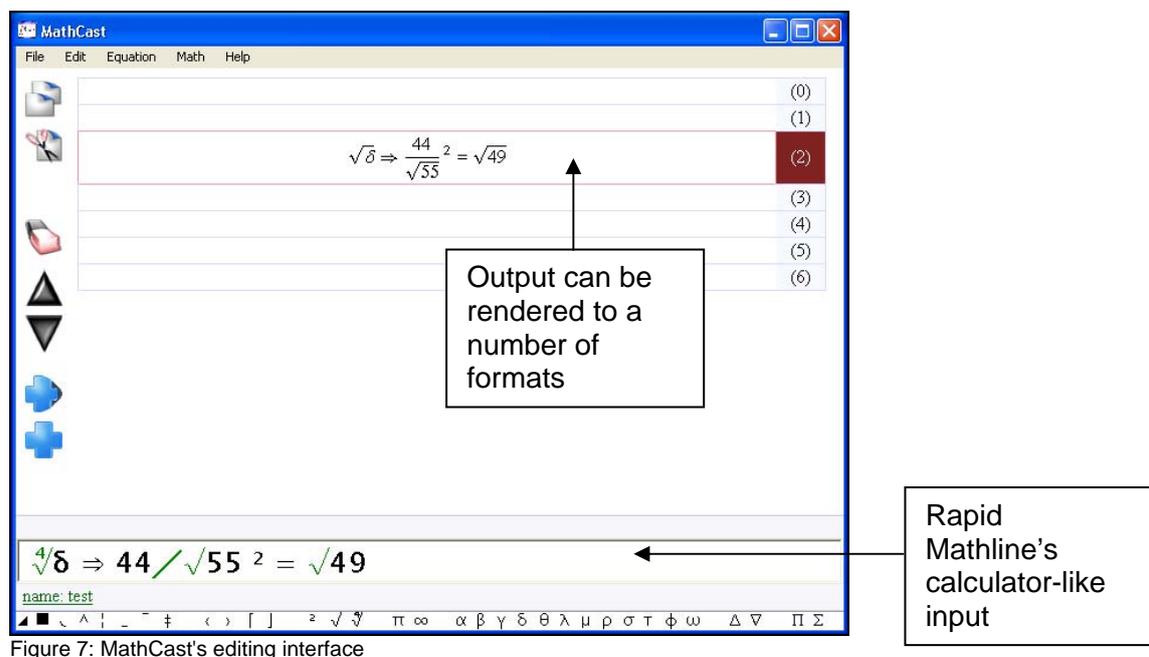


Figure 7: MathCast's editing interface

Equation > Export Equation > choice of export options including .bmp, .mml, .xml, .png, .emf

The Bb discussion forum doesn't recognise the .mml type that MathCast exports (one of the problems is Bb can't deal with whitespace, and even after manually editing the whitespace from the .mml file, Bb still could not correctly render the MathCast MathML)

Comparison of Three Equation Editors

	MathType	Equation 3.0	MathCast	Notes and further information
Export to MathML	Yes, MathML of various types can be cut and pasted using the Preferences >> Translators function	No it uses Microsoft's OMML format	Yes, can be exported as .mml file and saved as Html, xhtml and xml files	OMML (Office Math Mark-up Language) can be converted to MathML via the clipboard in Word 2007
Export to LaTeX	Yes, LaTeX and TeX of various types can be cut	No	No	

²³ <http://mathcast.sourceforge.net/home.html>

	and pasted using the Preferences >> Translators function			
Export as .gif image	Yes, anti aliased, different DPIs and background colours	No	No	May be possible to cut and paste out into an image editing programme to produce this
Export as .png image	Yes	No	Yes	Portable network graphic
Other file types	TeXvc (Mediawiki) Mathematica and Maple MathML	No	.bmp (Bitmap) .emf (enhanced metafiles)	
Cost	MathType is licensed to the University of Manchester under a perpetual licence agreement, and can be downloaded from the ITservices download site ²⁴ .	Free, comes with MS Word	Free	

²⁴ http://www.applications.itservices.manchester.ac.uk/show_product.php?id=281