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SALTERS-NUFFIELD ADVANCED BIOLOGY

Newsletter 4 November 2001

News from the project

The five AS writing teams worked extremely hard and have done a fantastic job producing a wide range of innovative materials. The central SNAB team are now busy turning this into pilot materials to be available from Heinemann.

Trial material

The trial materials will probably be published in two parts, the first module (topics 1 and 2) in about May 2002 with the second module (topics 3, 4 and 5) in June or early July 2002.

The pilot textbooks will be high quality black and white publications; post pilot they will be in full colour. The on-line materials will be accessible at the same time as the text books.

The materials will be available to any centre whether or not they are pilot centres. Details of the materials including prices should be available soon from Heinemann – see the back page.

Recruitment of pilot centres

Are you interested in piloting the course? We are still looking for a few more centres to take part in the trials.

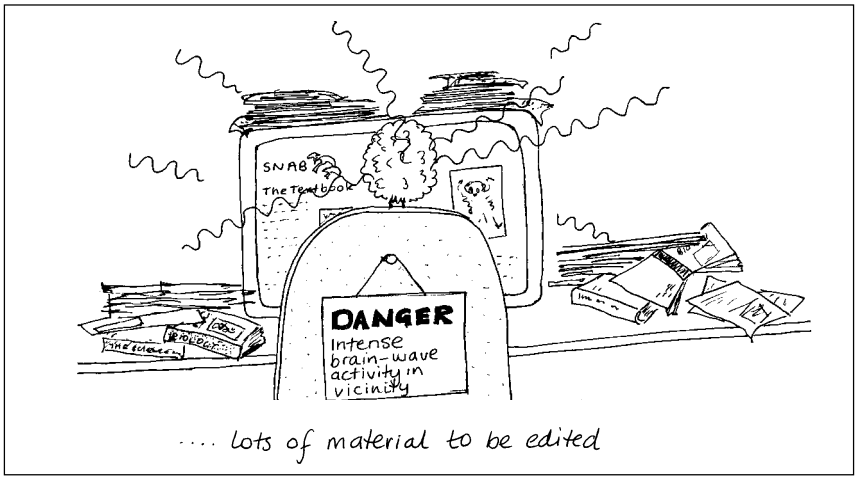
Contact Anne Scott (see the back page) if you are interested. You can download FAQs for prospective pilot centres from the SNAB website.

Assessment

Thank you to everyone who sent in comments and suggestions about assessment. We have been discussing these with Edexcel, and together we are developing some new thinking on assessment.

You can hear about our latest thinking at the ASE Annual Meeting (see back page). The SNAB website and the next newsletter will also give more details.

Anne Scott SNAB project officer



ICT in Salters-Nuffield Advanced Biology

One of the challenges during the development of the new biology course has been to provide an ICT component to enhance the course with a vision of the possibilities for the future.

The textbook for the course will be fully complementary to a website; the textbook containing the core storylines and biological principles, and the website providing learning resources such as tutorials, self-marking tests and downloadable worksheets. The student site will be separate from the teacher's and technician's site, and the communication between the two will allow the teacher to set assignments with deadlines, receive marks from online tests and receive homework assignments electronically.

The activity worksheets with teacher and technician notes will be available in a format allowing teachers to add their own notes and changes, and can be printed out for photocopying. One of the great advantages of this will be that the materials for the course can be customised by individual institutions, and they can evolve over time as suggestions are made by teachers and technicians using them.

The role of ICT in practical work will include data-logging and use

Continued on the back page

Using the language of pictures for A-level Biology teaching

We have been giving more thought to the visual presentation of information and ideas with the help of Simon Gates, who has contributed this article to the newsletter.

What kinds of experiences should we give our students to help them interact effectively with pictures? How can we judge, from the outside, what they see, in their minds' eyes, in the pictures they need to use, to understand, and on which they may be tested?

Visual language

Our accumulated every-day experiences are filtered and modified by visual perception. So we all have our own individual visual language, which is personal, private and subjective.

Visual literacy

Communication means sharing information. To do this we need to convert our private languages into a public visual literacy, understood by all those who share their experiences in the same classroom, and with those who set, sit and assess tests. To become literate in using pictures, we need to acquire both the vocabulary and the recognised means of using it. Once literate, fluency depends on more practice until we arrive at a standard of competency in using the language of pictures appropriate to an A-level course.

The National Curriculum directs teaching activities towards the literacy we need for 'verbal' skills, so we can read and write and talk to each other, using rules to ensure that we are aware of the common understandings we make with others when we communicate.

However, almost no provision is made to help with the 'visual skills' needed for visual literacy. It is left to subject teachers to find their own way with their own classes. The task for biology teachers focuses on the meanings we share when we use pictures in biology lessons.

Visual literacy for teaching

Visual literacy is essential for making and using pictures that communicate factual information.

When we use written text and pictures we need to know how to relate them to each other in ways that promote knowledge building among the readership, or usership.

Functions of pictures

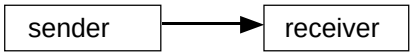
Our students need to use pictures interactively, not just to look and stare at them. In textbooks the pictures have a variety of functions. They are not selected just to illustrate the written text.

- Pictures are used for introducing a topic, to attract and hold attention;
- They provide triggers for discussion and generate enthusiasm for other tasks;
- They reinforce written text, when compared with it;
- Pictures allow student- and teacher- perceptions to converge through the shared experiences of using them to solve problems;
- Pictures provide advance organisers and revision summaries for topics.

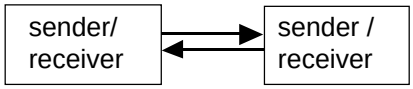
All these must make relationships within and between topics transparent.

Using the right pictures

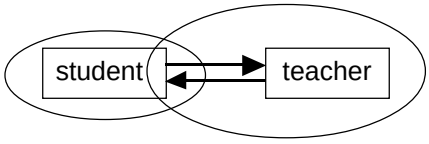
The diagrams below illustrate the importance of telling the right story, using models of communication that might be of interest to teachers as the example.



This is inadequate, because there is only one arrow, and communication must be two-way if it is a sharing process.



This shows the process (arrows) as two-way, and involves two 'entities' (boxes) – the people or machines involved.



This adds two overlapping fields of experience. Teachers explore their students' fields of experience at the beginning of a topic and during revision to find out how well they fit the needs of the course, before they set about trying to improve the match.

Transforming visual information

When we introduce students to the ultra-structure of cells, they need to be able to interpret electronmicrographs (EMs). These contain problems.

EMs are grainy in appearance and outlines of structures are not definite, but fuzzy, especially at high resolution.

If asked to transform the EM of rough endoplasmic reticulum shown here into an organelle map, would your students produce a tracing like the one on the left before making an 'organelle' map like the one on the right?

At this high resolution, there is a loss of contrast, wide and uncertainly defined membrane, as well as fuzzy ribosomes, which makes it more difficult for us to be confident we are seeing them as they are.

This EM is used as figure 1.16 in *Biology,* 1997, by M Barbor, M Boyle, M Cassidy and K Senior (Collins) and figure 1.5 in *Human Biology,* 1999, by M Boyle, B Indge and K Senior (Collins).

Experience of tracing and making 'maps' from these 'more difficult' EMs can help students work out what they are really 'seeing'. It does not take long to do and inexpensive resources are used. My 3m x 380mm roll of greaseproof paper, for tracing, cost about £1.50.

Repeating activities with similar aims allows students to move towards ownership of such transformations and assess, with confidence, novel EMs presented in tests.

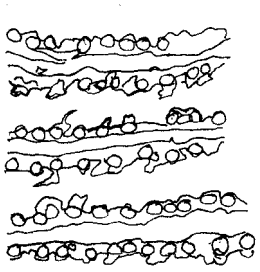
Some textbook examples

Many texts have EMs suitable for identifying or counting organelles.

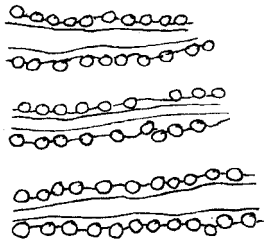
For example, chapter ten in *Biology – Principles and Processes*, 1993, by M Roberts, M Reiss, and G Monger (Nelson); chapter seven in *A-level Biology,* 1987, by WD Phillips and TJ Chilton (OUP); chapter one in *Biology 1*, 2000, by M Jones, R Fosbery and D Taylor (CUP).

For identifying and measuring, try the activity on page 63 in *Biology,* 1992, by M Rowland (Nelson).

High resolution electronmicrograph of rough endoplasmic reticulum (x approx 100,000)



Tracing made from electronmicrograph



Organelle map created from tracing

Simon Gates is a postgraduate research student in the School of Education at the University of Exeter. He was formerly a Head of Biology and Head of Science. You can contact him at s.m.g.gates@exeter.ac.uk

We are grateful to Dr Mike Davey of the University of Nottingham, Plant Sciences Division, for permission to reproduce the electronmicrograph, and to Collins Educational for supplying the print.

ICT in Salters-Nuffield Advanced Biology *continued*

of software packages for presentation and analysis of results. Where an activity suggests use of ICT equipment or software, there will be a supporting tutorial for students who are unfamiliar with the technique within the context of the activity.

Interactive tutorials and animations will often have student worksheets to ensure engagement with a clearly defined task, and the recording of essential notes for future revision.

We have frequently been asked whether good ICT facilities are an essential pre-requisite of running the SNAB course. The minimum requirement is for access to the internet in order to download the photocopiable worksheets. Student access to the internet will be important to make use of the full potential of the resources, but not necessarily during lesson time or in the laboratory. Practical work using ICT always has the option of an alternative method.

Whilst attempting to allow for institutions which do not currently have good ICT facilities, it is the intention of the course to encourage full use of ICT in biology teaching. By providing the resources which make use of the potential of ICT, it is hoped that we will motivate exploration and development of this important medium, with the support of CPD in this area.

A-level biologists should be taught ICT within the real context of the way in which ICT is used by professional biologists.

The biology taught within this course will be within a context so that it is clear to students why they are learning a particular biological principle. In the same way, the reason for using ICT, and for developing skills in this area should always be clear to students.

Angela Hall
SNAB ICT Project Officer

Come and hear about the project

Edexcel inset

Members of the project team will be speaking at a session in Grantham on Monday 26th November 2001 at 2 p.m.

To book yourself on this FREE session contact Edexcel:
tel 0113 224 2255
fax 0113 224 2277
or email Sue Howarth
sue.howarth@edexcel.org.uk

ASE Annual Meeting Liverpool 3–5 January 2002

Two talks, both on Thursday 3rd January

14.00–15.00
Assessment of Advanced Biology
Angela Hall, Anne Scott, Michael Reiss

16.00–17.00
ICT in Advanced Biology
Angela Hall

Salters-Nuffield Advanced Biology

Project Director: Professor Michael Reiss

To join our mailing list, contact
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Science Curriculum Centre, University of York, York Y10 5DD
ams12@york.ac.uk

Please photocopy this newsletter for your colleagues.

Visit our website **www.advancedbiology.org**

Pilot materials from Heinemann

Further details about trial materials will be available soon.

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