Literature Review

Developing E- and Blended Learning Approaches for International Students

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Abstract
International students represent a large and increasing proportion of the undergraduate cohort, but tend to achieve lower grades than UK home students in many disciplines. This appears to reflect the challenge(s) of studying with lower level English skills, and acclimatising to an unfamiliar academic culture. Here we discuss the experience of designing supplementary e-learning materials and/or blended learning environments aimed at supporting these students, and outline how we evaluated their effectiveness.

Background

International students constitute a large, and increasing proportion of the undergraduate cohort in UK higher education (17.4%; HESA, 2012), with the vast majority from *Non-English Speaking Backgrounds* (NESB). This makes an important financial contribution to the sector, but also brings intangible benefits – notably by increasing diversity, and expanding the horizons of students and staff. However, despite these economic and cultural gains, analysis of UK undergraduate academic performance finds international students attain a lower proportion of 2(i)/1st class degrees than home students (termed an *'achievement gap'*; Morrison, Merrick, Higgs, & Le Métais, 2005). This varies with nationality and the discipline studied, but similar issues are also found in Australia (Salamonson, Everett, Koch, Andrew & Davidson, 2008), suggesting this is a systemic issue in international higher education.

A cause for concern is that courses with a high proportion of international students are associated with unexpected increases in grades for domestic students, suggesting that faculty may be reducing educational standards in response to the issue (Foster, 2012). This relative under-performance is particularly striking given a large, US–based study found international students engage more with their academic work, and socialise less than their domestic counterparts (Zhao, Kuh & Carini, 2005). This dedication does not appear to compensate for the reduced English language skills of many NESB students, as poor comprehension (Mulligan & Kirkpatrick, 2000), and weaker academic skills (for example lecture-based note-taking; Lebcir, Wells & Bond, 2008) contribute to lower performance. These difficulties can be prolonged: many Chinese students still experience problems with academic writing after two years of higher education, despite making progress in their receptive language skills of reading and listening (Zhang & Mi, 2010).

Developing approaches to resolve these difficulties (one aspect of the 'internationalisation' of curricula) has received sustained attention, with several institutions developing best practice (for example HEA/UKCISA's *'Teaching International Students'* project). Recommendations tend to be applicable to all disciplinary areas, for example, to *'deconstruct'*, or give explicit advice on academic conventions (for example referencing rules or plagiarism), to provide a choice of source materials, and explicit guidance on academic skills (for example the scientific essay format; Marshall & Garry, 2006). Likewise, new approaches to supporting international student's academic skills can be widely applied (for example facilitating interaction in groupwork; Dales, McLaren, & Steiner, 2011), though academic skills training can also be tailored to discipline-specific contexts (for example communication in medicine; Hawthorne, Minas, & Singh, 2004).

Discussion of the barriers faced by international students (Omeri, Malcolm, Ahern & Wellington, 2003) often focuses on the difficulties raised by the lecture format. For example, it has long been acknowledged that the language challenges posed to NESB students are exacerbated by the *'real-time'* format of lectures (Flowerdew, 1994). In addition, while all students face the challenges of interpreting information given in lectures using their previous knowledge to make conceptual connections (i.e. top-down listening skills, Vandergrift, 2004), NESB students have the added challenge of decoding sounds and words ('bottom-up' listening skills), as well as adapting to the cultural differences of the lecture format such as use of humour and metaphor (Littlemore, 2001).

The use of technology is often advocated to help NESB students cope with these demands on listening skills (Vandergrift, 1997; O'Brien & Hegelheimer, 2007; Dudeney & Hockly 2012), with many authors recommending supplementary e-learning, or blended learning approaches. This allows students to: (i), choose from a variety of learning materials to determine what is relevant for their needs and (ii), work independently at a pace and place of their choice. A wide range of topics for supplementary e-material resources are suggested, including international students' 'Frequently asked questions', 'How to' guides on areas of assessment, or glossaries of discipline-specific vocabulary and specialist terms. Likewise, examples of marked and graded students work, or exams with model answers, can give students an indication of the standard and level of understanding expected (Carroll & Ryan, 2005). Several studies also recommend providing copies of course materials, including handouts and PowerPoint presentations prior to teaching sessions, to accommodate students with slower reading speeds, and allow them to reflect and prepare questions for the sessions that follow (Lord & Dawson, 2002). Many of these approaches are in line with the adjustments made for students with learning difficulties, and are known to be effective. However, it is interesting to note that a significant proportion of undergraduates experience academic difficulties (for example approximately 15% of medicine cohorts; Yates & James, 2006), and these support mechanisms may be an inclusive form of support for *all* students.

Allowing international students access to supplemental resources during the pre-sessional period can be an effective way to facilitate transition, particularly at a time when many students are concerned about the upheaval and challenge of studying in the UK. However, e-learning resources can also be effective when integrated into modules, by maximising student's exposure to concepts and ideas, and exploiting the flexibility and interactivity allowed by technology (Laurillard, 2008). In the STEM disciplines, this can be achieved using sophisticated simulations and/or 'virtual laboratory' environments (for example chemistry; Dalgarno, Bishop, Adlong & Bedgood, 2009), but these often require a level of programming skill beyond typical faculty members. In contrast, generating audio-visual recordings (i.e. lecturer's voice + PowerPoint slides) or quizzes is straightforward with current software (for example, echo360, Panopto, Camtasia, Xerte), as is making them available – typically by internal distribution via a virtual learning environment, or even publically

through YouTube. Blended learning approaches which use a combination of e-learning materials (for example interactive simulations, on-line multimedia recordings, and quizzes) and traditional 'face-to-face' sessions (i.e. lectures, practicals) are an established approach in many disciplines, and similar e-materials are also known to be effective in different distance learning contexts (Gooley & Lockwood, 2012; Simpson, 2013). Here, we describe how e-learning and blended learning approaches can be used to support international students' learning as part of their on-site learning experience in the UK.

Design considerations I: Selecting an appropriate learning environment

Ideally, learning environments should be designed with a specific target audience in mind. Thus, in the case of international students, both: (i) the range of students' abilities (for example diversity of cohort, educational background, level of English and academic skills etc.), and (ii) the complexity of the desired learning outcomes (i.e. Level in Bloom's taxonomy), should guide the design of e-learning materials and the environment in which they are to be used.

Our experience in developing learning support approaches is in the context of the *Birmingham Foundation Academy*, a foundation programme which prepares international students for entry to undergraduate courses. This is a diverse cohort (currently around 140 students), with a wide variety of nationalities, educational backgrounds, and language levels. For example, some students begin the programme with near-native language skills but require support with academic study skills, while others enter with relatively low academic English skills (IELTS 5.0-5.5). These issues, combined with the students' recent arrival in the UK, and their relative youth (i.e. typically 17-18 years of age) present a number of linguistic, cultural and academic challenges. With this in mind, in this project we sought to develop learning environments and multimedia materials that could accommodate the diversity of the cohort with four main aims:

1. To introduce unfamiliar (often culturally-determined) aspects of academic practice.
2. To reinforce material introduced in face-to-face sessions.
3. To introduce material to build on in subsequent face-to-face sessions.
4. To give students confidence that their level of understanding is appropriate.

We primarily adopted a supplementary e-learning support approach, as this provides opportunities for the 'self-paced' and 'tailored' blended learning experience advocated by Fox (2002), where the availability of optional learning objects encourages students to recognise their personal areas of weakness, and access materials on topics where and when they need support. Furthermore, podcasts are known to be engaging for international students (for example to introduce pre-arrival materials; Watson, 2007), as are other e-learning resource formats (i.e. lecture recordings, quizzes, etc.; Pearce & Scutter, 2010), though web-based communication presents both challenges and benefits for these students (Smith, Coldwell, Smith & Murphy, 2005b). Multimedia (i.e. video and/or audio) recordings are particularly valued because (i) they facilitate accessing (or revisiting) material outside of sessions (i.e. with minimal distractions), and (ii) they allow students to 'pause' and review material while working at their own pace. As these factors are important for students with reduced English comprehension, multimedia recordings appeared to be the best design option for our purposes. We also speculated that on-line recordings can facilitate a more 'active learning' style, by encouraging parallel access to web-based glossaries, dictionaries or alternative sources of information, and that this may be particularly valuable for NESB student learning.

When designing our multimedia learning objects, we were also guided by the 3C-model for blended learning (Kerres & De Witt, 2003) which suggests the balance of *'Content'* (i.e. learning materials), *'Communication'* between learners and faculty, and *'Constructive'* components, where students focus on learning; these should be determined by the complexity of the learning outcomes. For example, in some Foundation Academy modules, our focus was on reinforcing knowledge acquisition. In this case the use of optional, or supplementary, learning resources is appropriate. In other modules, we used a more explicit approach, directing students to specific e-resources during, or after face-to-face sessions, to reinforce concepts, introduce academic skills, or to explain aspects of an assessment. Finally, in modules where the application of concepts was important, we explored *'lecture flipping'* – where students view a short on-line recording on a topic prior to addressing it in a subsequent face-to-face session (Crouch & Mazur, 2001). This approach is widely used in a range of disciplinary contexts to introduce students to material prior to an interactive session where this material is applied and where student questions can be addressed more fully. This is a more active learning approach than traditional lectures, and appears to be more engaging for students (Smith, Sheppard, Johnson & Johnson, 2005a). The impact of lecture flipping on international students' learning remains unexplored, but by giving students access to learning materials before sessions and allowing them to prepare (Lord & Dawson, 2002), could be an effective way to support those that need more time to engage with, and understand material.

Design considerations II: Learning resource format

Our project focuses on developing support materials using e-learning formats that are known to engage students and facilitate their learning. As such, our primary focus is on audio-visual recordings (*'podcasts'*), as these are widely used as supplementary materials to introduce topics, revisit lecture material, or as structured components of distance or blended learning environments. Our recent evaluation of supplementary lecture recording (Leadbeater, Shuttleworth, Couperthwaite & Nightingale, 2013), was consistent with studies suggesting these are engaging, and primarily used for revisiting difficult concepts, revision, or for catching up with missed lectures (Bassili & Joordens, 2008; Pearce & Scutter, 2010). Multimedia recordings can be used to introduce topics or skills (termed *Reusable Learning Objects*), and are effective learning materials, particularly in content–rich disciplines (i.e. anatomy, pharmacology). They have also been found to be a useful way of introducing the culturally-specific aspects of a discipline to international students (for example the UK healthcare system; Evans, 2012). Finally, we also explored the utility of on-line formative quizzes as support materials, as a number of studies show these are an engaging component of e-learning. These are associated with increased academic performance (Angus & Watson, 2009), perhaps because they identify areas of weakness, and may increase student confidence in their level of learning by providing instant feedback.

Design considerations III: Optimising student involvement

Judging where and how e-learning materials are incorporated in learning environments is central to their effectiveness (Clark & Mayer, 2011). However, another aspect of the development process is also crucial – how to ensure the resources meet student's expectations. This is not straightforward in diverse international cohorts, but is absolutely essential to address the main criteria (for example *'usefulness'* and *'ease of use'*), that students use to evaluate learning materials (Arbaugh, 2000). Cultural factors (i.e. nationality, educational background) are known to impact on e-resource use in distance learning (Uzuner, 2009), and are likely to affect engagement with e-materials and/or blended learning environments.

One approach to address the issue of meeting learner expectations is to use student input. Clinical disciplines have successfully used *peer-to-peer*, or *near-peer* teaching for a number of years (Evans & Cuffe, 2009), while *learner-generated* e-materials have been seen to be effective in capturing students' creativity and conceptual frameworks (Lee,

McLoughlin & Chan, 2008). This is an under-researched area, but we speculate that using *near-peer* international students to identify key topics and/or contribute to the design of learning materials will have similar benefits, and may help to reduce any cultural or linguistic barriers to using the materials. A final issue in using students to develop learning resources is how to balance faculty and student involvement in the process. This will vary with the level of student experience, the topic(s), and learning outcomes to be addressed, but should ideally be a partnership where faculty contribute disciplinary understanding and pedagogic insight (for example identify frequently encountered problems, threshold concepts, illuminating examples, etc.), and students bring a culturally-informed, 'insider' view to learning the topic.

Evaluation strategies

The development of learning environments should be an ongoing, iterative and incremental process, from initially identifying and analysing a problem, to one or more cycles of design, roll-out and subsequent evaluation (Phillips, Kennedy & McNaught, 2012). Central to this is the evaluation of the materials and/or the chosen learning environment in terms of effectiveness for learning. In short, we need to ask the questions: *do students engage with these materials, and do they learn?* Understanding the underlying drivers and use(s) of e-learning resources is as important as knowing how much they are used, as this can inform how to refine the design of the learning objects themselves, or identify ways to improve the learning environment in which the objects are situated. Ideally, evaluations of this type are embedded in a controlled study, for example, by comparing an e-learning approach with traditional *'face-to-face'* sessions (Ringsted, Hodges & Scherpbier, 2011). In practice, logistical and ethical factors often preclude this, and the evidence gathered to evaluate interventions is often incomplete, or open to interpretation.

What forms of data are useful for evaluation?

Studies that can demonstrate that an intervention has a statistically significant impact on academic performance are clearly compelling (i.e. Bassili & Joordens, 2008; Abdous, Facer & Yen, 2012). However, data regarding the relative success of e-learning projects in terms of performance can be inconclusive either due to the small cohort and/or because of incomplete engagement with the innovation. Other forms of evidence used to evaluate effectiveness include determining students' engagement with the materials, either as self-reported in a questionnaire, or from download data gathered automatically when students access on-line resources. These *analytics* data, indicating the number of downloads per student and/or the pattern of viewing over the academic year can give insight into the proportion of students using the material(s), and what they are likely to be using it for. Quantitative data can also be used to inform and formulate more directed research hypotheses, or can help to identify areas to be explored in depth in student focus group discussions. These can be a valuable source of qualitative data, particularly if a representative section of the cohort is involved. We found focus groups informed several areas of the design process, notably (i), the diversity of student's responses to the resources, and why this may be the case (ii), the perceived benefits of engagement and (iii), where there were unintended outcomes (Leadbeater et al., 2013). Students can also be a source of ideas for development of resources or the learning environment. For example, learning objects can be designed in response to learner needs as they arise in teaching sessions, to support a 'just-in-time' approach to teaching and learning (Novak, Gavrin, Christian & Patterson, 1999). A more subjective measure of effectiveness is to probe student's views of the intervention, including their perception of whether it contributes to learning (i.e. von Konsky, Ivins & Gribble, 2009), if it is a preferred learning approach, or if it appears to increase levels of satisfaction (Bassili & Joordens, 2008). These factors influence the level of student engagement with learning materials, but the link between this and student learning and performance is complex.

In summary, the development and evaluation of e-learning materials and blended learning approaches is not a standardised process. In the absence of a controlled study format, the use of a combination of quantitative (for example questionnaires, analytics data, academic performance) and qualitative data (for example focus group discussions) to describe different aspects of the innovation on student learning, and that *'triangulate'* to validate each other is the best approach.

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