eAssessment and Learning

Case Study 6

eNABs – Benefits for teaching and learning

Introduction

This case study covers the formative and summative use of electronic NAB assessments (eNABs) and shows how eNABs can offer benefits to both centre staff and to students, in particular when they are embedded in the curriculum. It highlights two schools which use different approaches to the delivery of eNABs, but it draws on the experiences of staff across many centres.

Background – the Pass-IT project

The Pass-IT research project began in August 2002 and ended in January 2005. It investigated how best to use ICT-based assessment in schools and colleges to improve attainment, to support teaching and learning, and to provide flexibility in assessment.

The research findings indicated that ICT-based assessments:
♦ offer teachers and students more variety and flexibility
♦ assist in the integration of learning and assessment
♦ provide rich, focused information to the classroom teacher

The report also stated:
There seems to be no reason why online NABs cannot be offered in some subjects in the near future.

After the Pass-IT project ended, SQA developed eNABs for the three Units of the Higher Mathematics Course. These include e-assessments with different levels of help and feedback using randomised parameters for formative use, as well as non-randomised eNABs in each Unit for summative use.

The delivery system for eNABs

The eNABs are delivered by an online assessment system which has three parts:
♦ an Assessment Engine that students use to sit assessments
♦ a Test Scheduler that allows teachers to control which assessments are available to their students, and when they are available
♦ a Reporting System that allows users (students and teachers) to view performance in assessments

The assessments and the delivery system are hosted on an SQA server. You do not need to install any software to use eNABs – all that you need is an internet-connected computer workstation for each student. Responses to questions are

recorded in the database on the server as soon as they are submitted. The server is backed-up daily. In this way, there is very little risk to data as a result of computer crashes, and security is maintained.
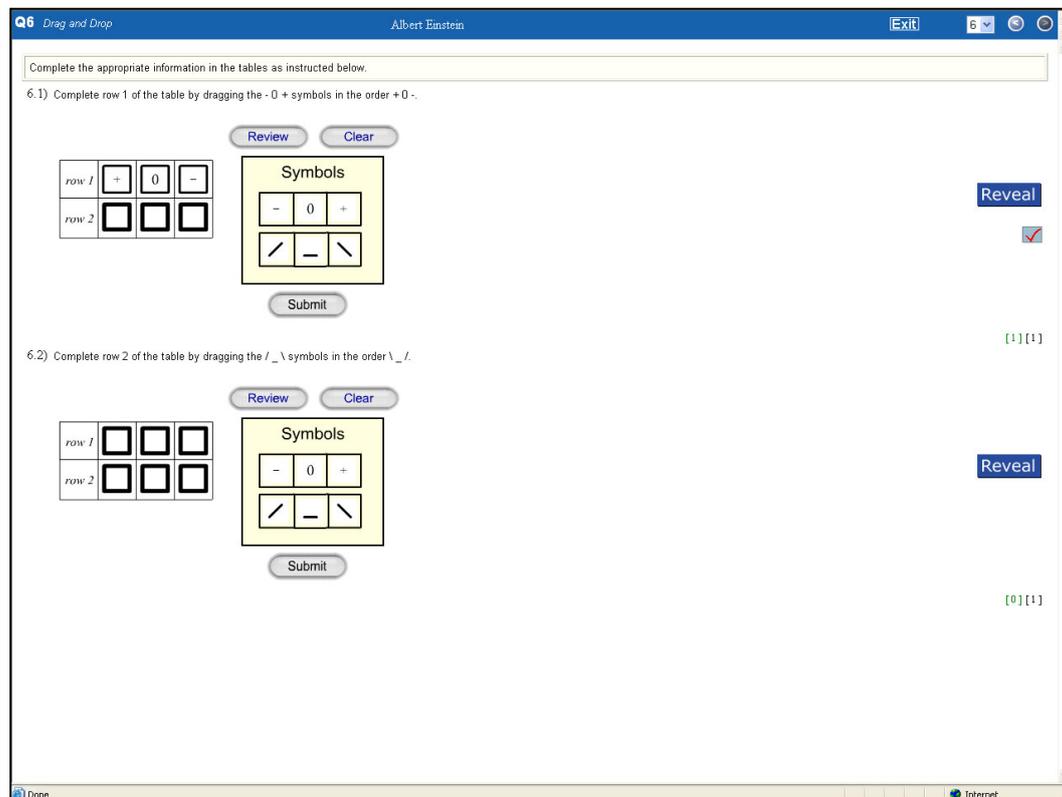
The Assessment Engine

Since the evidence is generated and stored electronically, there is no need for paper copies to be made. Evidence can be accessed electronically by authorised students, teachers and verifiers, as necessary.

The two schools

School A

This is a six-year comprehensive school in Highland Region. It has a roll of just fewer than 400, with nearly 100 in S5 and S6. It draws from four feeder primaries and has a large, rural catchment area. The school has embedded the use of ICT in its curriculum and has moved over to eNABs for Higher Mathematics, only using paper if a student needs to.

School B

This is an independent nursery, primary and secondary school in Edinburgh, with a combined roll of around 1600. The secondary roll is around 1000, with a higher than average percentage of students staying on in S5 and S6. Being an independent school, there is no set catchment area. The school has a campus-wide computer network which connects every department, classroom and office. The network consists of over 300 machines and around a dozen servers. Initially, the eNABs were used on an ad-hoc basis.

The use of the eNABs by the Maths Departments of both schools

School A – the embedded approach

This school has one Higher Maths class every year, with between 20 and 30 students. The class is rotated on a yearly basis between the three Maths teachers in the department. All three teachers are comfortable using the computing facilities with the class.

With the encouragement and agreement of senior management in the school, each year the Higher class is timetabled to use a computing suite for one of the six 55 minute periods throughout the session.

Although there are only 22 computers in the computing suite, lack of computers has never proved to be a problem. When the number of students does not exceed the number of computers (due to illness and/or planned trips, for example), students work individually on a computer. On days when there are not enough computers for each student to work on their own, some are doubled-up on a computer or are allowed to work in an adjoining computing suite under the supervision of the Principal Teacher of Computing. Whole-school commitment to using computers is evident.

The students use various resources during the timetabled period, the main ones being:
♦ SQA Higher Mathematics formative eNABs
♦ SCHOLAR online teaching and learning materials
♦ the BBC Bitesize resource

In addition to these resources, the students are encouraged to surf the internet and make use of other maths sites that they find.

The school has its own website and the Maths department's page on it has direct links to many useful sites including the SQA eNABs, SCHOLAR, and BBC Bitesize sites.

There is a school policy that only allows NAB assessments to be given during particular periods in the week. This policy ensures that students are not overburdened by assessment and can plan their study. The timetabled use of the computer suite is incorporated into this schedule so that summative eNABs can be delivered during these periods.

The eNAB system allows the flexibility for students to be summatively assessed on an individual basis (eNABs on demand). The use of the computing suite lends itself to this approach. So far, however, all of the students in the Higher classes have been assessed at the same time. This is due to the traditional way that teachers assess – old habits die hard!

It took a while for this embedding of eNABs into the timetable to be implemented. Suitability of equipment and broadband network connections; parental considerations; and the 'newness' of the system were some of the reasons

given. It has, however, been a success. Students like the eNABs, finding them to be a different way of approaching assessment. The more motivated students do search out and use other suitable sites during their practice sessions in the computing suite. As the Principal Teacher says:
My students generally like eNABs. They enjoy the break and doing something different – it's a change from listening to me all the time!

School B – the non-integrated approach

While the approach taken by school A has many advantages, not all centres are yet able to incorporate eNABs and other computer activities into the timetable. The approach adopted by school B is more typical of that used at present by centres.

In this school only the top set of several Higher Mathematics sets used the eNABs system. The others used the more traditional paper-based assessment. The class spent two periods becoming familiar with the assessment system and input procedures, as well as working on the formative assessment for Mathematics 1. This took place in the Primary computing suite and the Business Education department. The teacher noted that the Primary computing suite was good enough for this purpose but would not be suitable for summative assessments because the computers were too close to each other. There was also not enough desk space at each workstation.

The students took to the system.
Students quickly got used to the various input requirements and were able to work through the practice mode and examples with little assistance.

As with school A, all of the students in the class were summatively assessed at the same time. A third computing suite was used for this assessment. Because this suite was not timetabled for the use of the class it required some organisation, and not a little cooperation, from others in the school.
The main Resource Room was booked from 8:35 am to 9:40 am but this did necessitate the moving of a register class, the registering of [the Higher Maths set] outwith the normal registration groups, and the re-scheduling of the computer-based activity for a Modern Languages class.

It is apparent that whole-school cooperation is essential when using computing facilities in this way. In this school also, the commitment of senior management to the successful delivery of eNABs is evident.

The class teacher also noted that:
Some students took a little longer to complete the assessment than would have been expected of a conventional paper exercise, but all finished in the allocated time.
This observation bears out research findings. Most people take longer to read information presented on a screen than on paper. Because of this, it is usual to allow up to 10% extra time to sit an eNAB.

The class teacher used the Test Scheduler to make the formative eNABs for the remaining two Units of the Course available to the class over an extended period

of time. In this way, all the students were able to access these materials at a time and a place that suited them. No further class time was allocated to this practice material.

The Test Scheduler

The Teacher Reporting System allowed the teacher to monitor how the students used the formative eNABs. The teacher noted that not all the students accessed the practice materials. Those who did, generally did well in the corresponding summative assessment. The teacher also noted:

[Students] did appreciate the virtually immediate feedback and were fairly relaxed about the procedure by the final eNAB.

This school expanded its use of eNABs to include all five Higher Maths sets in the school session after the information for this case study was gathered. The school has also timetabled the use of a computing suite twice a week for the Mathematics department. In this way, the complete cohort of over 100 students is able to benefit from the formative eNABs throughout the session.

Advantages and challenges of both delivery methods

Both of the methods used by these schools to deliver eNABs – embedding them in the timetable and using a non-integrated delivery of part school-timetabled and part self-study at home – have their advantages. Both also present challenges to be overcome. Some of these are included in Table 1.

	Advantages	Challenges
Embedded delivery	♦ integrates with the teaching and learning ♦ motivates the learner to use a variety of resources ♦ means the teacher is always available if needed during timetabled sessions to provide help and feedback ♦ means teaching time is not lost in moving from classroom to computing suite ♦ incorporates different activities into classroom teaching	♦ is dependent on adequate computing and internet facilities being available ♦ can be more constraining in timescale
Non-integrated delivery	♦ gives the learner more control over when they access the eNABs ♦ means learners are not constrained to a set timetabled period – they can work for longer if they want ♦ does not commit timetabled periods on a regular basis – this can increase flexibility ♦ does not use up 'teaching' time with the class – timetabled contact time may be at a premium	♦ means accessing in school may require the goodwill of other departments ♦ means less well motivated learners may not access the eNABs from home ♦ creates logistical challenges in arranging computer access in school on an 'ad hoc' basis

Table 1

Individual students and computer access

♦ In both schools, there were students who were wary of using computers in general, and of computer assisted assessment in particular. However all these students agreed to try out the formative assessments initially. This settled their fears and in the end they all chose to be summatively assessed by means of the eNABs.

Sometimes more able students prefer traditional assessment, perhaps fearing that a computer is not as accommodating as a human marker. All students who initially expressed reservations achieved the success with eNABs that was expected of them by their teachers.

♦ There was only one student in one of the schools who sat his NABs in the traditional way – using paper – because he had been banned from accessing computers in school. He sat his NAB on paper in the computer suite, while his classmates used the eNABs. The teacher commented that this experience

helped to reinforce the message about the appropriate use of school computing facilities. With the Test Scheduler System, it is straightforward for teachers to include or exclude students from a scheduled assessment.

♦ One student normally had assistance from a reader and scribe for assessments. Using the eNABs system helped this student rather than hindered him. He sat his eNABs along with the rest of the class and not in a separate room as would have been necessary otherwise. He asked when he needed help instead of making use of a reader because:
[In the past] I had to teach the reader what the Maths parts were.
He did not need the use of a scribe when using the eNABs system. He commented that he enjoyed using the system – it was simple to use and put him under less pressure.

Benefits for teaching and learning from using the eNABs

Teachers like the flexibility of the formative eNABs and the many benefits for them and their students in using the eNABs system – in particular when the eNABs are embedded in the teaching and learning. One of the strengths of the eNABs project is the formative aspect, especially the facilities offered by the Student and Teacher Reporting Systems.

The Teacher Reporting System

The following questions and answers show some of the benefits gained. The comments were made by teachers who have used eNABs with their classes.

How do you use the formative eNABs with students?
♦ *In class as part of the learning and teaching process, logged on with a single registration and using a whiteboard.*
♦ *In class or a computing suite with the students logged on individually. Mostly with a Maths teacher present, but sometimes when the class is being covered by another teacher.*
♦ *Issued to students as homework for completion by a set date.*
♦ *Issued to students to work through in their own time to consolidate classwork and as revision.*

What benefits do the students gain from using the formative eNABs?
♦ *Students are more willing to ask for help when they are working on computers – their work is more accessible. With a normal size class, I can keep an eye on all screens at once.*
♦ *Students appreciate the virtually immediate feedback and soon become fairly relaxed about the procedure.*
♦ *Students who practice do well in the summative assessments. Students can identify their strengths and weaknesses and then do more work on specific questions, hence taking responsibility for their own learning.*

What benefits are gained from embedding the use of eNABs in the curriculum?
♦ *Students can use online teaching and learning materials, such as the SCHOLAR Higher Mathematics resource, and then try some of the relevant questions in a formative eNAB. They can also use other online resources available on the web to see the relevance of this work.*
♦ *Students become more successful learners and gain confidence as individuals by using the information available from the Student Reporting System.*

Do you have any other comments about the formative aspects of the eNABs system?
♦ *The use of eNABs is a perfect example of teaching being led by student responses.* (Referring to the information available through the Teacher Reporting System.)
♦ *The Student Reporting System helps parents see what children have to cope with.*
♦ *I find that it is generally the more able students who make the best use of this system.*
♦ *It is particularly good for self-directed learners. It does not, however, change 'lazy' students into motivated ones.*

Do you find the Teacher Reporting System helpful?
♦ *The Teacher Reporting System is easy to use. The ability to show individual Outcome results is particularly useful. A few students had failed Outcomes according to the system but in most cases the student's rough*

working showed that the intermediate steps warranted further marks and so the Outcome results were amended as passed. All students had a full set of results (pass/fail plus actual mark per individual Outcome) by the next period.

♦ *It takes less time to collate and communicate the results as opposed to the traditional paper and pencil method.*

♦ *It is really quick and easy to establish how many marks each student actually got for each Outcome. I'm impressed with the system! (Love the Teacher Reporting System!)*

In what ways do you use the formative eNABs and the Teacher Reporting System to provide feedback which can be used to inform the future learning of your students?

♦ *To check the responses made by all of the students in the class to the questions relating to a particular Outcome and modify my teaching as a result. The Teacher Reporting System is useful in showing where the teaching of a particular Outcome could be modified for the benefit of the students in the class.*

♦ *To check the responses made by all of the students in the class to particular questions and cover the work again, and in a different way, where necessary. The Teacher Reporting System can show that an individual section of work has not been understood by the class as a whole.*

♦ *To check the responses made by an individual student to a question, or all of the questions relating to a particular Outcome, and to provide additional help to the student as necessary. The Teacher Reporting System also shows where an individual student has been challenged by part or most of the work of a particular Outcome.*

♦ *To see who has completed homework, and the ratio of 'time spent' to 'success' – very informative for students.*

Conclusion

The experiences of staff in these two schools show that there are benefits in offering eNABs, particularly when they are embedded in the teaching and learning. The schools used the eNABs flexibly, choosing the method most appropriate to their own situations to gain maximum benefit for their students.

When embarking on the eNABs programme, a teacher in one of the schools remarked:
It all looks scarily straightforward. I've gone through the SQA Guidelines on e-assessment for Schools[1] as well. The document also looks straightforward, relevant and informative.

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[1] *SQA Guidelines on e-assessment for Schools*, June 2005. SQA Glasgow and Dalkeith. ISBN: 1 85969 574 4. Publication code: BD2625