THE le@rning FEDERATION

schools online curriculum content initiative

Northern Territory Government

Department of Employment, Education and Training

TRIAL OF THE LE@RNING FEDERATION CONTENT DISTRIBUTION AND IMPLEMENTATION OF THE BASIC E LEARNING TOOL SET (BELTS)

Northern Territory trial

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1 Executive summary

1. In mid 2003 the Northern Territory Department of Employment, Education and Training (DEET NT) with support from The Le@rning Federation conducted a trial of the harvesting and distribution of The Le@rning Federation learning objects. A trial was conducted by eight teachers at Woodroffe Primary School.
2. The purpose of the trial was to collect data about the harvesting and use of learning objects accessed at a school using the Basic E-Learning Tool Set (BELTS) on a local school server to:
   - gauge the technical impact on the server when under normal school load conditions;
   - ascertain professional learning needs in order to use BELTS and the learning objects from various perspectives;
   - identify the ongoing technical support requirements of teachers using BELTS;
   - streamline potential management issues in relation to access;
   - document and address technical issues as they arise;
   - record constructive critical feedback in relation to the use of BELTS and the learning objects; and
   - produce a report to inform professional development needs at a systemic level.
3. Learning objects were harvested from The Exchange by the Northern Territory Department of Employment, Education and Training and then distributed to the local school server through a local BELTS installation.
4. This report focuses primarily on the outcomes from the trial of BELTS but also includes feedback from teachers and students about the useability of learning objects in primary classrooms.
5. Key findings that emerged from the trial were:
   - The school required the use of an upgraded Linux server to handle the access and use of learning objects in primary classrooms across the school.
   - The perceived user friendliness of BELTS tended to depend upon how computer literate teachers were.
   - Professional development of staff was required to support teachers incorporating the learning objects into their day to day teaching and learning activities.
   - Once teachers had learnt how to use BELTS, teachers indicated that they found that the use of BELTS and learning objects enhanced their own learning as teachers by increasing their technical know-how and competencies using ICT.
   - The importance of having computers configured with the appropriate software and according to The Le@rning Federation hardware requirements was necessary to ensure ease of use of the learning objects in the classroom.
   - Logging onto the system initially created considerable difficulties for the teachers and students, in particular for those teachers of younger, junior primary aged students.
   - A short cut on the desktop to log on to BELTS was seen as a useful tool, rather than entering the URL each time.
   - Students indicated that they felt ‘in control’ of their learning using BELTS.
   - Teachers indicated that BELTS provided them with a means to integrate learning technologies into their teaching and learning.
   - To facilitate the use of BELTS across the school, whole school protocols were required for accessing and using BELTS.

2 Findings and recommendations

This section summarises the findings and recommendations outlined in the report.

2.1 Professional learning

- Professional development for teachers was required to be able them to learn how to use BELTS and to create learning sequences (or a lesson) that incorporated learning objects;
- Teachers valued the support they received from officers in DEET (NT) to ensure the use of learning objects was in the context of students' current learning in the classroom;
- Teachers indicated that they liked BELTS and the learning objects they trialed, and they reported that they could see the potential for further use of learning objects in their teaching and learning;
- Teachers felt that an atmosphere of collegiality was developed amongst staff members involved in the trial and that the support and encouragement from each other allowed them to work through the problems and difficulties they experienced and to learn together;
- Some teachers felt that if they had not had the level of support that was offered in the trial, they probably would have been deterred from using BELTS.
- Once teachers' understandings about how to use BELTS were developed and competency levels gained, teachers found BELTS was an extremely useful and effective way to integrate learning technology outcomes and create meaningful lessons for students.

2.1.1 Recommendations

- That school based personnel are identified to work individually and in groups with teachers to assist them with technical and management issues as well as to demonstrate how learning objects can be integrated into class programming and units of work.
- That several models of professional development be used in conjunction with each other including:
  - regular inservices provided at the system and school level;
  - modelling approaches by teachers and school leaders about how BELTS and learning objects can be effectively used and integrated into classroom practices;
  - opportunities be provided for teachers to reflect on their own learning; and
  - technical assistance be readily available when teachers are familiarising themselves with BELTS.
- That resource materials be developed to support the development of shared understandings about the functions of 'view', 'summary', 'details', 'download', 'enable login' and other key terms important to accessing and using the learning objects and BELTS.
- That a repository of lessons created by teachers to share 'good ideas and practices' be developed.

2.2 Management and Administration

- To ensure ease of use of the software it was essential to prepare servers and computers according to the specifications identified by The Le@rning Federation prior to the use of BELTS and learning objects. It was discovered that appropriate editions of plugins and browsers were central to the successful use of BELTS and learning objects.
- Teachers felt that a better system to classify and sort the learning objects was required. They found that information about the relevance of learning objects to year levels, outcomes and task requirements was difficult and time consuming to find.

- To enable collaboration and sharing of content across the school, the establishment of protocols for naming or identification of learning sequences was required.

2.2.1 Recommendations

- That learning object metadata clearly specify the version of the plugin software required for optimum performance.
- That revision of the metadata classification system be undertaken with a view to improving the classification and discoverability of learning objects.
- That processes for alerting schools to the necessity of determining naming protocols for the administration of sequences of learning and access to students and class lists are developed and used.

2.3 Technical

- It became apparent through the trial that The Le@rning Federation hardware configuration requirements for the use of BELTS and learning objects are important for optimum use of the learning objects and therefore have to be adopted when a school is setting up their IT systems.
- Logging in caused considerable problems at the start of the trial for both teachers and students. Both groups had difficulty accessing the BELTS site, which wasted a lot of time for staff and students. There were several reasons for the logon problems including:
    - The logon identity and password are sensitive; for example, incorrect case would result in a logon error.
    - If the wrong username or password was used, then 'login error' needed to be deleted from the toolbar, before log in could be successful.
    - Students had great difficulty putting an 'l' at the front – the 'l' could be mistaken for a 1 or I, and using the shift key to use a colon was physically difficult for students; especially the younger students.[1]
    - Students were required to use a different password to logon to BELTS than what they normally used for the school network. This created confusion particularly for younger students.[2]
- Once login was successful, using the lessons and learning objects was generally found to be very user friendly.
- One teacher reported that they found the number of steps required to develop a lesson or sequence of learning was cumbersome.
- It was not clear to the teachers how to save work undertaken within a learning object.

2.3.1 Recommendations

- That strategies are investigated to address the remaining 'logon' issues reported, that interfere with the ease of use of BELTS.
- That TLF consider providing a means to save work from within a learning object.

[1] This requirement for logon has now been rectified as a result of this finding from the trial.

[2] See Addendum, page 14.

2.4 Look and feel

- The size of the font made login difficult and it made the lesson page unappealing to students: it 'makes the whole thing look boring'.

2.4.1 Recommendations

- That consideration be given to redeveloping BELTS to enable:
  - 're-skinning' the look and feel of BELTS according to the age levels of their students;
  - varying the font sizes;
  - incorporating school logos and other 'branding' information about the school.[3]

2.5 Teaching and learning

- Feedback from students was generally very positive and indicated that they felt they were able to learn from the learning objects.
- Students' level of engagement often depended on matching the suitability level of the learning objects to student's ability level.
- Teachers indicated that they found the use of BELTS and learning objects an effective way to integrate learning technologies outcomes and felt that their satisfaction using ICT had increased.
- To ensure that online learning is an effective way to enhance student learning and engagement, teachers wanted to understand how to make learning objects more meaningful through the use of follow up tasks which would allow students to reflect on their learning, evaluate and apply their knowledge, research further topics and present understandings of topics.
- Teachers felt that student engagement and interaction was very high when using BELTS and the learning objects.
- Teachers indicated that they found BELTS provided them with a simple and easy avenue for students to access web sites, rather than bookmarking or students keying in urls. Similarly, easy access to other programs was provided through links placed in BELTS lessons.

2.5.1 Recommendations

- That teachers are supported to link the use of BELTS and learning objects to broader e-learning objectives.
- That strategies for sharing teaching practices using BELTS and learning objects across schools and jurisdictions are investigated.

[3] See Addendum, page 14.

3 Introduction

3.1 Scope of the report

This report summarises the outcomes from a trial of The Le@rning Federation content distribution and implementation of the Basic E Learning Tool Set (BELTS) undertaken by eight teachers at Woodroofe Primary School in the Northern Territory. Data for this report was gathered through an in-school trial conducted between August and December 2003. The Le@rning Federation and officers within the Northern Territory Department of Employment, Education and Training (DEET) provided teachers and the IT Coordinator at the school with advice and technical support.

3.2 Purpose of the trial

The purpose of the trial was to collect data about the harvesting and use of learning objects accessed at a school using the Basic E-Learning Tool Set (BELTS) on a local school server to:

- gauge the technical impact on the server when under normal school load conditions;
- ascertain professional learning needs in order to use BELTS and the learning objects from various perspectives;
- identify the ongoing technical support requirements of teachers using BELTS;
- streamline potential management issues in relation to access;
- document and address technical issues as they arise;
- record constructive critical feedback in relation to the use of BELTS and the learning objects; and
- produce a report to inform professional development needs at a systemic level.

3.3 Data collection

Both contextual and experiential feedback was gathered through written and oral modes from students and staff. This data provides indications of pedagogic practice as well as personal experience; both of BELTS and the learning objects. Data was collected using proformas developed by officers in DEET (NT). These proformas are available in Appendix One.

Three forms of written data were collected:

1. learning logs maintained by teachers throughout the process,
2. PMI (Plus, Minus, Interesting) on the Effectiveness of the BELTS pilot by both teachers and students, and
3. student written responses on using BELTS and learning objects.

4 Background

4.1 The Le@rning Federation[4]

The Le@rning Federation is an initiative of State and Federal governments of Australia and New Zealand. The Le@rning Federation aims to procure high quality researched and evaluated online curriculum content for delivery to system gateways in Australia (including Australian States and Territories) and New Zealand. The Initiative is being achieved through a collaborative, coordinated program, reducing potential duplication, increasing cost efficiencies, while stimulating the market and private investment in development.

The Le@rning Federation has adopted a design methodology for creating online content in the form of learning objects – chunks of material that can be used and reused for a variety of educational purposes. Between 2001 and 2006 The Le@rning Federation is developing the online curriculum content, which is being housed in a central repository (the Exchange), and is delivered to jurisdictions [5] via the Basic E Learning Tool Set (BELTS).

The Basic E Learning Tool Set (BELTS) is an open source[6], enterprise java solution that has been designed to support the presentation and management of learning objects to students. BELTS has not been designed as a fully featured learning management system. BELTS was designed with a view that it would be a component in a larger infrastructure framework.[7]

4.2 Basic E Learning Tool Set (BELTS)

4.2.1 Key business drivers for the development of BELTS

The Le@rning Federation identified the following key business drivers for BELTS.

BELTS has been designed to:[8]

1. Provide early delivery of learning objects to education systems and sectors;
2. Provide a prototype for an enterprise system architecture to provide learning to the education systems and sectors to assist with developing their own architectures;
3. Provide a framework for an open source learning management system, allowing the initial solution to continue to be extended for the benefit of education systems and sectors; and
4. Provide a system that assists education systems and sectors and schools to identify their requirements for learning management systems.

BELTS has been designed to interface with the Exchange[9] and learning management systems in the classroom. BELTS has been designed to support both centralised and decentralised models for delivery of learning objects, and to enable users to perform the key functions of:

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[4] The following information about The Le@rning Federation has been drawn from The Le@rning Federation (2003). First science content and BELTS software release to education systems and sectors: TLF operational paper –5, Curriculum Corporation and education.au; and The Le@rning Federation (2003). Request for Proposal: Basic E-Learning Tool Set, Curriculum Corporation and ***education.au limited***.

[5] The term 'jurisdiction' is the collective term used to refer to government and non government school systems and sectors.

[6] Open source software uses software source code that is open, unrestricted and available by downloading it from the Internet. The Le@rning Federation has identified a number of advantages to this form of licensing, including widespread use and feedback on functionality, reuse of code by other projects, and integration with other toolsets. The BELTS application has been made available at sourceforge (http://sourceforge.net/projects/belts), a major portal for the open source community. See The Le@rning Federation (2003). The Exchange progress report to TLF ECC.

[7] See 2.2 of the public Request for Proposal: Basic E-Learning Tool Set (2002)

[8] The following section has been extracted from the 2.2 of the public Request for Proposal: Basic E-Learning Tool Set (2002)

[9] The Exchange is The Le@rning Federation's repository for housing learning objects nationally.

- Searching and downloading Learning Objects from the Exchange;
- Administration of system, user and content management;
- Using simple tools;
- Managing the Curriculum Organiser; and
- Creating, managing and running lessons.

4.2.2 Deployment of BELTS

BELTS has been built as a single system with multiple functional modules that comprise the total functionality. It is intended that BELTS can be easily deployed on a range of different platforms, and the technical support information regarding the deployment of BELTS be provided in a format that is easy to use by a moderately skilled technical team.[10]

4.2.2.1 Models of deployment[11]

BELTS has been distributed to education systems and sectors.[12] It has been designed to support both centralised and distributed models for content delivery.

4.2.2.1.1 Central model [13]

The central model involves a single BELTS system servicing a number of schools, which access content over a wide area network. The central education system or sector BELTS system, is hosted in an application hosting environment. At this level, in terms of functionality, there is no distinction made between education systems and sectors, nor the ASPs and ISPs provided at a centralised level, to manage the discovery and distribution of content from the Exchange repository to a central BELTS repository. The centralised deployment model requires interfaces between the Exchange and BELTS that allow the discovery and transfer of content.

4.2.2.1.2 Distributed model[14]

The distributed model involves multiple BELTS systems deployed along a distribution chain, deployed down to the school level. Learning objects are pulled from the Exchange to the central education system or sector BELTS repository, and then distributed to the school BELTS repository. Learning objects (ie content) are delivered via a local area network to classrooms.

4.2.3 Installation of BELTS

The Le@rning Federation has provided systems and sectors with initial support for the installation of BELTS[15], however The Le@rning Federation has indicated that it is jurisdictions' responsibility to develop suitable ongoing local approaches for the distribution, support and maintenance of BELTS in schools.[16]

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[10] See 2.4.5 of the public Request for Proposal: Basic E-Learning Tool Set (2002)

[11] See 2.5.1 of the public Request for Proposal: Basic E-Learning Tool Set (2002

[12] See The Le@rning Federation (2003). First science content and BELTS software release to education systems and sectors: TLF operational paper –5, Curriculum Corporation and ***education.au limited***

[13] Ibid

[14] Ibid

[15] The Le@rning Federation (2002). Basic E-Learning Tool Set Deployment strategy, Curriculum Corporation and ***education.au limited***

[16] See The Le@rning Federation (2003). First science content and BELTS software release to education systems and sectors: TLF operational paper –5, Curriculum Corporation and ***education.au limited***

4.2.4 BELTS server configuration requirements[17]

The Le@rning Federation recommends the following requirements for the BELTS server:

4.2.4.1 Server hardware specification (minimum)[18]

5. 1 x Pentium 4 - 1.5 GHz (Or Greater)
6. 1 GB Memory
7. 18 GB Hard Drive Storage (Or Greater)

4.2.4.2 Server system software configuration[19]

Operating system	Microsoft Windows 2000 Server; or Linux (Red Hat Distribution) v 8.0
Database	PostgreSQL 7.2 Professional (Other JDBC compliant db products can be used but will not be tested b the TLF)
Application Server / EJB Container	JBOSS 3.2
Java 2 Environment	JDK 1.4.1
Browsers [20]	Microsoft Internet Explorer 6.0 or Netscape Navigator 6.2

4.3 Teacher and student computer software requirements

The Le@rning Federation learning objects have been designed to view within Learning Management Systems (LMS) and web browsers. TLF learning objects have been developed and tested according to the software requirements listed below.

4.3.1 Browser software and operating systems

- Netscape Navigator 6.2 and Microsoft Internet Explorer 6.0 on Microsoft Windows 2000
- Netscape Navigator 6.2 and Microsoft Internet Explorer 5.2 on Apple OS X

4.3.2 Browser plug-ins

- SVG — Adobe SVG Viewer Plug-in
- QuickTime — QuickTime 5 Player
- PDF — Adobe Acrobat Reader 5
- Flash MX — Macromedia Flash Player 6
- Shockwave — Macromedia Shockwave Player 8.5
- Java applets — Java for Windows

[17] See The Le@rning Federation (2002). Basic E-Learning Tool Set Deployment strategy, Curriculum Corporation and ***education.au limited***

[18] Ibid

[19] See The Le@rning Federation (2002). Basic E-Learning Tool Set Deployment strategy, Curriculum Corporation and ***education.au limited*** & The Learning Federation (2003). TLF specifications for viewing content, Curriculum Corporation and ***education.au limited***

[20] See The Le@rning Federation (2003). First science content and BELTS software release to education systems and sectors: TLF operational paper –5, Curriculum Corporation and ***education.au limited***

4.4 Learning object size

The Le@rning Federation has identified the following specification for the download speed of its learning objects

> *A user is able to interact with the object within 10 seconds of the initial request on a 64 kbps connection, where, 'interaction time' assumes a single user on a 64kbps connection* [21]

5 Description of the trial

5.1 Setting for the trial

Woodroffe Primary School is a medium size primary school located in Palmerston; a satellite town outside of Darwin. Woodroffe Primary School is part of the Northern Territory government 'Learning and Technology in Schools' (LATIS) network.[22] Eight of the nineteen teachers in the school participated in the trial.

Learning objects were harvested from the national The Le@rning Federation Exchange by the Northern Territory Department of Employment, Education and Training and then distributed to the local school server via a local installation of BELTS version 1.1.3. .

The school used their existing LATIS server. The server was upgraded with additional hard drive capacity and RAM for the purpose of the trial.

Teachers involved in this pilot were encouraged to integrate lessons and learning objects into their programmed units of work, rather than use them as stand alone lessons. Teachers and their classes had access to a computer laboratory once a week for one hour, and had access to pods of two to six computers per classroom. Teachers used a variety of methods and practices to introduce and use BELTS learning sequences ("lessons"). Often the computer lab environment was used to introduce sequences, which could then be worked on independently in the classroom, either individually or in small groups. Two classes formed a 'buddy' relationship (an upper primary and an early childhood class) to allow students to work together and share knowledge and skills. In many classes the students worked in pairs for optimum benefits.

5.2 Bandwidth and IT configurations

The following hardware was used with BELTS at Woodroffe Primary School:

- Standard LATIS Category 1 machines – Celeron 733Mhz, 64MB, 100MB LAN
- XP Machines – P4 2.4Ghz, 512MB, 100MB LAN
- 98 Machine – P3 1.5Ghz, 128MB, 100MB LAN
- Server Specs: Dual Processor, 1GB Ram, 30GB HD, 100MB LAN

The bandwidth LAN of the school is made up of 100Mb Switches in each building. There is a 100MB fiber backbone to the Central Communications room. The WAN bandwidth comprises a one-way satellite connection with a 33.6k-modem uplink. In bound satellite bandwidth is currently 6.5MB shared among all NT Schools. The availability of WAN bandwidth is normally good due to the proxy and caching servers on the LATIS server. Because of the modem uplink however, when several people access different sites, the system can become bottlenecked.

[21] See The Le@rning Federation (2002). Learning object size, The Le@rning Federation Operational paper 3, Curriculum Corporation and ***education.au limited***

[22] Information about LATIS is available from http://www.latis.net.au

5.3 Description of the support made available to the school

Teachers were provided with of face to face inservice on how to use BELTS for constructing lessons. This was followed up with ongoing availability for support from Ms Marita Maloney (IT services) and Ms Gail Smith (Curriculum Services) in DEET (NT). These officers provided teachers in the school with assistance to ensure teachers felt supported during the trial and so that the learning provided to students was in context of students' current activities in the classroom.

6 Outcomes from the trial

The following summarises the findings and recommendations that emerged from the trial.

6.1 Professional learning

Professional development for teachers was required to be enable them to learn how to use BELTS and to create sequences of learning or a lesson that incorporated learning objects. Teachers valued the support they received from officers in DEET to ensure the use of the learning objects occurred in the context of students' current learning in the classroom. Teachers felt that an atmosphere of collegiality was developed amongst staff members involved in the trial and the support and encouragement from each other allowed them to work through the problems and difficulties they experienced and to learn together. Some teachers felt that if they had not received the level of support that was offered in the trial, they probably would have been deterred from using BELTS.

Once teachers' understandings about how to use BELTS were developed and competency levels gained, teachers found BELTS was an extremely useful and effective way to integrate learning technology outcomes and create meaningful lessons for students. The teachers indicated that they liked BELTS and the learning objects trialed, and could see the potential for their further use in their teaching and learning.

The trial demonstrated that while only a relatively small amount of teacher professional development time was required to enable teachers and students to use BELTS at a functional level for constructing and using lessons, addressing the more complex pedagogical issues, required longer and more detailed and ongoing professional development.

Issues that emerged from the trial that require more detailed professional learning with teachers included the following:

- identifying the protocols for clearly identifying the lessons created in BELTS;
- identifying strategies for managing classes of students;
- identifying strategies for using unique lesson IDs;
- identifying strategies within BELTS for sharing lessons between teachers; and
- asking critical and philosophical questions about online learning.

6.1.1 Recommendations

- That school based personnel be identified to work individually and in groups with teachers to assist them with technical and management issues as well as to demonstrate how learning objects can be integrated into class programming and units of work.
- The several models of professional development be used in conjunction with each other including:
    - Regular in-services provided at the system and school level;
    - Modelling approaches by teachers and school leaders about how BELTS and learning objects can be effectively used and integrated into classroom practices;
    - Opportunities for reflecting on their own learning be provided;
    - Technical help when learning to use BELTS, be provided as required

- Resource materials be developed to support the development of shared understandings about the functions of 'view', 'summary', 'details', 'download', 'enable login' and other key terms important to accessing and using the learning objects and BELTS.
- A repository of lessons created by teachers to share 'good ideas and practices', be developed.

6.2 Management and Administration

To ensure ease of use of the software it was found that it was important to prepare servers and computers according to the specifications identified by The Le@rning Federation prior to the use of BELTS and learning objects. Difficulties in accessing the learning objects tended to arise if this preparation was not done. It was discovered that appropriate editions of plugins and browsers were central to the successful use of BELTS and learning objects. There were some software compatibility issues that arose between Windows XP and certain versions of Flash and Shockwave. [23]

Teachers found the search and discover system was not sufficiently time efficient. They felt that a better system to classify and sort the learning objects was required. They found that information about the relevance of learning objects to year levels, outcomes and task requirements was difficult and time consuming to find.

To enable teachers to maintain the integrity of their classes, and to support the collaboration and sharing of content across the school, the establishment of protocols for naming or identification of sequences of learning was required.

6.2.1 Recommendations

- That learning object metadata clearly specify the version of the plugin software required for optimum performance.
- That revision of the metadata classification system is undertaken with a view to improving the classification and discoverability of learning objects.
- That processes for alerting schools to the necessity of determining naming protocols for the administration of sequences of learning and access to students and class lists are developed and used.

6.3 Technical

During the trial both hardware and software issues were raised.

6.3.1 Hardware

Northern Territory schools have a LATIS server and at Woodroffe Primary School this server currently runs all the services in the school including the provision of access to online teaching and learning materials. Due to the already heavy usage of and large number of services running on the school's LATIS server, it was not uncommon for the server to experience high CPU usage. For the purposes of this pilot, in the first couple of weeks of the trial, Woodroffe Primary School's Linux server was upgraded from 640MB to 1.128GB of RAM, and 10GB of hard drive space was added. BELTS was installed on the LATIS server and all the available learning objects were downloaded and made available locally.

It was found that during the trial, even with the additional RAM and hard drive space, the placement of BELTS on the LATIS server had a large impact on the CPU usage when several users were accessing BELTS simultaneously. As the use of BELTS increased there was greater risk of the server performance being reduced. When BELTS was not being used it occupied very little of the server's CPU. There were isolated instances however, when the addition of the use of BELTS took the server's CPU resources to 100% capacity. This tended to make the server function slowly; BELTS stopped functioning and there was a noticeable

[23] TLF is aware of this issue and an upgrade to Flash 7 resolves this problem as long as all previous versions of Flash are deleted before the upgrade is performed.

impact on the server as other school services. To solve these problems the school had the BELTS services manually restarted by the Schools Helpdesk.

This demand on the CPU raised broader concerns about other future loads on Northern Territory schools' LATIS servers. With the introduction of new Territory-wide programs like eTool and more SAMS modules, schools' server resources are likely stretched to the limit. The inclusion of BELTS will add further demands of servers in schools.

6.3.2 Software

At the start of the trial logging into the BELTS program caused problems for both teachers and students. Both groups had difficulty accessing the BELTS site, which wasted a lot of time for both staff and students and caused some frustrations. There were several reasons for the logon problems including:

- The logon requirements were very sensitive and required exactly the correct information: eg an additional space at the end of the logon information or incorrect case would result in a logon error
- If the wrong username or password was used, then 'login error' needed to be deleted from the toolbar, before log in could be successful.
- Students had great difficulty putting an 'l' at the front – the 'l' could be mistaken for a 1 or I, and using the shift key to use a colon was physically difficult for students; especially for the younger students. [24]
- Students were required to use a different password to logon to BELTS than what they normally used for the school network. This created confusion particularly for younger students.

Once login was successful however, using the lessons and learning objects was generally found to be very user friendly.

Some teachers reported that they found the number of steps required to develop a lesson or sequence of learning was cumbersome, and it was not clear to the teachers whether it was possible or not to save work undertaken within a learning object.

6.3.3 Recommendations

- That The Le@rning Federation hardware configuration requirements for the use of BELTS and learning objects are adopted when schools are setting up their IT systems.
- That strategies are investigated to address the remaining 'logon' issues reported, that interfere with the ease of use of BELTS.
- That, if possible, refine BELTS to enable less steps be required for creating sequences of learning.
- That TLF investigate the possibility of providing a means to save work from within a learning object.

6.4 Look and feel

While both teachers and students commented on enjoying the use of BELTS, both groups commented that the user interface of BELTS was 'boring'. Some teachers commented that the size of the font made login difficult, especially for the younger children, and some students commented that the look and feel of the lesson pages made the lessons look unappealing.

6.4.1 Recommendations

- That consideration be given to redeveloping BELTS to enable:
  - 're-skinning' the look and feel of BELTS according to the age levels of their students;

[24] This requirement for logon has now been rectified as a result of this finding from the trial

- varying the font sizes;
- incorporating school logos and other 'branding' information about the school.

6.5 Teaching and learning

Teachers indicated that they found the use of BELTS and learning objects an effective way to integrate learning technologies outcomes, and felt that their satisfaction using ICT had increased. To ensure that online learning is an effective way to enhance student learning and engagement, teachers indicated that they wanted to understand how to make learning objects more meaningful, with follow up tasks which would allow students to reflect on their learning, evaluate and apply their knowledge, research further topics, present understandings of topics, and so on.

Teachers felt that student engagement and interaction was very high when using BELTS and the learning objects. They indicated that they found BELTS provided them with a simple and easy avenue for students to access web sites, rather than bookmarking or students keying in URLs. Similarly, easy access to other programs was provided through links placed in BELTS lessons.

Feedback from students was generally very positive and indicated that they felt they were able to learn from the learning objects. Teachers indicated that students' level of engagement often depended on matching the suitability level of the learning objects to student's ability level.

6.5.1 Recommendations

- That teachers are supported to link the use of BELTS and learning objects to broader e-learning objectives.
- That strategies for sharing teaching practices using BELTS and learning objects across schools and jurisdictions are investigated.

7 Conclusion

The trial collected data about the harvesting and use of learning objects accessed at Woodroffe Primary School using the Basic E-Learning Tool Set (BELTS) on a local school server. Through gauging the technical impact of BELTS on the school server under normal school load conditions it was found that the school required more hardware to handle BELTS in addition to that required for normal school IT workloads.

Teachers reported that once they were familiar with BELTS they were able to develop learning sequences and felt that they were able to incorporate 'learning technology' outcomes into their face to face teaching and learning.

The professional learning needs of teachers in the trials showed that while initial professional development allowed teachers to engage and use the learning objects, the application of learning objects and other online content in a pedagogical framework requires ongoing access to a variety of forms of professional learning.

Comments made by both teachers and students included that BELTS and the learning objects provided enjoyable learning experiences for those involved in the trial.

The value of Woodroffe Primary School trial is considerable. Both The Learning Federation and DEET (NT) were able to implement significant enhancements to integrate BELTs into existing systems and improve access to the online curriculum content to teachers and students.

8 Addendum to Report

April 2004

The Northern Territory Department of Employment, Education and Training (DEET) was impressed with the BELTS system and based on the feedback from the participants in the trail and to achieve interoperability with the NT Learning Architectures DEET have spent considerable time, energy and resources (human and financial) in customizing to meet our specific requirements.

- LDAP aware so single sign on for teachers through the NT Schools Portal. Teachers do not have to be created as users or log in through a separate URL.
- Re skinning to reflect the DEET (NT) look and feel.
- BELTS will be installed at each school on the Linux server.
- Servers have had an additional 1Gb RAM added.
- Terminology changes (lessons to learning sequences, repository to local store).
- Ability to accept items in addition to learning objects from Explore NT (Learning Content Management System) along with their associated metadata.
- Ability to automatically poll the central download system to accept new resources upon requests by teachers at the local level.
- Implementation of NT specific filters for searching and browsing the local store. Metadata adapted to suit these filters.
- Additional icon added to the LATIS server home page for students to enter BELTS through the use of ‘Learning Sequence ID’.
- Release of an updated workstation Standard Operating Environment (SOE) to all NT schools which includes the required plug ins (Flashplayer and Shockwave).

9 APPENDIX ONE

Data collection forms:

1. Woodroffe Learning logs
2. PMI for the effectiveness of BELTS
3. De Bono's Six Thinking Hats® sheet

Woodroffe Learning Log

REFLECTION ON LEARNING OBJECTS LESSON SEQUENCES USING BELTS AND EFFECTIVE LEARNING AND TEACHING PRINCIPLES

Teachers Name:

Name and description of learning sequence:

Date of implementation	**Client Group**

Reflections on Implementation of learning sequence
Technical issues: **Management Issues:** **Planning/programming Issues:**

Learner centred/ understanding the learner (How did your presentation of lesson sequence & classroom practice reflect this principle?)

Pedagogy/understanding the Learning Process (How did your use of learning objects support the learning process?)

Supportive and challenging environment (How did your use of computers & learning objects contribute to the learning environment?)

Worthwhile Partnerships (What partnerships did your use of computers support, promote or utilise?)

Suggested changes and other comments

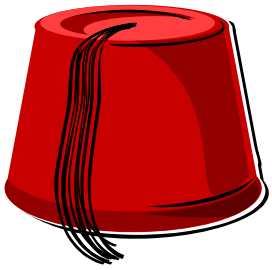
Other suggestions for further PD

PMI for the Effectiveness of BELTS

Plus	Minus	Interesting

Resource Discovery Journal

Six Thinking Hats®

White Hat (facts, questions) 	Red Hat (feelings, intuitions) 
Yellow Hat (positive, why it will work, success) 	Black Hat (caution, weak points) 

Green Hat (creative alternatives)	Blue Hat (overview, summary)
	

Reference: Frangenheim, E. (1998) *Reflections on Classroom Thinking Strategies*. Loganholme: Rodin Educational Consultancy.

