Summary

The aim of this project was to raise awareness about dyslexia and work-based learning by developing a series of reusable learning objects (RLOs) (these are short, interactive, multimedia ‘bite-sized’ chunks of learning) which can be used by mentors in the workplace, and by their students. The RLOs are freely available to all academic departments who use work placements as part of a learning programme, such as nursing, education and engineering. The RLOs complement the support already available to students in academic settings, and also ensure that the legal requirements for supporting disabled students are fulfilled.
The model used in the RLO design (European Academic Software Awards EASA finalists 2004) has been developed with UCEL (Universities Collaboration in eLearning) and more recently with the CETL in Reusable Learning Objects (RLO-CETL). The RLOs use text, audio and highly engaging graphics to deliver the content, and learning is made interactive by including activities and self assessment exercises. A rigorous quality control mechanism is built into the production process including expert peer review and student evaluation. The content for the RLOs was derived from data collected from an ethically approved, funded quantitative study (HEFCE Disability grant). The two RLOs are ‘Understanding Dyslexia’ and ‘Dyslexia and Workplace learning’. They are freely available at www.nottingham.ac.uk/nursing/sonet/rlos and the SCORM compliant packages are available on request.

Both RLOs have evaluated very positively with mentors, students and tutors. Server logs indicate that there is a steady increase in users accessing the RLOs. Within our own School of Nursing, the dyslexia RLOs have been integrated into mentor training and updates. Students starting courses are given information about the RLOs along with other study support information.

**Background**

Organisations are now legally required to make reasonable adjustments if disabled people (including those with dyslexia) are disadvantaged compared with non disabled people. Practical work experience placements have now been brought within the scope of the DDA Under the Disability Discrimination Act 1995 (Amendment) Regulations 2003 (HMSO 2003).

Like at most universities, students at the University of Nottingham who are dyslexic are well supported in their academic studies by their tutors and Academic Support
units. However the needs of these students in the practice setting will be different. Mentors may be unaware of what dyslexia is and the ways in which dyslexic students can be supported in the practice environment. Wright (2000) suggests that in practice settings there may be a general lack of understanding about what dyslexia is and how educational support can help individuals achieve safe practice. This lack of understanding may lead to non-declaration of dyslexia for fear of being discriminated against (Blankfield 2001).

The development of a series of web based RLOs will both raise awareness of what it means to have dyslexia, and also identify situations in practice where dyslexic students have had difficulties. Strategies that can be used by mentors and students to enhance learning and meet learning objectives or competencies will be available and accessible to all.

**Project Objectives**

To develop and evaluate two interactive multimedia re-usable learning objects (RLOs) that would:

- inform work based mentors about dyslexia and the impact the condition might have on how dyslexic students learn in practice and carry out their practice

- inform mentors how to support and facilitate effectively the learning of dyslexic students on work based placement

- provide an information source for dyslexic students to enhance their learning strategies on clinical placement
**RLO rationale and definitions**

Reusable learning objects (RLOs) are discrete units of learning that can be integrated into a formal lecture or used individually to aid revision or background knowledge (Leeder, Wharrad & Davies, 2002; Wiley, 2000; Gilbert, 2000). There are many definitions of RLOs and discussions about the benefits and limitations of size. Our working definition of an RLO is:

"a small interactive web-based resource based on a single learning objective which can be used in multiple contexts"

(School of Nursing Educational Technology Group

www.nottingham.ac.uk/nursing/sonet/rlos)

RLOs can be presented in different formats to suit individual learning styles, to maintain interest and optimise learning, and to address disability issues and technological constraints. This enhances learning as students can work on difficult aspects at their own pace and revise materials prior to main lectures. RLOs are therefore useful for personalised learning and to address differentiation. High quality graphics and audio are used in the RLOs to help engagement with the material and to facilitate learning. Up-dating material is always an issue: it’s much easier and more cost effective to update a single RLO than large CAL packages or whole modules.

By making the RLOs freely accessible to the students via the web also had a number of advantages:

- reduced the number of trips into the university
- saved on space and staffing
- RLOs could be used again and again
• Students could work at their own pace
• Flexible learning around clinical placements
• No username or password required
• Fewer problems with Firewalls

**RLO development framework**

RLOs are short interactive multimedia learning objectives, comprising a stand-alone collection of four web-based components:

- **Presentation:** presenting the concepts and facts to be understood by the user in order to support the learning objective
- **Activity:** activities to be carried out by the users in order to engage with the content and understand it better
- **Assessment:** the user will be able to apply their understanding and test their mastery of the content
- **Links:** external messages to reinforce the message and aid understanding

The specification (or 'storyboard’) for the RLOs included text, copyright-free video clips, animation and images to illustrate and support the narrative. This was written by the research associate and, the project director provided advice on instructional design. The RLOs were developed by media developers using Macromedia Dreamweaver, Flash and Director. The production of the RLO was an iterative process with regular discussions between the media developers and the author.

**RLO Pedagogy and design principles**

SONET were early adopters of RLO’s and as a result have many years of systematically evaluated experience in developing RLOs with practical and theoretic experience of the
pedagogical principles governing design. All learning object designs are based on IMS Learning Design principles with the emphasis on the environment in which the learning occurs, the roles played by the learner and “RLO-author” and the activities undertaken. Designs ensure that the most appropriate multi-media environment is created, that learners take active roles within the learning process and are supported by help and feedback and that activities and assessments are appropriate the to learning goal. (Windle, Wharrad et al, 2007)

• The first principle is that each RLO has clearly defined learning goal(s) which both provides a framework for the content and design and tells the user what they will learn from the RLO.

• High quality multimedia representation and forms of visualisation appropriate for the learning goal are at the heart of design. These include audio commentary, graphics, animation and video. Users have consistently evaluated our use of visualisation approaches as being excellent as illustrated by the following comments:

"Liked the visual analogues, fantastic way of learning and remembering" (First pass metabolism RLO – Nottingham Post Registration Nurse)

"I wish there were more of these. A great way to bring pharmacology to LIFE" (Australian University Student)

• Activities and self assessments in the RLO should align with the learning goal (Biggs, 2003) and are important because users must be actively engaged in the process of learning (Laurillard, 2005) and need feedback from self assessments
to determine whether they have successfully achieved the learning goal. A variety of activities including crosswords, drag and drop, open text, annotating diagrams, multiple choice quizzes and identifying unsafe practice in video clips are just some of those that have been used in our RLOs.

- The RLOs should be small (high granularity) partly to facilitate reuse and “just-in-time learning”, but also as our research and that of others shows that small learning units are the most valued and effective for the learner. For an average user our RLOs are between 5 and 20 minutes of learning.

- Our RLOs are designed in such a way that once a successful RLO design has been developed and used in one context, reusable templates or GLOs are produced so that these designs can be reused using different content thus reducing expensive development costs for subsequent RLOs.

In addition to these guiding pedagogical principles, users are involved at every stage of development to ensure that the end product is educationally and organisationally valuable. For quality control, an expert peer review process is built into the development framework at the written specification stage and again after prototype media development.

**Materials Developed**

The first RLO focuses on the positive characteristics of dyslexia and special skills those with dyslexia possess. The short RLO uses images of famous dyslexic people in public life to emphasise their special talents. Other visual imagery is used to illustrate other
traits and skills that dyslexic people have. Users can complete interactive tasks to enable them to gain an insight into how it feels to be dyslexic.
The second RLO focuses on the difficulties that dyslexic students encounter when learning in the workplace and provides strategies and guidelines that mentors can use to help students to learn in this sometimes challenging environment. True personal experiences from students with dyslexia (in the form of ‘talking heads’) are used to convey strategies used to overcome difficulties experienced on a nursing placement. Anecdotes can be powerful and make the speakers real, especially when actual words are used.
Focus groups and interviews with dyslexic students and their mentors had already been carried out to identify any difficulties on nursing practice as part of another funded study (HEFCE Disability Grant). Both groups indicated that web based learning resources would be useful to understand more about dyslexia and how to ensure that students learn effectively and reach the required level of competency to practice. This grant did not include funding for the development of e-resources hence the importance of the funding we received from ESCALATE along with a small grant from the ‘Making Practice Learning Work’ FDTL4 project that has allowed us to produce the RLOs.

**Evaluation**

Evaluation is integral to the RLO development process and is specified at various stages. The written specification is peer reviewed by two content experts who also evaluate the RLO once it has been produced. Representatives of potential users of the RLO are consulted at this stage to ensure that the content is appropriate. User evaluation is also carried out once the prototype RLO has been produced and is repeated with different groups of users who access the RLO (specifically in this case this would be mentors and dyslexic students). There is a short electronic feedback form at the end of the RLO to capture views of on-line users and server logs are used to establish broad trends in use of the RLOs.

‘Understanding Dyslexia’ was released on 20th September 2005 and ‘Dyslexia and Work-based Learning’ was released on 29th January 2007. Figure 1 shows server logs for each RLO at selected points since release. A peak was reached in January 2008 with over 200 and 100 hits respectively in that month.
User evaluation from Online Feedback form

Each RLO has an online feedback form where users can optionally record their views. There are 10 questions including open and closed types – the form is kept deliberately short so that users will be more inclined to complete it. Figure 2 shows the quantitative data for 'Understanding Dyslexia’, the summaries for Dyslexia and Work-based Learning are similar.
Figure 2
User evaluations for Understanding Dyslexia RLO. Users included students (50%), tutors and mentors.
The responses to the open ended questions are shown below:

**Qualitative comments for ‘Understanding Dyslexia’**

*’What did you like most about this learning object?’*

“Sets out exactly what dyslexia is and the difficulties”

“Clear information and not time consuming”

“I found the activities thought-provoking and entertaining!”

“It was clearly displayed and easy to understand.”

“The ability to change the background colour, the use of text and sound together for inclusivity”

“It had mini activities that got me thinking what it would be like to be dyslexic.”

“Being able to change the background colour as this made reading easier”

“I was using the website as a planning tool for some research I am doing at college. I am a teaching assistant with a newly diagnosed boy in my class and the site gave me loads of information that I can use to (hopefully) get this boy the kind of teaching he deserves and the resources he needs to access it. “

“The audio aspect helped me hugely in my note taking.”

“It reinforced and explained things about my dyslexia that I had been thinking but couldn’t explain”
‘What did you not like about this learning object?’

“It gave a lot of information and spoke about getting a test to see if you are dyslexic but didn't say who and where to go to get one.”

“The fact that you have to change the background colour every time, the overall negativity about dyslexia focusing on what 'they' can't do or have problems with”

“Unable to access the picture screens that go with the commentary”

“My computer has not got speakers so could not listen to narration.”

“The sound track took ages to load but that could have just been the computer system at that time.”

“Would like more information on practical things that you can do in class to help young, newly diagnosed children. The boy in my class is only 7; has only just been diagnosed with dyslexia and is currently doing his SATs with no additional support or resources. I desperately want to help him but, at the moment, don't know how.”

“It only touches the surface. I want to know more about why I am different. What is that happens in my brain to make me different. Understanding is the key to helping me to deal with my dyslexia”

“I like it all”
Qualitative comments for Dyslexia and Work based learning RLO

‘What did you like most about this learning object?’

“It had more focus than the 'understanding dyslexia' and offered practical solutions instead of focussing on what might go wrong”

“Easy to follow - good practical advice for mentors”

“Very useful within my role will give mentors a clear idea of how they can support students with Dyslexia”

“It provided a very good overview of strategies when working with students with dyslexia.”

“This was very good as it was directed at nurses, I felt I could relate to it more. it was good to hear the statements from other students and scary how familiar the strategies are.”

“The animated boxes were very interesting and raised my knowledge”

“Helpful advice on spelling and taking time”
Qualitative comments for Dyslexia and Work based learning RLO

‘What did you not like about his RLO?

“Still a bit irritated that the colour change has to be actioned each time!”

“I don't think there is time in a busy ward setting for students to have individual attention, I feel that I am just another hindrance in an increasing work load, however the staff are helpful in helping me meet my learning needs.”

“Nothing”

Evaluation Summary

Many of the positive comments related to the underlying pedagogical design features of the RLOs ie the ways in which the material was delivered as activities and exercises, visually and with commentary. Some users wanted more detailed information. Some of the negative comments related to technical difficulties such as not being able to see the images or hear the audio. Overall the feedback was very positive.
**Dissemination**

**Within the School of Nursing, University of Nottingham**

The RLOs are available to all mentors who support Nottingham School of Nursing students on clinical placement (approximately 3,000).

The RLOs are publicised to all students, who will also be able to access them on the School intranet, the internet and are able to receive a CD ROM version, if required.

The RLOs are introduced at the mentor training courses and updates.

The RLOs have been publicised in the Mentor’s newsletter, website and in research forums.

**Within the University of Nottingham**

The RLOs have been publicised at the Disability Liaison Officer Network meetings, which will enable all the departments at the University to be aware of them.

**Other Schools of Nursing and Universities**

Presentation at the RCN international conference in Dublin (2005)

Two papers concerning dyslexia and work based learning from a nursing perspective have already been submitted to Nurse Education Today two further publications are in preparation.

**Anticipated benefit to education**

Increasing educators’ awareness of dyslexia and work-based learning issues is more important than ever before, and the proposed RLOs will fulfil that role, in all subject areas where work-based learning takes place. It is likely that there are more dyslexic
students in higher education than in the past, as the number of learning disabled college students (including dyslexics) has been increasing over the past 10 years (Ijiri & Kudzma 2000; Konur 2002). Recent disability legislation could mean that disabled persons are now more likely to be accepted on higher education courses. Furthermore, many students are not identified as being dyslexic until they enter higher education (Wright 2000), and could require extra support. As dyslexia affects 3 – 10% of the population (Snowling 2000), it is likely that most work-based mentors will have mentored, or will be mentoring a dyslexic student. Many may not have been aware of that fact, given the nature of some work-based tasks that do not involve substantial amounts of writing or reading. This is therefore a very pertinent issue for all educators.

Dyslexia and work-based learning is therefore an important issue, which up until now has not been supported by research. RLOs will raise the profile of dyslexia and work-based learning, and increase the awareness of work-based learning educators to the issues. An increased awareness of the difficulties faced by dyslexic students, and the adaptive strategies that can be used will enhance the learning of the students and improve outcomes.

**Transferability**

The subject matter of the RLOs and the general guidance is applicable to other courses who have workplace learning such as teaching, continuing education, pharmacy, physiotherapy and engineering. The student stories are specifically from healthcare - with some technical input these could be replaced by other examples. The first RLO which focuses on the positive characteristics of dyslexia and dyslexics’ special skills will be applicable to all work place learning environments, such as teacher training, engineering and other medical subjects apart from nursing such as medicine, physiotherapy and pharmacy. The second RLO will provide a template upon which
other subject areas can introduce their own examples of situations in practice where dyslexic students have had difficulties and suggest adaptive strategies.

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References

Biggs J (2003): Aligning Teaching and Assessment to Curriculum Objectives, Imaginative Curriculum Project, LTSN Generic Centre

Blankfield S (2001) Thick, problematic and costly? The dyslexic student on work placement SKILL 70 23-26


Konur O (2002b) Assessment of disabled students in higher education: current public policy issues. Assessment and evaluation in higher education 27 (2): 131-152


