New Opportunities: Teacher Librarians Managing Digital Learning Objects

Judith Timbs
e-magine, Centre of Excellence in Online Learning
26 Lampton Avenue
Derwent Park, Tasmania 7010,
Australia
judith.timbs@education.tas.gov.au

Abstract

Digital learning objects are new kinds of resources which teacher librarians will be required to manage and make accessible to teachers and students. In Australia there are currently large-scale national and state initiatives underway to develop a critical mass of learning objects. The development of a Learning System Architecture has also become a vital step to make it possible to manage these learning objects. Packages that will enable students and teachers to communicate, collaborate, locate and access resources within intellectual property arrangements, assemble digital resources into learning sequences, assess and report are all necessary requirements. The Learning System Architecture emerging in Australia enables these disparate systems to function together as seamless and interoperable packages. A new profile of teacher librarian competency is being developed in Tasmania to assist with planning the professional learning needs of this group. The new profile includes understandings and experience of information communication technologies and online learning. Managing these new digital resources to support the teaching and learning is a key new professional role for teacher librarians.

This paper will discuss the new challenges that teacher librarians will encounter with the organization and management of electronic resources with a particular focus on the management of digital learning objects. Teacher librarians now have to manage collections that are not only physical but also digital, that are not only using MARC cataloguing tools but also utilising metadata tools and standards. All these activities depend on high levels of technical infrastructure, connectivity and modern equipment. Current national and state initiatives in Australia to build a critical mass of online content and new services to support teaching and learning have added to the increase in the range of information services available and to the complexities of electronic resource provision.

New professional roles are emerging in the networked electronic information environment, in relation to digital resource discovery, the application of metadata and the development of portals, subject guides and gateways to maximise access to electronic resources for students and teachers. Information and Communication Technology (ICT) is providing growing opportunities for the management of electronic resources, which have the potential to improve the effectiveness of student learnings. Specialist skills are critical to the management of these electronic resources both at the system and school based levels.

These new electronic resources are described as learning objects and "defined as components of online content that have educational integrity. That is, they have educational value that is independent of the online content's context. For example, a learning object could be any type of digital asset such as an animation, a video clip, a piece of text, a URL or a learning sequence of digital assets, so long as those assets had educational integrity ".[1]

Online content is becoming an important priority with many governments around the world as e-learning is beginning to play a part in the delivery of education opportunities. E-learning has come to mean the enablement and delivery of asynchronous or synchronous education and training content (eg. multimedia presentation, simulations and assessment) over an intranet, or the Internet, to an end user device. The provision of online content can provide opportunities for e-learning to occur at a distance (distance education) in a normal classroom, library or at home. Online content therefore has the ability to transform both distance education and normal classroom practices.

In Australia a major national initiative is well underway to provide quality online content in the form of learning objects. The initiative is known as the Schools Online Curriculum Content Initiative (SOCCI) conducted by the Le@rning Federation. In 2001 the Prime Minister announced a $34.1 million grant over five years (with matching funding by the States and territories) to produce high quality online content. Over the past few years there has already been strong investment by all Australian public schooling systems in equipment and connectivity. This new Federal initiative is intended to increase the much-needed content for use by the schools. The funds will be used to create a critical mass of online learning objects in agreed curriculum areas such as science, mathematics, literacy for students at risk, languages other than English, innovations enterprise and creativity and studies of Australia. These materials will be made available free to all teachers in Australian schools. The development of learning objects provides a great deal of flexibility and educational opportunity without locking in teachers and students into proprietary solutions. Learning objects can be identified, tracked, referenced, used and reused for a variety of learning purposes. Learning objects can be used as discrete "chunks" of content or can be linked or chunked to form learning sequences.

In the real world of classroom teaching "it is not envisaged that these new learning objects will replace books, videotapes, etc or students talking, observing or doing. Nevertheless they will provide opportunities for content to be produced which may:-

- explain or demonstrate concepts which are more difficult to do so in other mediums,
- replicate processes which are dangerous or difficult to reproduce in several classrooms,
- explain processes which require repetition for proof or testing,
- use ideas which require connections beyond the experiences of the learner." [2]

Obviously some of the characteristics inherent in the digital media such as its capacity for simulation, the drag and drop capabilities (to make connections like Lego blocks) and its ability to engage students in collaborative learning make it another important educational tool available to learners.

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[1] Curriculum Corporation, Metadata Application Profile 0.9. P1

[2] The Le@rning Federation, Schools Online Curriculum Content , a major initiative for schools. Feb 20th 2002 p2.

The Le@rning Federation in Australia has concentrated on producing learning content in areas of high need and development is well underway for the production of science materials grades 1 to 6 and 9 to 10, as well as numeracy and mathematics years 1 to 9. Other content areas planned are languages other than English (Chinese, Indonesian and Japanese) all year levels, literacy years 5 to 9 and Studies of Australia, at all levels.

The Initiative is following the international IMS Global Learning Consortium standards designed as technical specifications for the distributed management of learning. These interoperable standards include metadata, digital rights and accessibility specifications and are fundamental to the distributed management and access to learning objects across Australia and to the world. An Intellectual Property Rights Management System is also being developed to enable the use of public and private content to meet quality, technical and interoperable standards.

All materials produced by this Initiative will be "tagged". These "tags" or metadata become the means by which online learning objects can be discovered, organised and made available with reference also to licensing agreements. The "tags" will use agreed and standard sets of terms for such things as subject/topic, year level, skill, learning outcome, nature of learning activity (eg. critical thinking activity, communication activity, experiment etc), and learning design (eg. auditory learning, independent learning, problem solving, team teaching, testing, etc). The use of the metadata tags will also make it possible for state systems to match the resources to local curriculum frameworks and student outcomes, adding a greater degree of specificity to the existing indexing.

The learning objects produced by the Le@rning Federation will be stored in a digital repository, known as the Learning Exchange and through an agreed set of protocols and standards, State education authorities will access the Learning Exchange. The Learning Exchange software application will manage the acquisition, hosting, distribution and intellectual rights management of the new digital resources. The delivery of the content from the Exchange to the schools will be State's responsibility. The learning objects will be "transported" with their metadata to local State systems. This will enable in particular the management of the intellectual property rights associated with them to remain with the object. Teachers will be able to reassemble the learning objects and repurpose them within a nationally agreed framework, which importantly provides a secure environment for commercial developers.

The Le@rning Federation has engaged two organizations to conduct major aspects of the Initiative. The Curriculum Corporation is managing the content development, which includes sending tenders out to commercial companies, and providing quality assurance processes from educational reference committees made up of teachers. *education.au limited* is brokering the information systems and interoperability standards, including the Intellectual Property Rights Management System. Extensive trials will be carried out involving students and teachers at each stage of product development. The first consignment of learning objects (science objects) will be available in August 2002 for delivery to the States.

The next critical step is for state educational authorities in Australia to take the nationally produced content and make it available for use within their State schools. The development of relevant local initiatives to manage the distribution of the content is now a

major activity. I will refer to my own state, Tasmania, since it is a case study with which I am familiar. Tasmania is Australia's smallest State with a population of less than half a million, two hundred and eighteen public schools and approximately seventy thousand students. The State has a reputation for high quality education and public library systems. The education and library sectors work closely together providing services to their core clients and because of their expertise they often develop information and educational services across other government agencies, eg. The Service Tasmania Initiative. The schools and public libraries share the same automated library system (GEAC) enabling shared cataloguing, enhanced interlibrary loan systems and effective resource discovery across the whole State.

The Department of Education has developed highly effective technical infrastructure and has delivered high quality professional learning programs to support the use of ICT in schools. Ninety five percent of Tasmanian schools have ISDN lines (and some with ASDL lines), which connect them to the Internet. There is one modern Pentium computer to every five students. All computers are connected to networked servers, which are supported by professional technical staff. Major application software packages are hosted and supported centrally. Our schools require software packages for diverse functions including - resource discovery, library management, course management, assessment, student and staff profiles and financial management. In most cases Tasmania has acquired commercial packages to meet these needs however in some cases custom-built software has been developed. The latter is the case with the development of an XML digital resource databank (DRD) or repository. This was developed three years ago to provide a "bucket" or web store of resources for teachers and it also contained some of the functionality of a content management system. This "bucket" of digital learning resources and its associated services is located at the *Discover* website, the Department's e-learning web portal for teachers. This portal found at www.discover.tased.edu.au also integrates a range of commercially produced software packages including a learning management system and some online communication and collaborative tools. Resources are added to the repository by completing an input wizard containing fields of metadata. Metadata standards comply with international Dublin Core and National EdNA (Education Network Australia) standards. Resources are moderated for quality assurance purposes.

An emerging need, is for Tasmania's existing portfolio of software applications to be interoperable to enable us to exchange digital resources and information and to manage the new processes associated with The Learning Exchange, which have been described above. As part of this activity the Department of Education in Tasmania is developing learning systems architecture to facilitate the seamless integration of application packages and services for teachers and learners.

The diagram below outlines the components of the learning system architecture.[1]

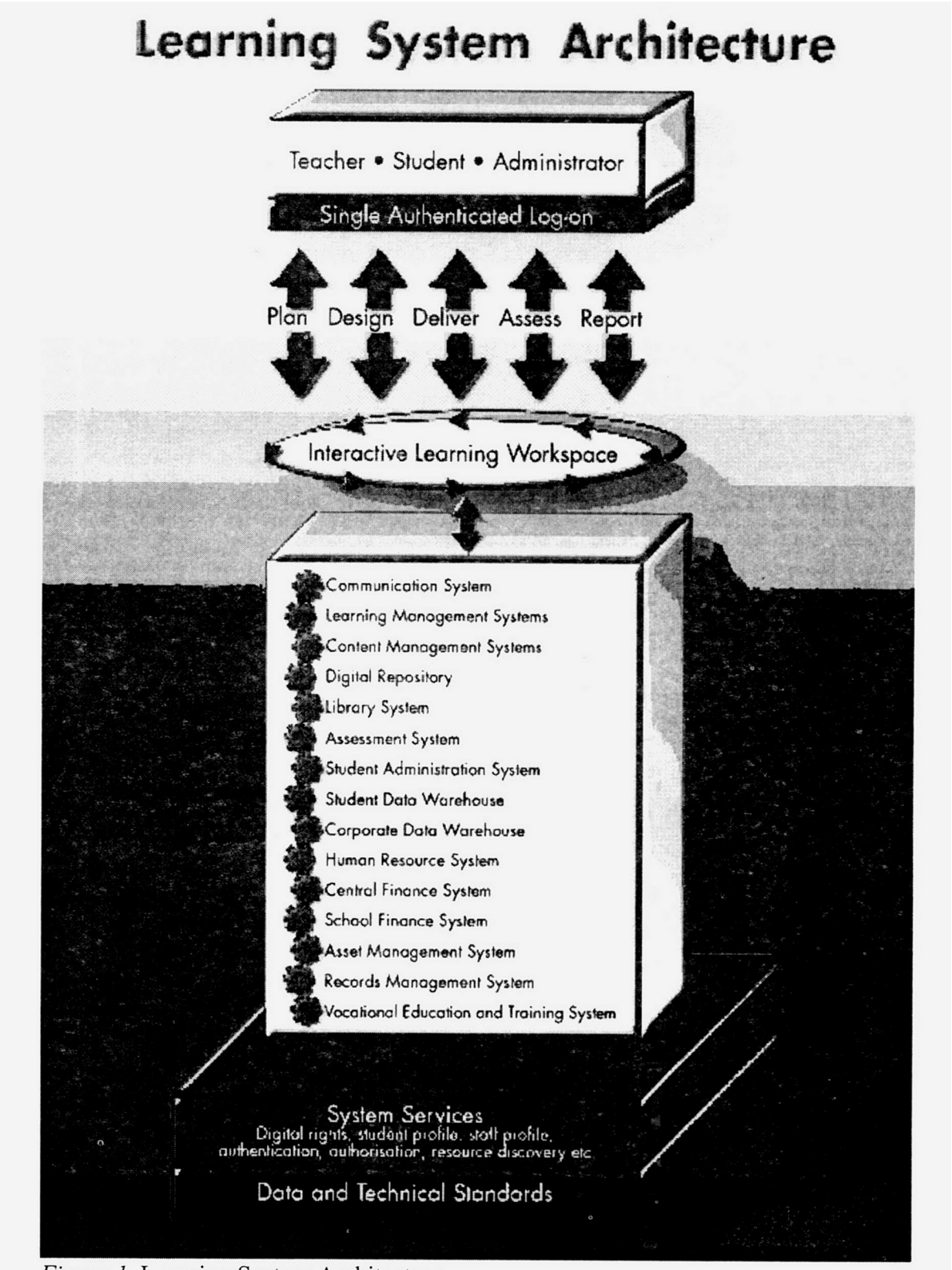

Figure 1. Learning System Architecture

[1] MCEETYA ICT in Schools Taskforce 2002 'Developing a National Learning System Architecture Framework for the Australian School Sector, Discussion Paper, 12th March 2002.

The architecture describes a single authenticated log on to provide access to the range of integrated software applications and processes. A teacher, for example, might wish to plan and design a unit of work. The teacher would have access to, eg. email (the communication system), to be able to search the digital repository (in Tasmania's case the *Discover* digital repository), search the local school library's holdings, search the nearby school libraries, and designated public libraries, and be able to assemble and deliver resources within a learning management system (currently in Tasmania we have a WebCT state-wide licence). The development of a workspace for teachers and students to conduct these searches and to plan, design and deliver online learning experiences is commonly referred to as the Resource Assembly function.

In Tasmania the design of this architectural framework involves integrating commercially produced software packages with locally designed and produced packages. There is a priority to design the learning system architecture to match national and international standards. Our challenge is to implement this initiative for the K-12 school sector. A discussion paper has been produced for all Australian States explaining the need for a complementary nationally agreed to architecture. The paper also sets out the relevant steps whereby all the stakeholders could become involved in this collaborative initiative. It is anticipated that if the whole of the education sector was clear about its learning system architecture it could become a powerful group in influencing the design of future commercial software applications. National progress is underway with this initiative.

Implementation of the learning system architecture in Tasmania is providing a number of opportunities for teacher librarians to work with information system personnel. The need to integrate the storage and discoverability of a diversity of information sources at the state level includes such activities as: - rescoping our digital repository, building or buying a content management system and integrating our proprietary learning management and library management systems. Teacher librarians have both the understandings of the teacher and student needs in mind, as well as the expertise to develop and apply standards (such as metadata and Z39.50 protocols) in order to facilitate the integration and coordination of heterogeneous databases, catalogues and digital repositories.

Teacher librarians have recently gained experience working at the state system level by developing and applying metadata to the Department of Education's website (which consists of approximately 200 sub webs). The task has also involved the design and implementation of a resource discovery service for the Department's website. These teacher librarians have indexed the resources using Dublin Core and EdNA standards metadata as well as tagging the resources to the navigational pathways. They have also maintained quality assurance processes on the site.

During the past three years the Department of Education in Tasmania has been involved in a partnership with multimedia companies to develop digital content for teaching and learning. One hundred and thirteen modules of rich multimedia content comprised of over 500 learning objects have been developed in the nationally funded initiative named the OPENIT Project. The OPENIT Project team who now work on the staff of *e-magine*, The Centre of Excellence in Online Learning have demonstrated extensive pedagogical expertise in e learning. They now have a successful track record of working with commercial companies to design, prototype, and trial and develop content.

Professional learning in Tasmania is currently concentrating on assisting teachers to effectively use this content. Teachers are able to access these multimedia materials through the *Discover* digital repository. Teachers are able to browse these materials or request copies for use in the learning management system. Teachers are also shown how to change or repurpose these materials for their own use. The materials are available free to all Australian government schools and independent schools in Tasmania and will soon be made available for purchase to other markets. Browsing copies of these high quality resources can be found at URL http://ww.discover.tased.edu.au/netlearn/course/st.htm. Teacher librarians have been employed to assist with the resource discovery, resource annotations, metadata descriptions and in constructing logical pathways and links to these new electronic resources.

Discover, Tasmania's e-learning web portal has been primarily servicing the resource and professional learning needs of teachers, with particular focus on local teacher networks, local curriculum frameworks and local content. *Discover* points to the EdNA national educational gateway and service. This national gateway has assembled a critical mass of quality educational materials in core and targeted educational areas over the past few years. EdNA not only provides value to Australian classrooms by providing access to the best and latest curriculum and support materials, it also provides access to a wealth of online collaborative projects. EdNA has also been a leader in developing standards and pooling expertise around the nation. EdNA's main audience, like *Discover's* has been primarily teachers. Tasmanian teacher librarians have benefited from the expertise and trail blazing leadership roles, which EdNA has forged.

However it was recently discussed within the Department of Education in Tasmania that both services did not meet the needs of students. Whilst many digital resources indexed could be accessed and used by independent learners, resource discovery was teacher focussed and indexing was not granular enough to meet student needs. The Department decided to custom build a student portal named "*The Student Freeway*".

The Student Freeway is currently under construction and will provide easy access to selected and evaluated web resources for Tasmanian grades 3-12 students to support their educational activities. It will apply national standards to index resources to optimise the discovery of resources. It will also provide a consolidation of portals useful to Tasmanian students.

The e-learning portal for students will add electronic resources to the single digital repository and by the use of specific metadata tags, the resources will be returned in several "look and feels" suitable to the age range of the students/users. Multiple presentations of the one piece of data are now becoming a common characteristic of content management systems and will be an important feature of this Project.

The student portal will be a space for students to engage with others, it will have collaborative input and it will take students to the content within sites (not just to the front door of websites). We believe that this service is a unique development. Most gateways for students in the global market are either commercial or attached to portals designed for teachers.

Table 1 is included below to further explain additional features of the portal.

Table 1[1]
Summary of essential points related to The Student Freeway

- *The Student Freeway* will provide equity of access to all Tasmanian students. It will feature the Tasmanian syllabus, Tasmanian Essential Learnings and focus on Tasmanian content.
- *The Student Freeway* will promote, extend, and support learning by Tasmanian students. It will be a point students can go for revision and remediation. It will provide ways for students to see possibilities and make connections with successful Tasmanians/ Australians.
- *The Student Freeway* will provide quick and efficient access to relevant information. Tasmanian students will find something to help them.
- *The Student Freeway* will be designed for students in Tasmanian schools from Grade 3 to Grade 12. Parents helping students with homework will be encouraged to use this as a first step and Teachers will be able to direct students to specific sites. Teacher Librarians will use this as the entry point for students to the Internet. Special needs groups will be considered.
- Tasmanian students will be able to see exemplars of work related to their own study and there will be opportunities to link with "homework buddies"
- Tasmanian students will be able to log in and this will allow a student to make a personal profile. Two profiles will be developed to suit junior and senior students. Students will be able to personalise their profiles to some extent for example lists of most used sites, most recently used sites and add other items to make this their own space. Other users will access the site in a public mode.
- Log in will offer extra features including opportunities for interaction and collaboration, reference tools, email to/from Tasmanian schools,
- Teachers will be able to tag a list of resources. A search by students will bring up this list.

This Project is another example of the use of teacher librarians and their specialist skills. Teacher librarians are being used because of their understanding of networked environments, their ability to select relevant and high quality digital resources, their skills to provide resource descriptions and annotations, and also their ability to value add with evaluative metadata, eg. Ratings systems. They are also able to design structured pathways to discover the content. Teacher librarians also have high quality indexing skills in relation to the curriculum needs of Tasmanian students.

[1] Williams, Isobel (2002) *The Student Freeway* Unpublished Manuscript

So far in this paper I have highlighted examples of the special expertise of teacher librarians and their work in national and state based initiatives to manage digital content and in particular digital learning objects. I now want to focus on the utilization of their skills at the school level and how these initiatives will be managed locally.

If we take the information resource management landscape in terms of the Tasmanian scene, a teacher librarian will now have to grapple with the following scenario: -

- a collection development policy that takes into account learning objects from the Le@rning Federation, the *Discover* digital repository, including OPENIT materials, and locally produced teacher resources,
- the provision of digital document delivery services,
- an Intranet of locally identified Internet sites/web based resources utilizing locally organised subject guides/pathfinders to assist in resource discovery,
- the integration of proprietary software, eg. Schoolsnet, library management systems (GEAC) and learning management systems (WebCT),
- the management of online indexes, full text periodical services and e-books,
- the provision of services such as links from the OPAC catalogue record to scanned content/pages, reviews or related web sites,
- the management of licences, copyright, digital rights, intellectual property and privacy requirements,
- the management of mobile devices, such as handheld, tablet computers and laptops,
- the management of students accessing courses online at school, at home or in a community facility,
- the participation in collaborative projects with teachers and students,
- the provision of networked CD ROMs and the
- archiving of digital resources.

This list is probably incomplete but it does enable us to address the growing complexity of the work of a teacher librarian.

In Tasmania we intend to assist teacher librarians in the school settings in two ways. One supportive initiative is to build interfaces and applications for use on the school based computers to connect to the software application and processes contained within the learning system architecture. These developments would enable students and teachers to access local repositories (maybe located on school intranets) and remote repositories, as well as other packages required to conduct teaching and learning. The second initiative is to develop a profile of teacher librarian competency, taking into account the understandings and experience of information communication technologies and online learning as key components. A professional learning program will be planned and implemented to match the new profile of competency.

To date a project at the state level work has commenced to develop the learning system architecture previously mentioned. Work has also commenced to assist teacher librarians to seamlessly manage their own school based resources and those, which their users will need to access from remote repositories with the development of new software applications and interfaces. It is intended to retain the *Discover's* digital databank as the main central repository of Le@rning Federation objects, the OPENIT online modules and other centrally developed resources. Teachers and students would access these resources utilising the new interface. Once an object has been located it will be made available to the

student or teacher. The object may have been retrieved from the school server or from the central repository as it is our intention is to do regular dumps from the central server to school servers of many of the digital resources. By this means, much bandwidth can be saved in the reduction of the transfer of objects up and down the line.

Teachers may produce their own learning objects or modify existing ones. By a series of wizards new or modified resources will be added to local school servers. The wizards will contain fields for the entry of metadata to enable discoverability via the school intranet. Work has also commenced on enabling one search to be conducted to discover resources in the digital repository, the school library's collection and in the central state collection of media resources. Teachers, students and teacher librarians would have multiple pathways and entry points to discover these resources. They could enter via the school's intranet page, the school's Internet page, *The Student Freeway*, *Discover's* home page, the school library's home page or the public library's home page. As yet we are not daunted by the interoperability problems, but are challenged by the curriculum and pedagogical needs of teachers and students.

Teacher librarians will need to have the skills to manage these disparately located resources and to be confident in the use of a range of software applications. Local school based web stores will need to be organised using metadata to assist with resource discovery. The use of centrally provided wizards will provide support with this task. A local search engine will be required on each school server to provide a solution to efficient and effective resource discovery.

Whilst not all the details of this strategy have been worked out the key functionality required has been scoped to assist as a practical guide to future developments.

Success in achieving desired standards of professionalism in teacher librarianship will depend on assisting teacher librarians to aspire to develop new skills and knowledge in order to be able to participate in these emerging fields of librarianship.

e-magine,, the Centre of Excellence in Online Learning in Tasmania recognises the important role of teacher librarians and has initiated a major project to develop a profile of teacher librarian competency. The intention of the profile is to scope the work of current practitioners, to identify the new areas of knowledge, skills and understandings required and to develop and implement a professional learning plan for our practitioners.

The draft profile has identified key areas of competence in the areas of: - principles of school librarianship, teaching and learning, leadership and advocacy, information services and knowledge management, library policy and building partnerships. The profile is organised under the key areas of competence, the desired learning, evidences of competency and learning opportunities. A major thrust of the Centre will be to provide the delivery of some of the content of the professional learning program online. Planning is underway to complete the profile and implement the associated professional learning program in the latter half of 2002.

The competency profile is also being developed to plan a new Graduate Certificate in Information Management. This Graduate Certificate will be offered to teachers in schools who may wish to take on new responsibilities to manage school library collections. Like

many places in the world at the moment Tasmania has a dwindling number of teacher librarians working in schools. This has occurred for a number of reasons however it is true that we do not offer any local training opportunities. The Graduate Certificate would be nationally accredited and would be conducted by the Department of Education as one of the providers in Tasmania. The University of Tasmania plans to introduce a new Graduate Diploma in Information Management in 2003 with a teacher librarianship stream. The completion of Graduate Certificate would enable a fifty percent credit to the Graduate Diploma course, thus providing an attractive pathway for teachers in our schools. Both these new courses reflect the current and emerging new skills and competencies required to manage school libraries.

Learning in an Online World states that "all school teachers and students must have access to quality digital education resources that support curriculum outcomes. The development of such resources must support Australia's unique identity in the global information economy". [1] To provide online content there needs to be a partnership between educators - to determine what content is required, information managers (teacher librarians) to manage and organise content and ICT professionals to provide the technical infrastructure to get the resources to the screen. Skills associated with these tasks are building in Tasmania's educational settings. Providing support to use the content by our Tasmanian teachers and students is also a key area of work. *e-magine* has a well developed professional learning program for all our state's teachers. Information literacy, information technology literacy and the use of a learning management system are also important areas of this program.

As more and more learning will involve both classroom and online learning, *e-magine's* role is critical to supporting the developments outlined in this paper. School libraries of the future will combine a managed place and a managed digital space.

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