Development Fund Overview

Efficacy and appropriate use of electronic assessment techniques for computing subjects.

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Abstract
Following the 2008 National Student Survey results, an investigation into the underlying reasons for low satisfaction with assessment and feedback amongst computing students was held to examine whether innovative electronic assessment and feedback methods such as phase tests utilising electronic marking and feedback, enhance student learning and to investigate the impact of these methods on staff. The staff who participated in the research found the perceptions of students to be surprising and valuable confirmation of the value of the testing method and the willingness of students to engage with it, a view which they were initially sceptical of. The experiences of staff who currently create and run phase tests and the perceptions of students from the questionnaires have enabled the project team to draw up practical guidance for staff members who may consider this form of testing.

Aims

The aims of the project were:

- To assess how innovative assessment and feedback tools can be designed to satisfy both the learning needs of students and the pedagogical requirements of staff, based on the evidence gained from the project.
- To test the validity of electronic methods of assessment such as phase tests in terms of student perceptions of the impact on their learning.
- To assess the impact on staff in terms of perception of usefulness, and impact on workloads.
- For staff to critically consider how existing and innovative practice impacts on their relationship with their students.
- To develop evidence-based guidance on the appropriate use of such assessment tools for implementation across the subject group, and in the wider Information and Computer Science community.

Outcomes

An evidence base to inform discussions on how electronic assessment methods can be made to be fit for purpose has been developed:

- An audit of assessment methods was undertaken, examining course and module information, and this showed that phase tests are used within a number of modules in this subject area, and are implemented as part of a suite of assessment methods. Learning Teaching and Assessment strategies show that the phase tests are intended to enhance the student experience by allowing them control over when and where they take the test, and are intended to provide both formative and summative feedback.
- Analysis of available student experience data showed that students have not raised specific issues about the use of phase tests.
- A questionnaire for students on phase tests was developed and deployed via the virtual learning environment to explore how students perceive the rationale for the tests, whether they believe that they are beneficial for their learning, to judge the amount of work that students put into their preparation for phase tests and

explore whether they consider them to be an 'easy option' either for themselves or for the staff running the tests.

- The response rate for the questionnaires was 27%. The results of the questionnaire showed that students value the immediate feedback that they receive via the phase tests and generally view the method of assessment positively (See appendix 2). Views on how much the tests help development in other areas of the course are mixed.
- Interviews with staff members who create and run the tests, investigating their perceptions of the students' view of the test, their reasons for running the tests, how they feel they contribute to students' learning and development.
- These interviews show that creation of phase tests is a time-consuming task but is done for valid pedagogical reasons. The distribution of workload before the test rather than marking afterwards allow staff members to manage their time more effectively but this is not the major impetus for creating such tests. Where tests are built in-house, they are carefully worked into assessment regimes to attempt to engage students with their learning.
- Practical guidance has been developed for staff on best practice of these assessment methods to enhance student learning. It was based on the evidence base to ensure that these assessment methods are used appropriately and effectively to support the student learning experience.

The project's evidence base was affected by the decision of a member of staff to withdraw their module from the research. The decision was taken at the point that a number of focus groups with students from that module were to be held, at a point of the semester where it was too late (in terms of student availability) to organise further focus group activity.

In light of this, the results should currently be viewed as tentative, and further work will be undertaken in the autumn semester with students to validate and investigate the questionnaire results, and further enrich the evidence base for the results of the project. (This work will form part of the matched funding provided by Sheffield Hallam for the running of the project.) A paper will be developed following this additional work which will enable dissemination of the findings across the sector, for submission to the Information and Computing Science Subject Centre's journal, *Italics*.

However, the experiences of staff who currently create and run phase tests and the perceptions of students from the questionnaires have enabled the project team to draw up practical guidance for staff members who may consider this form of testing. The staff who participated in the research found the perceptions of students to be surprising and valuable confirmation of the value of the testing method and the willingness of students to engage with it, a view which they were initially sceptical of. Therefore it is expected that other staff will similarly find this exploration of student views of interest and supportive for their choice of assessment.

Deliverables

[See resources section for a list of the project deliverables]

The project sought to enhance practice where innovation was already embedded and to use the outcomes of this activity to further embed innovation into teaching and learning in areas which were not using these innovative methods, via the provision of user-friendly guidance based on the perception and experience of staff and students. It also sought to attempt to ensure that where this form of assessment is being used it is appropriate and enhances the students' learning experience rather than detracting from it.

The guidance aims to help staff considering using this form of electronic assessment ensure that it supports students' development and enables them to realise their potential, while also being manageable within staff workloads.

Assessment and Feedback is an area of concern for the sector as a result of the National Student Survey. The project investigated whether there are elements of the assessment culture peculiar to computing subjects that are impacting on this aspect of the student experience and discussed how to mitigate this and use innovative electronic assessment techniques to best effect. The assessment tools are utilised across the sector, and the evidence-based guidance on the best use of these tools (Appendix 3) should enable other Information and Computer Science departments to ensure that they are using the tools to best effect, taking into consideration staff workloads and student perceptions.

g) **Background** (c 300-500 words)

Following the 2008 National Student Survey results, an investigation into the underlying reasons for low satisfaction with assessment and feedback amongst computing students was warranted.

The project team believed that there was a need to investigate whether innovative electronic assessment and feedback methods, such as phase tests which utilise electronic marking and feedback, or the automatic testing of computer programs, used with computing students enhance their learning in the students' view and offer suitable feedback. There was also a need to investigate the impact of these methods on staff, especially in terms of time and workload, and their perception of the success of the methods. By investigating this with students and staff the project team hoped to ensure that there will be a strong evidence base to inform discussions on how best to use these assessment and feedback methods, and to develop guidance for staff to ensure that these methods are used appropriately.

The work built on research (O'Brien and Sparshatt 2007, 2008) undertaken in the University into staff and students' perceptions of feedback and beliefs about each others' perceptions, and on innovative feedback practice undertaken by academic staff (e.g. audio feedback, electronic feedback) which provides feedback via electronic means to students.

Putting it into Practice (750- 1000 words)

Phase testing is an assessment methodology in use across the sector but which appears to be particularly appropriate for students in the ICS area and their future careers in a way that written exams may not be. It tests the ability to have detailed technical knowledge and to make quick decisions, all of which are important skills for students intending to work in a programming/ computer support environment.

This work has examined the practicalities as described by experienced staff members, of implementing a phase test regime, but also investigated the perceptions of students of this kind of learning. The results from students challenge some of the preconceptions that staff implementing the regimes had and some negative assumptions about students' views of this type of test. For this reason alone this work has been valuable, as it has reassured the staff who are implementing the tests that students do engage with them, and see them as valuable learning tools. The questionnaire aspect of this project could be implemented in other areas to validate this with different student groups and to assure staff that students are engaging with learning via the phase tests.

The testing under investigation focussed on tests that consist of multiple choice questions, administered to students via the virtual learning environment (Blackboard) in a stepped format, i.e. in small tests throughout the year/ semester. All were summative, but with a relatively small percentage of the final mark attached to each test. The research began with an audit of course documentation and student feedback data to understand the role of phase tests in the Learning, Teaching and Assessment strategies of the relevant courses.

The implementation of the student questionnaire phase of the research was undertaken via the Virtual Learning Environment (Blackboard) and was relatively

simple to set up and administer. The drawback was that the response rate was not as high as potentially could have been if the test had been directly administered by staff members, but the positive aspect was that the test was engaged with by 27% of the cohort on a voluntary basis without the potential influence of the presence of a member of staff.

The discussion with staff was done on a personal basis in an interview setting. The discussion focussed on practicalities of working with this type of testing, explored staff perceptions of how students engage with the tests and the pedagogical basis for running such test. These aspects were then combined with the student results to develop practical guidance (Appendix 3) for staff considering undertaking such tests. This guidance can be taken by other institutions as a basis for developing their own guidance or for use by staff implementing their own phase tests.

The initial outcomes from the project for this institution are a deeper understanding of how and why students engage with this type of testing, and a challenge to negative assumptions of staff about student perceptions. Staff were sceptical of student motivation with regard to phase tests. They believed that students considered them an 'easy option' and also believed that students may fee that they were also an easy option for staff, as they are run by the computer (not recognising the work necessary to set the tests up effectively), and that students may be dismissive of them on this basis.

The questionnaire results were reassuring to staff on this basis as they showed that students valued the tests for the instant feedback they received, in terms of their mark. Students did not generally see the tests as an easy option for staff (only 10% agreed with this view [appendix 2]). 57% would do the same amount of preparation for a phase test as for another type of test. However, 40% admitted they did less preparation and none said they did more. Whether this is due to the multiple choice aspect of phase tests, or is to do with the relatively low stakes stepped approach to small tests at regular points of the module, is not clear and will be investigated further with students in the additional work to be undertaken in the autumn.

The guidance has been designed to be practical on the basis of staff and student views. It attempts to cover some of the practicalities of implementation and to answer in advance some potential scepticism of staff, to highlight the major things to consider and decisions to make if deciding to run a phase test as part of an assessment strategy, and to signpost staff to further information to help them in creating a phase test pool of questions.

Issues and Debates (500 –1000 words)

Any Benefits for the Academic?

Technology today is fully integral part of the student learning and work experience and therefore it is inevitable e-assessment should be a reflection of this interdependency on technology and alignment with teaching practices, Bennett (2002). Some practitioners perceive e-assessment as the holy grail, as it not only enhances the student learning experience through assessment of learning, feedback and motivation, but it supports teaching and assessment paradigms in providing performance indicators for/of staff and students, Mariott (2009). E-assessment also provides the assessor with a rich source of data that can be quantitatively and qualitatively analysed using computer-based methods to ascertain the depth of student learning and to evaluate the effectiveness of the teaching, Vendlinski & Stevens (2002). Electronic phase test assessments, certainly from the academics' viewpoint, can provide easy access, analysis and insight into the depth of student learning facilitated through different learning strategies, whereas it would be a more torturous/onerous task with a traditional paper-based phase test, Nortcliffe (2005). From the marking perspective, the automation of traditional paper-based assessment

increases efficiencies, accuracy, reliability and data management, Hamilton and Shoen (2005), as well reducing a workload burden on the academic. Though it provides efficiencies in one aspect, it is time consuming to develop, and requires careful planning to ensure it is effective in assessing learning deliveries and outcomes, Buzzetto-More, N.A.and Alade (2006). Therefore, e-assessment should not be seen as a “cheap” alternative; it has the potential to contribute more than an efficient assessment marking tool, but to be effective, investment in academic time is required prior to deployment.

Increases student learning?

Multi-choice assessments in particular lend themselves to the electronic medium as they enable the academic to quickly assess and track student knowledge and understanding of a didactic subject, Buzzetto-More, N.A.and Alade (2006). However, a higher success rate is typically achieved with multi-choice examinations, as students find it easier to recognise a complex answer than construct one, Caygill and Eley (2001). Nicol (2007) demonstrated that a more constructive approach is the deployment of e-multi-choice tests as a formative assessment and feedback methodology to develop learner autonomy. A further enhancement would be for the students to construct the tests themselves. In practice, student construction of multi-choice questions has the potential to deepen student learning, Nortcliffe (2006), but this is only possible if the students deem the exercise worthwhile and invest a greater amount of their time, otherwise a lesser model of student learning is achieved. E-assessment can facilitate deep student learning, and with careful planning and implementation be best practice in assessment and learning. E-assessment has the potential to offer new approaches to assessment, feedback and learning, Whitelock (2009); however, there is a need to develop a holistic learning strategy that incorporates and considers carefully the assessment, feedback, student learning, learner autonomy and reflection to ensure greater student learning.

What are the student perceptions?

A small study of the student population at the University of Bradford indicated that their general perceptions and feelings of e-assessment were positive, Dermo (2009); however, students perceive randomly selected questions as unfair. Therefore there is a need to ensure parity in the difficulty of each question in the question bank. Marriott's (2009) study of the change of an assessment practice to e-assessment in a module demonstrated that the majority of students preferred the revised e-assessment method as it enabled them to develop their learning consistently and provided valued and timely feedback. Kibble's (2007) large study of a cohort of students identified that student performance significantly improved in the final examination if students had actively participated in e-quizzes throughout their course, however high student engagement in e-quizzes was only achieved through increased incentives, i.e. credit. Low stake, outside classroom e-quizzes do have a positive effect on the student learning and eventual attainment, Angus and Watson (2009); however, low attainment students are less likely to volunteer to participate in outside classroom e-assessments. Therefore, as learner providers we have a long way to go in convincing all the student population that active participation in e-assessments is beneficial to them and the development of their long-term learning, understanding and knowledge formulation.

Conclusion

E-assessment is not a “cheap” substitute for alternative methods of assessment, and students do not perceive it as such. However students' perceptions of the importance of e-assessments in the learning individual learning strategy is low, as indicated by their lack of engagement in preparatory work for an e-assessment, pre-conceived

idea that e-assessment is easier than a paper assessment or the fact that weaker students are less willing to participate in low-stake e-assessments. Therefore, e-assessment needs to be carefully marketed to students and needs to demonstrate its learning worth for each individual, i.e. the benefits to them personally. E-assessment has the potential to provide alternative methods of assessment that can provide valuable and timely feedback, deepen the student learning, increase student motivation to learn, and encourage student reflection of their learning. Importantly it can promote student motivation to feed forward the feedback. However e-assessment requires careful consideration, planning and development as an integral component of the overall learning strategy in order to ensure the personal development of each student in the learning outcomes of a module or course.

Resources

Phase test questionnaire for students (Appendix 1)
Response to student questionnaire (Appendix 2)
Guidance on the application of phase testing (Appendix 3)

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Appendix 1

Questionnaire for the evaluation of phase tests

Please complete this questionnaire, which should take no more than 5 minutes to complete, to examine your experience of phase tests. This will inform research taking place within the University.

All responses to this questionnaire will be kept confidential and anonymous.

1. **Why do you think that phase tests are used as part of your assessment?**
(Please tick all that apply)

They are quick to run □
Help to identify struggling students □
Less work for the tutor □
They provide immediate feedback on progress □
To test progress in all areas of the module □
It is appropriate to use this type of assessment for the course □
Not Sure □

2. **Do you think that a phase test is?**
(Please tick all that apply)

Quick □ Accessible □ Acceptable □
Understandable □ Not Sure □

3. **Do you think phase tests are?**
(Please tick all that apply)

Suitable for my learning □ Suitable to test my knowledge □
A method of marking □ Not Sure □

4. **Do you think phase tests should?**
(Please tick one answer only)

Be marked by the computer for immediate feedback and mark □
Be marked by the tutor to receive feedback and mark at a later date □
Provide immediate right and wrong answers with additional feedback from tutor at a later date □
Not sure □

5. **Do you prepare for a phase test in the same way you would prepare for a paper-based assessment?**
(Please tick most appropriate answer only)

Yes, I do the same amount of preparation □ No, I do more preparation □
No, I do less preparation □ Not Sure □

6. **Which do you prefer?**

Paper-based tests □ Phase tests □ Not Sure □

7. **How much do you value the instant feedback from phase tests?**

Not at all □ A little □ Very much □ Not Sure □

8. **How much do you use the instant feedback from phase tests?**

   Not at all □ A little □ Very much □ Not Sure □

9. **Does the preparation you do for a phase test help you in other areas of your course?**

   Yes □ No □ Not Sure □

10. **Does the feedback you receive from a phase test help you in other areas of your course?**

    Yes □ No □ Not Sure □

11. **Do you have the opportunity to discuss the results from a phase test with your tutor?**

    Yes □ No □ Not Sure □

Any other comments on phase tests?

Thank you very much for taking the time to complete this questionnaire.

Appendix 2

Student responses to Phase Test Questionnaires

Question	Percentage response
1. Do you think phased tests are used as part of your assessment because: (Please tick all that apply)	
Help to identify struggling students	23
They provide immediate feedback on progress	70
To test progress in all areas of the module	57
It is the right type of assessment for the course	47
They are quick to run	20
Less work for the tutor	10
Not sure	0
2. Do you think that phase tests are? (Please tick all that apply)	
Quick	47
Accessible	30
Understandable	40
Suitable for my learning	47
Suitable to test my knowledge	47
A good method of marking my work	50
Not sure	0
3. Do you think phase tests should? (Please tick one answer only)	
Be marked by the computer delivering mark immediately	43
Provide mark with immediate right and wrong answers	30
Provide mark with immediate right and wrong answers and additional feedback from tutor at a later date	53
Be marked by the tutor, delivering feedback and mark at a later date	0
Not sure	0
4. Do you prepare for a phase test in the same way you would prepare for a paper-based assessment? (Please tick most appropriate answer only)	
Yes, I do the same amount of preparation	57
No, I do less preparation	40
No, I do more preparation	0
Not sure	0
5. Which do you prefer?	
Paper-based tests	7
Phase tests	83
Not sure	10
6. How much do you value the instant feedback from phase	

tests?

Not at all	3
A little	17
Very much	77
Not sure	3

7. Do you find feedback from phase tests understandable?

Not at all	13
A little	40
Very much	47
Not sure	0

8. How much do you use the instant feedback from phase tests?

Not at all	10
A little	47
Very much	37
Not sure	7

9. Is feedback from phase tests sufficiently detailed for you?

Not at all	30
A little	27
Very much	33
Not sure	10

10. Does the preparation you do for a phase test help you in other areas of your course?

Not at all	7
A little	43
Very much	47
Not sure	3

11. Does the feedback you receive from a phase test help you in other areas of your course?

Not at all	27
A little	47
Very much	27
Not sure	0

12. Do you have the opportunity to discuss the results from a phase test with your tutor?

Yes	43
No	43
Not sure	13

Appendix 3

Guidance on best practice implementation of Phase tests

Introduction

Technology today is fully integral part of the student learning and work experience and therefore it is inevitable e-assessment should be a reflection of this interdependency on technology and alignment with teaching practices, Bennett (2002). Some practitioners perceive e-assessment as the holy grail, as it not only enhances the student learning experience through assessment of learning, feedback and motivation, but it supports teaching and assessment paradigms in providing performance indicators for/of staff and students, Mariott (2009). E-assessment also provides the assessor with a rich source of data that can be quantitatively and qualitatively analysed using computer-based methods to ascertain the depth of student learning and to evaluate the effectiveness of the teaching, Vendlinski & Stevens (2002). Electronic phase test assessments, certainly from the academics' viewpoint, can provide easy access, analysis and insight into the depth of student learning facilitated through different learning strategies, whereas it would be a more torturous/onerous task with a traditional paper-based phase test, Nortcliffe (2005). From the marking perspective, the automation of traditional paper-based assessment increases efficiencies, accuracy, reliability and data management, Hamilton and Shoen (2005), as well reducing a workload burden on the academic. Though it provides efficiencies in one aspect, it is time consuming to develop, and requires careful planning to ensure it is effective in assessing learning deliveries and outcomes, Buzzetto-More, N.A.and Alade (2006). Therefore, e-assessment should not be seen as a "cheap" alternative; it has the potential to contribute more than an efficient assessment marking tool, but to be effective, investment in academic time is required prior to deployment.

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Multi-choice assessments in particular lend themselves to the electronic medium as they enable the academic to quickly assess and track student knowledge and understanding of a didactic subject, Buzzetto-More, N.A.and Alade (2006). However, a higher success rate is typically achieved with multi-choice examinations, as students find it easier to recognise a complex answer than construct one, Caygill and Eley (2001). Nicol (2007) demonstrated that a more constructive approach is the deployment of e-multi-choice tests as a formative assessment and feedback methodology to develop learner autonomy. A further enhancement would be for the students to construct the tests themselves. In practice, student construction of multi-choice questions has the potential to deepen student learning, Nortcliffe (2006), but this is only possible if the students deem the exercise worthwhile and invest a greater amount of their time, otherwise a lesser model of student learning is achieved. E-assessment can facilitate deep student learning, and with careful planning and implementation be best practice in assessment and learning. E-assessment has the potential to offer new approaches to assessment, feedback and learning, Whitelock (2009); however, there is a need to develop a holistic learning strategy that incorporates and considers carefully the assessment, feedback, student learning, learner autonomy and reflection to ensure greater student learning.

What are the student perceptions?

A small study of the student population at the University of Bradford indicated that their general perceptions and feelings of e-assessment were positive, Dermo (2009); however, students perceive randomly selected questions as unfair. Therefore there is a need to ensure parity in the difficulty of each question in the question bank.

Marriott's (2009) study of the change of an assessment practice to e-assessment in a module demonstrated that the majority of students preferred the revised e-assessment method as it enabled them to develop their learning consistently and provided valued and timely feedback. Kibble's (2007) large study of a cohort of students identified that student performance significantly improved in the final examination if students had actively participated in e-quizzes throughout their course, however high student engagement in e-quizzes was only achieved through increased incentives, i.e. credit. Low stake, outside classroom e-quizzes do have a positive effect on the student learning and eventual attainment, Angus and Watson (2009); however, low attainment students are less likely to volunteer to participate in outside classroom e-assessments. Therefore, as learner providers we have a long way to go in convincing all the student population that active participation in e-assessments is beneficial to them and the development of their long-term learning, understanding and knowledge formulation.

Conclusion

E-assessment is not a “cheap” substitute for alternative methods of assessment, and students do not perceive it as such. However students' perceptions of the importance of e-assessments in the learning individual learning strategy is low, as indicated by their lack of engagement in preparatory work for an e-assessment, pre-conceived idea that e-assessment is easier than a paper assessment or the fact that weaker students are less willing to participate in low-stake e-assessments. Therefore, e-assessment needs to be carefully marketed to students and needs to demonstrate its learning worth for each individual, i.e. the benefits to them personally. E-assessment has the potential to provide alternative methods of assessment that can provide valuable and timely feedback, deepen the student learning, increase student motivation to learn, and encourage student reflection of their learning. Importantly it can promote student motivation to feed forward the feedback. However e-assessment requires careful consideration, planning and development as an integral component of the overall learning strategy in order to ensure the personal development of each student in the learning outcomes of a module or course.

Guidance

The following practical guidance is based on examination of student perceptions of the value of phase tests to their learning, and the experience of staff who have worked with this methodology for the past few years.

Benefits of Phase tests

- Phase tests provide a way of fully integrating students' learning and understanding. They are a good way to ensure that students have a firm grasp of technical information, which they can then apply in other areas of their course.
- The instant feedback of phase tests is particularly valued by students. An immediate mark will be greatly appreciated by students.
- Students will engage with the learning of the module of the phase tests are stepped throughout the semester/ year. They may not engage on a continuous basis if the testing is in one part at the end of the module.

> ***Students' Views:***
> *'I think most tests should be prepared like phase tests'.*
> *In response to: 'How much do you value the instant feedback from phase tests?' 77% answered 'Very much'.*
> *When asked 'which do you prefer, paper tests or phase tests?', 83% of students said phase tests.*

Creating the test

- Do not underestimate the length of time it will take to prepare the questions - writing the questions and right answers may be relatively simple but the creation of plausible wrong answers can take longer than you may think!

> ***Students' Views:***
> *When asked why they think phase tests are used as part of their assessment, 70% said because they feel it provides instant feedback on progress, only 10% said because they were less work for staff.*

- Negative questions may be appropriate to students' learning. For example,. in a diagnostic situation, it may be important for student to be able to recognise what is not true, as what is. You may also wish to use negative questions to encourage students to think more widely, by encouraging the idea that there may be more than one 'right' answer to a given situation.
- Consider whether a phase test is an appropriate way to use lab/ seminar time, or whether it would be more beneficial to students' learning to take the test in their own time, with labs/ seminars supporting their learning in other ways.
- Low stakes frequent tests will encourage students to engage with the learning on a continual basis, whereas one test at the end of the module may encourage a 'cramming' approach to learning.
- Consider whether a mock phase test will be helpful for students - bearing in mind that the questions will have to be created in the same time-consuming manner as the real tests, and if the number of potential question on your subject area is finite it will limit the pool available for students to answer.

> ***Students' Views:***
> *'Sometime I found mock Phase Test would prepare better for me as I am not too familiar with Phase Tests.'*

- It is very important that the questions are written in clear and unambiguous English. Help with this is available from Student and Learning Services (see resources section for further guidance).
- Get to know the IT system well - and be prepared for it to go wrong! Have a solution prepared for any failure in the system.

Feedback

- Provision of feedback on each answer is an ideal but may not be practical. It would be very time consuming to create and the potential for plagiarism needs to be considered. Will the test be administered in a random way that will give each students different questions from a set (in which case feedback, or right/wrong for each question is not appropriate as students could potentially pool answers) or are there set questions for all the cohort at a set time? How much control do students have over when they take the test or are they undertaken in semi-exam conditions? Are the results summative or formative? All of these points need to be carefully considered before taking the decision about feedback.
- If it is not practical to give a response to each question, are there other ways feedback can be given more generally as part of the general learning or around other related areas of work?

Resources
You may find some of these resources useful when considering whether or not to create a phase test.

Guidance available on Sheffield Hallam University Blackboard site:

Designing Effective Online Assessment
https://d2.parature.com/ics/support/DLRedirect.asp?fileID=44673

General Rubric for Online assessments:
https://d2.parature.com/ics/support/DLRedirect.asp?fileID=44676

General resources about using multiple choice/ low stakes tests:

Angus, D. and Watson, J. (2009) Does regular online testing enhance student learning in the numerical sciences? Robust evidence from a large data set, British Journal of Educational Technology, 40(2), pp 255-272)

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