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Educational Content Authoring Tools

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Introduction

The authoring, storage, delivery and reuse of educational content is rapidly becoming a significant problem in the tertiary education sector where significant content is generated for the plethora of courses delivered each year. Effectively being able to manage this authoring process (authoring, storage, delivery and reuse) will offer significant advantages for the tertiary education sector. The challenges being faced in the content authoring process in tertiary education sector can be summarised as follows:

- Little or no archiving of content (each lecturer redevelops content).
- Tools used are content developer specific.
- Content types supported depend on the platform used by each developer.
- Important standards are not necessarily supported (i.e. WCAG, SCORM, etc…).
- Content is typically recreated for each delivery mode (i.e. PDF, PowerPoint slides, lecture notes, etc…).
- Content cannot be updated easily.

Scope

This report is focussing on the specific requirements of the authoring, storage, and re-use, and delivery of education resources of a variety of types. The report will be limited to the authoring tools that exist either as standalone systems or as authoring tools within a variety Learning Management Systems (LMS), both open source and commercial.

This report will not deal with aspects of administration, student management, or other aspects that are peripheral to the creation, storage and dissemination of the content itself which are often available with LMS. In this regards Figure 1 highlights the scope of this report.
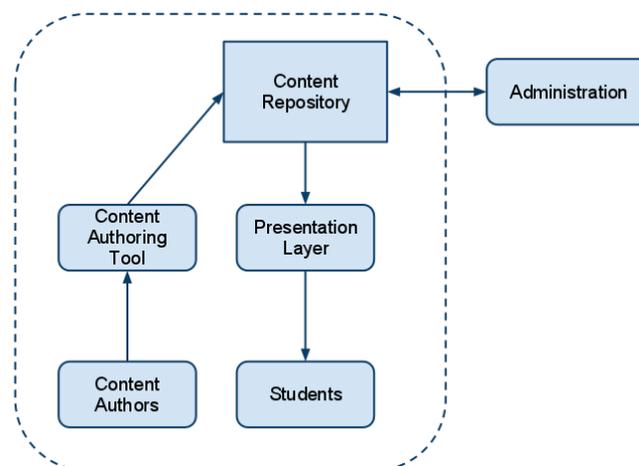
Figure 1: This report is limited to analysing the content authoring, content repository and presentation and dissemination capabilities of a number of content authoring tools.

Evaluation Criteria

Content Types

There are numerous content types that are important for the creation of educational content and any content authoring tool must be capable of natively handling, storing and delivering these content types to students. In evaluating the content authoring tools the following content types will be evaluated.

- Audio
- Video / Animation
- Text
- Equations / Scientific Notation (Physics, Chemistry, Biology)
- Images
- References (both online and offline content)

A diversity of other content types exist but generally derives from the high level content types listed above. An important capability for these content authoring tools is that they are extensible to ensure new content types can be incorporated as they become available.

Delivery Modes

Once an educational module is created it is important that it can be delivered to students. In evaluating the following tools we will be analysing if the content modules can be delivered through the following delivery modes.

- Through Learning Management System (LMS)
- Standalone Web Interface
- Printable Document Format (i.e. PDF, DOC)
- Lecture slides and handouts
- Portable devices (iPad/iPhone, Smartphones, etc…)

Important Standards

SCORM and IMS Global Standards

Sharable Content Object Reference Model (SCORM)[1] is a collection of standards and specifications for web-based e-learning. SCORM defines a standard format for educational content, including static and dynamic content as well as interactive learning content like quizzes and surveys. Furthermore, SCORM defines a method of tracking and scoring student progress through these educational materials.

Technically, SCORM defines a standard for communications between client side content and a host system called the run-time environment, which is commonly supported by a learning management system. SCORM is a specification of the

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[1] http://www.sumtotalsystems.com/resources/toolbook/community_scorm.html

Advanced Distributed Learning (ADL) Initiative, which comes out of the Office of the United States Secretary of Defense.

SCORM 2004 introduced a complex idea called sequencing, which is a set of rules that specifies the order in which a learner may experience content objects. In simple terms, they constrain a learner to a fixed set of paths through the training material, permit the learner to 'bookmark' their progress when taking breaks, and assure the acceptability of test scores achieved by the learner. The standard uses XML, and it is based on the results of work done by AICC, IMS Global, IEEE, and Ariadne.

Alongside the SCORM standard there also exists the standards developed by the IMS Global Learning Consortium (IMS GLC) [2]. In comparison to ADL the mission of the IMS GLC is to develop open interoperability standards, support adoption with technical services, and encourage adoption through programs that highlight effective practices. The IMS GLC's stated aim is

> *"to develop open interoperability standards to advance technology that can affordably scale and improve educational participation and attainment."*

IMS GLC represents more than 160 Member organizations and provides a neutral forum in which members work together to advocate the use of technology to support and transform education and learning.

Again in comparison to SCORM, IMS have defined a considerable number of standards that are important for sharing and reusing learning content. Some of these standards, like SCORM, define the path that students progress through a specified learning activity. Unlike SCORM however, IMS also has standards to specify meta data, accessibility, and question and test interoperability. The important IMS standards from an evaluation perspective are:

- IMS Common Cartridge (Content sharing and reuse)
- IMS Content Packaging (Content sharing and reuse)
- IMS AccessForAll (Accessibility)
- IMS Meta-data (Meta-data for describing learning content)
- IMS Question and Test Interoperability (QTI) (Representation of question and test data)

While SCORM and IMS standards will coexist side by side there is a view in the educational community that in the long term the IMS standards will become the defacto standards, thus possibly representing a slightly more important standard when evaluating LMS capabilities.

The diversity and completeness of the IMS standards are important considerations because it is likely in future that most, if not all, LMS will support these standards. In order to be able to develop repositories that are future proof it is thus important that content authoring tools are capable of supporting these standards.

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[2] http://www.imsglobal.org/

WCAG[3] and ATAG[4]

Web Content Accessibility Guidelines (WCAG) 2.0 and Authoring Tool Accessibility Guidelines (ATAG) 1.0 cover a wide range of recommendations for making Web content more accessible. Following these guidelines endeavours to make content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Adherence to these guidelines will have the potential benefit of making content more usable for users in general.

ATAG 1.0 provides guidelines for Web authoring tool developers. Its purpose is two-fold: to assist developers in designing authoring tools that produce accessible Web content and to assist developers in creating an accessible authoring interface.'

Authoring tools can enable, encourage, and assist authors in the creation of accessible content through prompts, alerts, checking and repair functions, help files and automated tools. It is critically important that content developers be able to author content that all people, including those with disabilities, can access. The tools used to create this information must therefore be accessible themselves. Adoption of these guidelines will contribute to the proliferation of content that can be read by a broader range of readers and authoring tools that can be used by a broader range of authors.

Metadata Standards

There are a plethora of metadata standards that can and have been used to describe and facilitate the reuse of educational content[5]. Two important metadata standards are DublinCore[6] and IMS[7]. Both standards allow the content for a given learning module or resource to be systematically described in a machine understandable form. Metadata standards generally and DublinCore and IMS specifically allow content reuse through the systematic description of the educational resource that has been created. Appropriate metadata standards are an important part of any content authoring tool, and thus a critical part of the evaluation criteria.

HTML5

HTML5[8] is the next major revision of the HTML standard, currently under development. Like its immediate predecessors, HTML 4.01 and XHTML 1.1, HTML5 is a standard for structuring and presenting content on the World Wide Web.

HTML5 is a response to the observation that the HTML and XHTML in common use on the World Wide Web is a mixture of features introduced by various specifications, along with those introduced by software products such as web browsers, those established by common practice, together with many syntax errors in existing web documents. It is also an attempt to define a single mark-up language that can be

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[3] http://www.w3.org/TR/WCAG20/
[4] http://www.w3.org/TR/WAI-AUTOOLS/
[5] http://sites.google.com/site/erwinfolmeronsemanticstandards/list-of-semantic-standards
[6] http://dublincore.org/
[7] http://www.imsglobal.org/
[8] http://dev.w3.org/html5/spec/

written in either HTML or XHTML syntax. It includes detailed processing models to encourage more interoperable implementations; it extends, improves and rationalises the mark-up available for documents, and introduces mark-up and APIs for complex web applications.

Licensing

The licensing arrangements for software is often complex but generally falls into two categories; either commercial proprietary or open source. The most common open source license is the GNU Public License[9]. The license under which the software is provided does not indicate the utility of the authoring tool but does provide an indication of how extensible the software is, as closed source proprietary tools cannot be extended by the user community (or software developers they engage), and must instead rely on the company choosing to add additional features if they are to be available.

Deployment Scenarios

The content authored using these tools can be deployed and used in a variety of ways and in analysing these tools it is important to understand how the authoring tools, and their associated repositories can be deployed operationally.

In the classroom students can use the learning resource in a variety of ways both as standalone resource and as part of a blended learning approach where digital content supplements or complements face to face and other teaching opportunities.

At a school or institution level teachers could share learning modules, or collaboratively create learning modules. The capabilities for the authoring tool to facilitate this are thus an important characterisation of the utility of a particular authoring tool.

If the tool uses a well managed, standards-based, repository then administrators or other content authors can easily understand what learning modules exist, who created them, what content types they contain and which educational level they are designed for. This would make managing learning resources on a school or institution wide level significantly simpler.

Beneficial Teaching and Learning Practices

There is diverse theory on beneficial educational practices but this is beyond the scope of this report. There are however a few overarching themes that accurately summarise the myriad concepts out there.

Firstly, it is important to generate content that requires active learning as opposed to passive learning. Such an approach can be achieved through creating interactive

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[9] http://www.gnu.org/copyleft/gpl.html

content that requires user involvement. A typical example is the necessity to complete quizzes or surveys as part of the educational content.

Given the different ways in which people learn it is important that a variety of modes of learning are available to students. This corresponds to offering multiple content types. This encourages learning by those who have different learning modalities and who benefit from different pedagogies. In this way students are able to consume the content types that best allow them to learn, and interest them, without requiring intervention by the content author.

Knowledge is derived from creating webs of information and is achieved by understanding the relationship between different concepts. When creating online content it is important that the content is modular, allowing students to learn manageable amount of information while giving them the opportunity to create the links between such bundles of information. A good content authoring system should thus allow opportunities to link between content modules as well as linking to additional content, thus ensuring that students are able to take advantage of the plethora of information available in other digital and print resources.

Software to be Evaluated

The following table lists the existing software packages and authoring tools that will be analysed in this report.

Authoring Tool	Developer	Source
Equella	Equella	http://www.equella.com
ICE	University of Southern Queensland	http://ice.usq.edu.au/default.htm
Moodle	Moodle	http://moodle.org/
LAMS	Macquarie University	http://lamsfoundation.org/
Ecampus	Ecampus	http://www.ecampus.com.au
AContent	ATutor	http://atutor.ca/acontent/

Other content authoring software packages and tools that exist but are not analysed in detail in this report are given in the following table.

Authoring Tool	Developer	Source
Blackboard/WebCT	Blackboard	http://www.blackboard.com
Exelearning	eXe project	http://exelearning.org/wiki
LRN	.LRN	http://www.dotlrn.org/
Pearson LearningStudio	Pearson	http://www.pearsoncustom.com/pearson-learning-studio/
Sakai	Sakai Project	http://www.sakaiproject.org/

General Comments

There are a number of comments that relate broadly to all the authoring tools analysed herein and for convenience this analysis is presented separately. While HTML5 was presented earlier as an important standard it remains to be ratified. In the interim therefore there are a variety of similar but non-standard HTML implementations in the wild. For this reason true HTML5 compliance cannot be appropriately measured. All of the tools support the development of rich multimedia content and many use the same WYSIWYG editor, TinyMCE[10], to achieve that. For this reason the HTML5 compliance of each of the authoring tools is not discussed below.

Another commonality between authoring tools is that they do not natively support mobile devices, with the exception of Blackboard which is not analysed in this report. All the authoring tools allow the creation of stand alone Web sites however so content can be viewed on portable devices using a standard web browser. This area of compliance will surely change in years to come and is not a major failing for any of the tools analysed.

EQUELLA

EQUELLA is a digital repository and content authoring tool that provides the ability to author, store and disseminate content in the teaching and learning, research, media and library contexts. This analysis will relate to EQUELLA's capabilities relevant to a teaching and learning environment. The system is commercial and proprietary and is being used by a variety of institutions and organisations around the world.

Learning content within EQUELLA can be rich HTML web pages including images, sounds, videos, PDF documents, MS Word documents, ZIP files, journal articles, book chapters, links to items, files and web pages, and much more.

The HTML Editor has a WYSIWYG interface and provides numerous operations, and tooltips to enable materials to be selected from the common pool of digital learning materials stored within the Digital Repository, as well as uploaded from a desktop or an external web page. EQUELLA can also create interactive learning content including quizzes.

EQUELLA enables classification of learning content by allowing information describing an item's content to be stored with that item. This metadata is fully discoverable and searchable, and the meta data fields can be chosen arbitrarily by the content author.

EQUELLA allows learning content to have multiple versions with different statuses (draft, live, moderating, etc) enabling content currently in use to be modified and reviewed without impacting on their use.

Equella conforms to a considerable number of standards that are listed as follows:

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[10] http://tinymce.moxiecode.com/

- SCORM 1.3/2004, IMS, IMS DRI and METS – for import and export of items;
- Z39.50 – for federated searching including the ability to transform and import records;
- ECL, SRW, DSM, LORN, Google and edna – for federated searching;
- OAI-PMH and LORAX – for harvesting;
- LDAP, CAS and External Authentication (Shibboleth and Microsoft ISA) – for authentication;
- SOAP and WSDL – for web services;
- RSS and Atom – for publishing;
- ODRL – for storage of Digital Rights; and
- MADS, MARC 21, MARCXML and MODS – for library system interfaces.

It has been noted[11] that Equella "is a very powerful system and with power comes complexity. Equella ships with some very powerful core code and an extremely flexible configuration tool/layer that allows an educational institution to set it up to service its specific needs and business logics. This flexibility means that the institution can manage the application into the role it needs it to support without having to enter the expensive and risky world of software customisation. It takes effort and commitment but so does any serious endeavour."

On the whole Equella offer excellent content creation capabilities but the interface is somewhat overly complex for the average user. In addition, EQUELLA does not support the important accessibility standards, which are a major oversight for such a complex, enterprise level tool.

ICE

The Integrated Content Environment (ICE) is a free Word-processor based system developed at the University of Southern Queensland that allows authors to work individually or collaboratively on material for the Web, CD and print.

One of the key features of ICE is its word processor integration. Authors work in Microsoft Word or OpenOffice.org Writer and ICE converts the content into usable, self-contained course web sites in IMS package format.

A variety of content types are supported but there is limited multimedia support due to the word processing based format used within ICE. ICE is able to accept content from a variety of existing sources using conversion tools for incorporation into the ICE word processor. This conversion means that the external content types are transformed into the ICE content form. This is a considerable advantage because it means these content types become natively supported after conversion. The external content types supported include:
- Excel
- Word
- PowerPoint

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[11] http://www.capterra.com/learning-management-system-software/reviews/31011/EQUELLA/The %20Learning%20Edge%20International

- GeoGebra
- Latex
- Chemical Mark-up Language

ICE can communicate with a content repository run by a version control system called Subversion and if version control is not required, ICE can use a simple file system or share content through simple file sharing environments like DropBox or iFolder.

Due to the nature of the word processing format used by ICE the content developed is mainly non interactive, however flash (FLV) videos can be incorporated. ICE does not support any accessibility standards nor provide the ability to use metadata to describe the educational content created.

ICE is capable of making IMS content packages for use in other LMS and ICE can be directly integrated with Moodle, which reduces re-work and re-formatting costs for using ICE within the Moodle LMS. ICE allows content to be disseminated using the Atom publishing protocol and can also be distributed as a PDF.

It was noted[12] that "ICE is a good idea if you have a large team all using the same templates. But not as useful for a traditional university where everyone does their own thing"

While ICE offers good support for a variety of content types the early development stage of this project means that the offering is somewhat immature, clearly not supporting key content types, nor offering conformance to important standards that are likely to prove critical for ensuring the modularity and reusability of educational content into the future.

Moodle

Moodle is a popular LMS for producing Internet-based courses and web sites. Moodle is provided freely as Open Source software (under the GNU Public License). Moodle supports a diversity of content types, including all of the six content types listed earlier in this document, and is capable of developing interactive quizzes and questions.

Being open source, and having a mature development framework, Moodle is highly extensible, but unfortunately still has major limitations with respect to the evaluation criteria specified earlier. These limitations are unlikely to be fixed in the near term.

One of the major deficits of Moodle is the frequency and severity of bugs that persist within the tool. The slideshow configuration of the lesson activity is a perfect example where functionality is not provided due to a bug that renders the slideshow mode useless.

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[12] Survey response to survey located at https://spreadsheets.google.com/viewform?hl=en&pli=1&formkey=dGJSTUV6NVYxQjg4NFVmaS12TDY4akE6MQ#gid=0

The other major deficit with Moodle is its inability to export content in a format that is suitable for other LMS or even to print or other digital formats. While Moodle supports the inclusion of LMS and SCORM packages it is not capable of exporting either. This is partially due to the social constructionist philosophy behind the Moodle activities which are not seen by the Moodle development community as being fully compatible with the IMS and SCORM specifications.

Moodle supports neither the accessibility standards nor metadata creation for learning content.

From a survey conducted[13] the Moodle benefits are that "It is simple to learn and use, has many possibilities, it allows for a great deal of student activity" but conversely the detriments are that "It has many possibilities (can be overwhelming for some), standard format is unappealing and can lead to a huge long site."

Other comments that were discovered in this survey are that "Although customisable and 'open-source', ability to customise is severely limited at ANU and makes it difficult to develop methods outside of presets." And "Moodle is simple, but a little stark in its look. The Moodle book module has just enough features to make it usable."

Moodle is very simple but its inability to store content in a standard form makes the content difficult to reuse within Moodle and almost impossible to reuse in another LMS or in any standalone form. This renders the content authoring capability of Moodle essentially useless when evaluated in the context of creating highly modular, highly reusable content that is not dependent on a specific authoring tool or distribution mechanism.

LAMS

LAMS is an open source[14], authoring tool for designing, managing and delivering online collaborative learning activities. It provides content authors with a visual authoring environment for creating sequences of learning activities. These activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration. LAMS can be used as a stand alone system or in combination with other learning management systems detailed herein.

LAMS provides teachers with a visual authoring environment for creating, storing and re-using sequences of learning activities. Teachers drag and drop activities into the authoring interface and then join the activities together to produce a learning sequence. LAMS is capable of supporting all the content types detailed earlier and can create modular learning object, as well as interactive and collaborative tasks such as discussion, voting and debate, and quizzes and tests.

LAMS does not support the accessibility standards but does support a number of the important IMS standards including the IMS Content Packaging for creating reusable

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[13] Survey response to survey located at https://spreadsheets.google.com/viewform?
hl=en&pli=1&formkey=dGJSTUV6NVYxQjg4NFVmaS12TDY4akE6MQ#gid=0
[14] http://lamsfoundation.org/license/lams/2.0/

content objects, the IMS Metadata standard for being able to extensively categorise and describe authored content and the IMS Learning Design standard for the expression of a variety of different learning pedagogies.

Ecampus

Ecampus is a commercial, proprietary LMS with a dedicated authoring tool, Composica. Like all the tools discussed thus far Ecampus supports all the content types using a WYSIWYG authoring environment and supports the creation of interactive quizzes and surveys. Ecampus is capable of creating both SCORM compliant packages as well as other content types suitable for LMS/online/offline/CD.

Composica follows excellent data management standards by separating the content, its appearance and its behaviour. The look and feel of each course can be swapped out even after the content has been created because the system keeps styles, navigation rules, and persistent graphics in distinct layers and objects, which are separate from the learning content.

Composica offer opportunities to import external content, specifically from Microsoft PowerPoint, directly into the authoring tool where it can be stored natively. Composica can be used collaboratively and allows content modules to be created and shared between a variety of courses. Composica integrates with standard LMS as it is fully SCORM compliant. A metadata editor allows for the creation of extended course related metadata and Ecampus is AICC PENS compliant, however Ecampus does not support any of the accessibility standards.

AContent

AContent is an open source, stand alone content authoring system and repository used to create interoperable, accessible, and interactive learning content. It can be used along with learning management systems to develop, share, and archive learning materials. AContent supports all the content types listed previously as well as being able to create interactive quizzes and tests. Importantly from this perspective AContent supports the IMS QTI standard for importing and exporting quiz and test data.

AContent has a simple WYSIWYG interface and being a stand alone authoring tool has an uncluttered interface for managing the creation, storage and distribution of learning modules. Of all the tools analysed herein AContent has the simplest workflow for creating compelling and re-useable learning objects.

AContent is the only authoring tool reviewed herein that has a focus on providing accessible content as an integral component of the authoring process. AContent conforms to the following accessibility standards
- W3C WCAG 1.0
- W3C WCAG 2.0
- W3C ATAG 2.0

- US Section 508
- Italy Stanca Act
- IMS AccessForAll 2.0 draft
- ISO FDIS 24751

As a standalone system AContent is developed with a view to offering flexibility in the way that learning content is capable of being exported. For this reason AContent is capable of exporting the authored content into a variety of important standards:
- IMS Content Packaging 1.1.2+
- IMS Question Test Interoperability (QTI) 1.2/2.1
- IMS Common Cartridge 1.0
- W3C XHTML 1.0

One of the most impressive capabilities of AContent is that it supports the IMS AccessForAll standard. This standard allows a single learning resource to be supplemented by additional content types to support learners with a variety of learning modalities. This directly supports optimal teaching and learning theory by providing a systematic method of catering to diverse student needs. AContent also supports metadata descriptions of learning content

Another notable difference between AContent and the other authoring tools analysed herein is that AContent has the ability to distribute content package using a standards based web service API, allowing third party software to search, preview, import content from, and export content to the AContent repository. AContent also supports OAuth, creating a single sign-on between a host system and an AContent repository connected to it for the authenticated distribution of AContent resources.

General Comments and Recommendations

The vast majority of the authoring tools allow the creation of rich text content modules for delivery to students using a combination of text (including mathematical and scientific notation) and multimedia resources. There is essentially no limitation to the types or forms of content that can be included in any of the content authoring tools detailed herein.

For the vast majority of these tools the content authoring represents a component of a much larger learning management system. This design philosophy leads to confusion between the content authoring process and the content deployment process. This problem is only likely to increase as the tools become further integrated, offering increased LMS capabilities but not focussing specifically on the authoring process. I strongly believe that there is the possibility that the authoring process will become confused in the rush to add new features and capabilities to many of these LMS.

From a teaching and learning theory perspective it is important to separate the content creation process from the specific tool being used to deploy the content, not only to focus attention on the process of creating truly compelling and interactive learning objects, but also to ensure that the content can be easily shared and reused without being locked into a specific authoring tool or LMS.

The major challenge faced by many of these tools is the ability to store this content in a manner that is simple to reuse. The IMS and SCORM standards define the ability to share and reuse of content and while many of the authoring tools support these standards many do not. There is a disturbing trend in some of the authoring tools surveyed that the authored content cannot be reused due to the lack of support for the necessary, standards based, SCORM and IMS export formats and processes.

In almost all of the authoring tools there is also the deeper question of distributing content in a form outside that of a web-based LMS. Content types like HTML, DOC, PDF and PPT stand out as obvious requirements for non LMS content types that need to be supported, something that is currently lacking in almost all the tools reviewed.

Of all the content authoring tools AContent conforms to the most useful standards whilst offering a simple and effective authoring tool. The tool itself is uncluttered, offers the ability to include all the necessary content types and conforms to the important accessibility standards developed by the W3C. It creates modules that are compatible with most existing LMS through the use of standards based export mechanisms. Importantly AContent allows the creation of metadata that describes the content being developed.

There is at this stage no need for the development of a new, standalone tool for the content authoring process. Such a tool already exists, for the most part, in the form of AContent and creating a new tool would simply represent redevelopment of an already excellent wheel. There is significant potential to extend AContent to provide the capabilities that are lacking, few as they currently are.

CECS Specific Comments and Recommendations

In the CECS context there is a key theme that emerged from the survey conducted[15]. This is best summarised by the following quote.

> *"Everything created in a university should be easy to share with colleagues and re-usable as stand-alone learning objects."*

While Moodle based Wattle is a useful, easy and robust LMS that has been adapted for use within the ANU it fails to offer a compelling content authoring tool simply because content developed within Wattle is typically relegated to remain there, something detrimental to the long term plans of creating compelling, reusable content objects.

Moodle offers a great many capabilities for student management and administration but it does not yet contain enough standards based content authoring tools to warrant the exclusive use of this platform for content authoring.

Fortunately, it is possible to retain Wattle whilst obtaining truly world class content authoring through the use of a standards based content authoring tool and repository like AContent. Any content developed within AContent can be seamlessly integrated

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[15] Survey response to survey located at https://spreadsheets.google.com/viewform?
hl=en&pli=1&formkey=dGJSTUV6NVYxQjg4NFVmaS12TDY4akE6MQ#gid=0

within Wattle but can also be used within a variety of other LMS or stand alone distribution mechanisms should the need arise.

Such a solution separates the content creation from the content deployment which, from a technical perspective, is the best way of managing the content creation and deployment process.

While AContent offers an impressive capability for supplementing Wattle, it still has a number of areas in which further improvements would yield considerable benefits for the creation, storage, sharing and re-use of content for ANU staff and students. A programme to implement these changes, develop a protocol for the use of AContent alongside Wattle and implementing the program into the tool kits for ANU content creators is a vital next step. There is also a training and development programme necessary to educate content creators in the best practice use of AContent alongside the existing Wattle deployment.

Such a deployment would have the long term benefit of being LMS agnostic. Such a solution would ensure that future LMS deployments, almost all of which support either or both of SCORM and IMS would be able to re-use and update existing educational content. This would greatly improve the longevity of educational content, facilitate the creation of compelling, shareable and re-useable learning objects and significantly reduce the cost of course development over the coming years.