Distance and Blended Learning
in the Faculty of Engineering and Physical Sciences

Guidance for Development of Distance/Blended Learning Courses
EPS eLearning Team

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1. Scope of Report

The aim of this report is to provide a framework and guidance for anyone interested in developing a distance or blended course/programme - models that will be collectively referred to as “flexible learning”. The framework draws on the experiences of designing, building and delivering successful flexible learning programmes within the Faculty of Engineering and Physical Sciences (EPS) as well as best practice drawn from both the University of Manchester (UoM) and other institutions.

This report aims to provide a foundation to assist in the understanding of possible models for flexible learning and the particular issues involved in the design and delivery of such programmes. It will also offer what to expect from the design and development process and the support that may be available.

In keeping with the current UoM and EPS strategies for the development of flexible learning programmes, this report will focus on postgraduate teaching and continuing professional development (CPD), though the final section also covers the developing area of Massive Online Open Courses (MOOCs). Although it is not the current UoM strategy, much of the content of this report could equally be applied to undergraduate teaching.

2. Selecting a Programme

There are a number of drivers that might promote the creation of a flexible version of a course, but at its core flexible learning allows teaching to reach out to wider audiences that might be unable or unwilling to attend full-time, campus-based courses.

More specifically, flexible learning enables the University to address particular market opportunities, including:¹

- **Overseas students**: the principle reason overseas students with offers fail to attend at the University is lack of funding. Flexible learning costs students roughly one-third the total cost of studying in Manchester (given travel and living costs, and salary foregone), and therefore significantly increases the potential market. Pure distance learning also requires no UK visa.
- **Post-experience/mature students**: a sizeable group – by demographic definition, far larger than the UG and recent-graduate PG markets served by face-to-face provision – which, due to work and home commitments, finds it hard to access on-campus teaching.
- **Continuing professional development (CPD)**: some employers are legally-obliged to provide CPD and many others wish to do so for capacity-building reasons, creating a very large worldwide market for continuing professional development training. Flexible learning CPD offers a lower-cost, higher-flexibility route that is transportable to a multi-location workforce. Employees studying while working apply their

¹ Taken from: Central DL Support Office Strategy Document, (June 2012). Distance Learning Steering Group, University of Manchester.
knowledge directly to their work context, so employers tend to see immediate benefits.

- **PGR feeder:** expanding provision of PGT via flexible learning broadens the feeder base for PGR, thus helping to fulfil University goals of expanding PGR numbers.
- **Mixed-mode students:** although a small market, provision of flexible learning enables students to study on-campus for a short period (e.g. one Semester) and then wrap off-campus learning around this in order to complete their studies.

Other potential opportunities include:

- **Third-party funding:** as a more-tangible product than face-to-face teaching, flexible learning has the potential to attract third-party funding for development. Pharmaceutical companies, for example, have paid for development of CPD courses delivered via flexible learning to healthcare professionals.
- **License income:** there is potential for flexible learning courses to be licensed for a fee to other educational institutions, who will deliver the course in a face-to-face capacity using the online materials as the foundation.
- **International partnerships:** a portfolio of flexible learning materials offers the University a base with which to enter into capacity-building partnerships with universities in the global South; and to work alongside other flexible learning providers to share good practice and access particular overseas markets.

Creating a flexible learning course can involve a significant investment in both time and cost so it is important to understand how this investment can be recouped, especially when making a case for funding to back the initial development. Appendix 1 shows an outline of the costs and income from the development of a full MSc into a flexible learning format. In this example the investment can be recovered within 3 years given a fairly low but consistent level of student recruitment.

This kind of modelling can be extremely useful for understanding the business case for creating a flexible learning programme and then for measuring the success during delivery – as actual income and costs can be compared against the target projections in the model. The details of a business model will be different for every programme, but in general the following factors should be taken into account, many of which can be established or at least estimated through thorough market research:

- Academic time required to prepare materials
- Academic time required for participation in delivery – particularly online collaboration and assignment marking.
- Additional support (e-tutors) involved in online collaboration and/or marking
- Additional resources, teaching materials or external consultancy
- Time required from eLearning team for design/development
- Future support and maintenance costs*
- Additional costs – market research, project management

*An example of how the support and maintenance costs for a unit may be calculated is provided in appendix 2.
It is important to understand the potential market for the course so undertaking appropriate market research is vital. The process for undertaking market research is not covered in this document and from this point in it will be assumed that a market need has been identified and measured and that a fully-costed business model has been constructed on the basis of this research.

3. Flexible Learning Models

Once a programme has been selected for offering in a flexible format, the delivery model must be decided. It is often appropriate to keep this model as close as possible to the campus-based delivery to make efficient use of time and resources, but this is not always desirable or even possible. This section will examine some of the particular issues associated with developing a flexible learning model.

3.1 Typical Structure

As with any Master’s degree, a flexible learning MSc normally consists of 8 x 15 credit units plus a 60 credit dissertation. Each 15-credit unit is usually taught over the course of a single semester and includes around 10-12 topics, plus possibly 1 or 2 reading weeks.

Full-time students may be able to complete 4 units per semester and complete the MSc in 1 year, but the majority of learners on a flexible programme can be expected to be part-time and will more typically take 2 units per semester, making it possible to complete the taught part of the programme in 2 years (3 years including dissertation).

As with any unit, the flexible course unit will generally be divided into topics organised into a sequential structure. The precise elements included in a given topic will vary according to availability and the subject matter, but the following should be considered an absolute minimum in order to provide distance learners with suitable levels of teaching material, staff contact and feedback.

3.1.1 Knowledge Transfer.

This will generally form the bulk of most units and represents the replacements for the lectures traditionally used in campus-based courses. A wide variety of delivery methods are available, but fundamentally they all involve a one-way transfer of knowledge with the learner as a passive recipient. Methods may include:

- Video-captured lectures
- Narrated slide presentations (captured live or not)
- “Talking head” video presentations
- Audio-only recorded presentations
- Lecture slides with accompanying notes*
- Text-book style full notes with embedded graphics
- Notes converted to HTML to incorporate interactive elements and animation
Clearly, “raw” copies of lecture slides without comprehensive additional notes, while they may be appropriate for hand-outs in lectures, are insufficient on their own to satisfy the needs of flexible learners - though they may be usefully provided in conjunction with a captured lecture.

A key point to note here is that, while some campus-based lectures may appear to include little interaction, material presented online is almost always an even more passive experience for the learner. Where possible, to help ensure learner engagement, it is recommended that topics are broken down into smaller “chunks” of around 10-15 minutes employing a variety of presentation methods.

Open educational resources (OER) are a potential source of content to help provide a variety of presentation methods. These resources represent teaching materials that have been developed by lecturers in higher education (HE) and other institutions and made freely available for inclusion in courses. Thousands of such resources are available in the Jorum repository at: http://www.jorum.ac.uk/.

3.1.2 Additional, background sources / Reading activities
Core lecture-type content can often be supplemented by additional background material that is also available online and learners may be directed to such materials as either mandatory or optional activities.

The UoM library currently subscribes to over 25,000 online electronic journals and has a vast number of digitised or online e-books available – allowing links to papers or chapters to easily be incorporated into a flexible learning unit so that the learner does not need to physically attend the library. If a required book or paper is not currently available, the library offers a digitisation service that may be able to put your references online.

Important note: Copying or scanning printed materials and embedding them in your course will almost always be an unlawful breach of copyright. There will generally be an alternative, legal route to incorporating the desired material – please contact the EPS eLearning Team or University Library for further information.

Another potentially useful service is provided by the Box of Broadcasts service. This is an online archiving service that has captured every BBC (TV & radio), ITV and Channel 4 programme broadcast since 2009, with even earlier recordings of some programmes available. The UoM contract with this provider allows for documentaries, interviews, news footage or any other useful TV/radio programme to be included within your course and be freely available to students with a valid UoM network user ID.

Some useful links:

Library Online Catalogue: http://www.library.manchester.ac.uk/searchresources/librarysearch/
Library Digitisation Service: http://www.library.manchester.ac.uk/ourservices/servicesweprovide/digitisation/
Box of Broadcasts (enter “University of Manchester” for institutional login): http://bobnational.net/
3.1.3 Formative assessment
As has already been mentioned, the presentation of core content online is typically a passive experience for the learner and it is important to incorporate sufficient interactive elements both to help ensure engagement but also to provide the learner with confidence that their knowledge and understanding are progressing appropriately.

One approach is to provide self-tests that will allow the learner quickly to assess their own progress and identify any gaps in their learning. Blackboard (Bb9) provides a range of question types that can be automatically marked—mostly variants on the multiple-choice or multiple-answer formats.

Such tests allow learners to test their knowledge without intervention by the teaching staff, but are most useful when some thought has been put into providing feedback. Different feedback should be provided for correct and incorrect answers with, at the least, an indicator of where in the teaching material the learner can find the content related to that question.

Feedback of this type is helpful but never as much as individualised feedback. Formative assessments can easily be embedded in the form of essay or short-answer type formats that then need to be marked, but to enable the opportunity for providing individual feedback to learners.

For mathematical disciples, questions around calculation or solving equations can be useful. These can be set up so that the calculation displays a slightly different set of values each time it is displayed (but all based on the same formula)—making it possible for students to re-use the test and ensure they understand the underlying maths.

Creating multiple-choice type quizzes can be time-consuming, but please note that this is an area where the EPS eLearning team has a great deal of expertise. The eLearning team can create such quizzes based on content provided the teaching staff, who can then review the quiz and amend as necessary based on their expertise in the subject area.

3.1.4 Opportunities for discussion/interaction
Another important component for flexible learning programmes is the facility for learners to interact with teaching staff. This is particularly vital for pure distance-learning programmes where there is no opportunity for face-to-face contact.

There are many approaches to achieving this contact—and these can be roughly divided into the three types below (please note that examples given are recommendations but are by no means exclusive—for example, video conferencing is a perfectly reasonable method for individual contact):

- Individual contact (e.g. email, instant messaging, phone) – for efficiency reasons, only recommended for very small groups or when individual contact is appropriate such as if performance or attendance is below expectations or for dissertation supervision. Synchronous (i.e. live) methods are often more suited to individuals or small groups.
- Tutorial groups (e.g. discussion forums, web conferencing) – this can be particularly effective and with video and/or audio enabled, online tutorials can be run in a very similar way to face-to-face tutorials.
- Full course group (e.g. blogs, Twitter) – for large groups, asynchronous (i.e. not live) methods are generally preferred otherwise it can be difficult for as many people to be able to contribute.

As with content presentation, a variety of methods is recommended with the choices depending on many factors such as group size and the preferences of both staff and students. For large-scale events or more sophisticated collaboration, UoM has access to a selection of licences for various products such as Adobe Connect, GoToMeeting and Fuse - please contact the eLearning Team for details.

Any form of online group collaboration platform is greatly enhanced by the use of structured activities to promote student participation. This can be as simple a question or problem or research task posed by the lecturer in a blog or forum post.

Participation is also more likely if teaching staff are seen to be actively involved in the discussions. A regular, publicised slot, even if only an hour per week, when the lecturer will visit the forum/blog to respond to posts can be extremely effective in keeping a forum active.

3.1.5 Summative Assessment

All essay type coursework assignments should generally be submitted through Turnitin – allowing both students and teaching/admin staff to track submissions as well as providing plagiarism checking and access to online marking via Grademark.

Summative assessments that make use of multiple-choice or similar automatically marked questions can use the Bb9 quiz tools just as described under section 3.1.3: Formative Assessment. This type of assessment can also be presented in the form of an online exam – an approach that may be suitable for blended programmes but not always for distance learners. The eLearning Team can provide further advice in this area.

In the vast majority of cases, Turnitin will be an appropriate tool for online submission, but there are occasional circumstances when it may need to be supplemented or even completely replaced by other tools. Two possible examples of this are multi-part assignments that require more than one file to be submitted and assignments that require submissions using file types not supported by Turnitin (e.g. MS Excel). In both of these cases, the Bb9 submission tools may be more suitable.

Grademark is a product tied in to Turnitin that allows all marking to be carried out online and feedback supplied directly back to students on a specified date. Grademark includes a number of tools to help facilitate marking, including an audio recorder to capture spoken comments and "quickmarks" – flags pre-filled with commonly occurring feedback comments that can be dragged and dropped onto a script.

3.1.6 Gathering student feedback

A commonly cited problem for teaching staff when they first start teaching on a flexible programme, especially a pure distance programme, is the lack of feedback from students to
help them modify and target their teaching. The usual mechanisms for online contact, via
discussion forums or web conferencing can often be felt to be too formal and insufficient to
give a lecturer a clear picture of how well their students are getting on.
It is important to alleviate this problem by providing both the mechanism and opportunities
for gathering student feedback. All courses provided through Bb9 will automatically include
the Unit Survey, which is helpful for general improvement of a programme, but less useful for
responding to a particular class or individuals.

Structured collaborative activities are an extremely useful teaching tool and well-defined
questions, tasks or activities help to encourage student participation online. But the formality
of such exercises can make it difficult to get a “feel” for how students are progressing – as
many lecturers would do through tutorials and lectures on campus-based courses.

The inclusion of less formal collaborative environments – e.g. unstructured discussion areas
or suggestion boxes can help to alleviate this problem. Unlike in structured activities,
amazonous postings may be permitted in such areas to promote honest feedback. As with
any tool of this nature it is essential that suggestions and responses are discussed or at
least displayed openly to the class to demonstrate that feedback is being received and
responded to – otherwise participation will usually quickly decline.

3.1.7 Administrative and technical support
Off-campus learners lack the opportunities that campus-based students have to turn up at a
reception desk and communicate in person with administrative and other support staff in. It is
essential that learners on flexible programmes have a named and easily contactable admin
contact to make up for this. Experience has shown that the success and failure of a flexible
learning programme can hinge on the way in which communications between admin staff,
academic staff and students are managed.

The admin contact for a flexible learning programme should be familiar with the teaching and
assessment models, teaching staff and programme schedules and ideally should be
included in every meeting of the programme team. In many cases, this admin contact may
become the primary contact for off-campus students – a contact who, unlike lecturers,
generally persists across the whole programme rather than individual units.

Similarly, dedicated technical support is vital for the success of a flexible learning
programme. Comprehensive and well-designed online content is a tremendous advantage to
campus-based students but it is not their only, or even primary, source of material. Lectures
will continue even if the online content is unavailable. For flexible learners however, the
online material is all they have. If it is unavailable, unreliable or inaccurate, confidence in the
programme will quickly slide and complaints are sure to follow.

A traditional, responsive support model is sufficient for the online provision that runs
alongside lectures in a campus-based course. For flexible learning this is inadequate – a
more proactive model based on preventative quality assurance is much more appropriate.

The cost of both administrative and technical support needs to be considered alongside all
other teaching/delivery costs right from the start of the design of a flexible learning
programme.
3.2 Distance Learning Models

One approach to flexible learning is the pure distance model – where are teaching content and collaboration takes place online and there is no need for the learner to attend the University at any point. This model is particularly suited to overseas students.

3.2.1 Flexibility of Delivery

One of the first design issues to consider for a full distance learning (DL) course is the level of flexibility that will be offered in the way teaching will be delivered. One extreme is to provide all teaching content, appropriately structured and with a recommended timetable, at the beginning of the course. The timetable might include scheduled events (discussions, tutorials etc.) but the student is free to plan their own path in an entirely flexible way, with access to content whenever they wish to study. This approach may suit some individuals but should be pursued with caution as it can prove overwhelming to many. In general a relatively structured course with content released at regular intervals (usually weekly) is recommended. This latter approach helps the students by providing a recognised structure as well helping teaching staff to identify whether anyone is falling behind.

However, even if this latter, timed-release approach is taken, it is quite common to receive requests from individual students to release content early in order to fit with other personal or work-related activities. An approach to such requests should be decided on before the outset of the course, but in general early release of content is acceptable as long as the individuals concerned undertake to participate as normal in scheduled events.

3.2.2 Groups or individuals

Related to the above point is the decision whether to emphasise group activity, possibly even group work assignments or whether to treat the group as individuals. This decision will have a clear impact on the choice of activities and methods of communication. Individual contact allows for personalised feedback and tuition but obviously is only appropriate for small groups due to the time commitment required. However, it does have the advantage of being able to rely on familiar methods of communication – such as email. In the majority of cases the group should be treated as a group – or partitioned into manageable sub-groups in the case of very large numbers. In this case online collaboration tools such as discussion forums, blogs or web-conferencing are the most appropriate methods of communication. Group-work assignments can be delivered in the form of a shared document reports or presentations but can also be built in the form of a wiki.

When using what may be unfamiliar tools such as wikis or web conferencing, it is essential that students are provided with sufficient instruction in their use and on-going support. The EPS eLearning team will be able to provide assistance in this area.

3.2.3 Example of a pure distance model

This example of a typical distance learning course might involves 10 topics taught over 12 weeks with one “reading week” and a final week dedicated to the final assignment. Topics are released on a weekly basis throughout the semester to help provide structure to students and prevent them becoming overwhelmed in week 1. These topics are supplemented by regular collaborative activities. This approach also helps to keep dispersed groups together and focussed on the same activities and discussions at the same time.
The unit might be structured as follows:

<table>
<thead>
<tr>
<th>On-going</th>
<th>Available throughout the unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Twitter “hash-tag” with feed embedded in Blackboard to allow quick</td>
</tr>
<tr>
<td></td>
<td>contact and questions about course topics.</td>
</tr>
<tr>
<td></td>
<td>• General discussion forum for lengthier questions and discussions</td>
</tr>
<tr>
<td></td>
<td>(monitored by a teaching assistant.</td>
</tr>
<tr>
<td>Week 1</td>
<td>• Video introduction/welcome by course leader</td>
</tr>
<tr>
<td></td>
<td>• Narrated slide presentation of topic 1 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – students introduce themselves</td>
</tr>
<tr>
<td>Week 2</td>
<td>• Narrated slide presentation of topic 2 material with self-test quiz</td>
</tr>
<tr>
<td>Week 3</td>
<td>• Narrated slide presentation of topic 3 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – online research activity, post findings</td>
</tr>
<tr>
<td>Week 4</td>
<td>• Video of guest lecturer presentation of topic 4 material to campus-based students</td>
</tr>
<tr>
<td></td>
<td>• Reading assignment on topic 4 material</td>
</tr>
<tr>
<td></td>
<td>• Self-test quiz covering contents of video and reading assignment</td>
</tr>
<tr>
<td>Week 5</td>
<td>• Narrated slide presentation of topic 5 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Narrated screen-flow demonstration of wiki tools</td>
</tr>
<tr>
<td></td>
<td>• Set interim assignment – students assigned to small groups and set a task to be presented in</td>
</tr>
<tr>
<td></td>
<td>the form of a group wiki</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – providing advice on online group work (eLT can participate)</td>
</tr>
<tr>
<td>Week 6</td>
<td>• Reading week – opportunity for students to “catch-up” and complete interim assignment</td>
</tr>
<tr>
<td>Week 7</td>
<td>• Narrated slide presentation of topic 6 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – journal paper review, post comments</td>
</tr>
<tr>
<td>Week 8</td>
<td>• Video presentation of topic 7 material with reading assignment and self-test quiz</td>
</tr>
<tr>
<td>Week 9</td>
<td>• Narrated slide presentation of topic 8 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – feedback on interim assignment</td>
</tr>
<tr>
<td>Week 10</td>
<td>• Narrated slide presentation of topic 9 material with self-test quiz</td>
</tr>
<tr>
<td>Week 11</td>
<td>• Narrated slide presentation of topic 10 material with self-test quiz</td>
</tr>
<tr>
<td></td>
<td>• Set final assignment – essay to be submitted online</td>
</tr>
<tr>
<td></td>
<td>• Discussion forum – questions related to topic of final assignment</td>
</tr>
<tr>
<td>Week 12</td>
<td>• Completion of final assignment</td>
</tr>
</tbody>
</table>
3.3 Blended Models

It can be greatly beneficial if students and teaching staff have an opportunity to meet face-to-face – possibly at the outset of the course. This is not essential for effective distance learning, but experience suggests that it can improve student engagement especially in discussion forums, which can be slow to get going for those students with no experience of online collaboration. This improved involvement may help to lessen the distance learning student’s sense of isolation and serve to improve retention.

It should also be noted that mandatory attendance at workshops may make the course less attractive to some prospective distance learners, especially those who are overseas or in full-time employment – both significant distance learning markets. However, this model is often very suitable in CPD type courses where learners can be released from work for short, occasional residential events and may also appreciate the networking opportunities.

3.3.1 Example of a blended model event

One of the most suitable times to introduce a residential element is right at the start of a course – allowing the students to meet each other and the teaching staff. Another event can then be scheduled later in the unit, for example to provide support and advice on upcoming exams or coursework assignments. The inclusion of such events in a programme makes the use of online collaboration activities less important, though it is still useful to maintain a channel for general student queries and feedback.

A typical residential event on a blended programme might include the following activities:

- An introduction to the unit and staff
- Laboratory, workshop or similar activities that allow students to gain hands-on experience with equipment and techniques
- Presentations from visiting lecturers
- Group-work activities, possibly culminating in a presentation to the whole group
- Formal exams (if at end of session)
- Social opportunities to meet fellow students and teaching staff

4. Design Issues

4.1 Academic Contact

To avoid the very real danger of distance learning students feeling isolated and disconnected from the teaching process, it is essential that regular online contact is maintained. As a minimum, each unit should include one or more discussion forums for general discussion of content issues and questions or requests for clarification.

For campus-based students it may be reasonable for the academic to monitor discussion forums once a week and answer questions as these students have other mechanisms for asking questions or making contact. For distance learning students a much more regular
programme of contact is required. For example, discussion forums should be monitored daily so that all queries are responded to within 24 hours.

This level of contact can pose an unreasonable burden on academic staff as numbers of students grow. In this case it is possible to introduce “e-tutors”, typically research students, who can be employed to form the frontline of contact with distance learning students – available online every day throughout the course. With a small amount of training, these e-tutors should be able to answer general questions about the subject, promote and steer online discussions and monitor student participation. Any questions the e-tutor does not feel able to answer should be passed on to the academic.

The use of e-tutors provides a scalable model that frees up academics from the need to monitor discussion forums on a daily basis. However, it is important for the perceived credibility of the course and the reassurance of the distance learning students that the academic does retain a strong online presence – perhaps participating once a week in discussions or even a scheduled, live, online seminar via a “chat” tool.

Apart from discussion forums there are many other tools that can be used for online collaboration. For example, Wikis can be used to support online group work activities and blog or journal tools can be used for students to demonstrate reflective practice.

4.2 Academic Time Requirements

Apart from delivery of the finished course, the input required from academic staff into the development process falls into two main areas:

1. Design of materials/activities (in collaboration with eLT).
2. Review of developed online material.

This assumes that course is already being delivered on campus and so that teaching material already exists in some form. For completely new courses, the time to write content will usually be significantly greater than that required for either of these activities.

In October 2010, a request for academic staff to estimate how long it takes them to complete a range of eLearning design activities yielded the following results (averaged across 9 respondents involved in distance learning development and delivery):

For one topic:
- Material equivalent to 1-hour lecture: 7 hours
- 5-10 question quiz with feedback: 3 hours*
- Discussion forum activity: 2 hours
- Uploading files, papers etc: 1 hour

(* In most cases quizzes can be built by the eLT and then reviewed by the academic).

Based on these figures (with quiz development removed and 2 hours added in for reviewing developed content), the total time required from teaching staff is estimated to be 1.5 days.
per topic – amounting to 18-20 days for a full unit. These figures assume that no new content needs to be written and reflect the conversion of existing material into a form suitable for distance learners – i.e. with additional narrative where necessary. Experience has shown that these figures can vary dramatically for different units.

4.3 Assessment

Flexible learning units can be assessed by either examination, coursework or a combination of the two. Assessed coursework should be submitted online via Turnitin to allow plagiarism checking and facilitate online marking.

Exams can be scheduled to take place at the same time as campus-based students, either at UoM or at a remote approved exam centre. It is normally the responsibility of the student to arrange a suitable location, supported by the programme administrator and subject to UoM approval. If such scheduling is not possible, a separate exam paper will be required for distance learners.

Assessment models may vary and could for example, follow either the traditional or a more problem-based approach:

**Traditional Assessment Model**  
Teaching material provided according to sequential structure with assignment set and submitted at the end of the sequence.

**Problem-based Assessment Model**  
The assignment problem is set at the start of the unit and acts as a guide and structure for the student’s chosen learning pathway. Material is provided non-sequentially and the student selects what to learn and when based on the “motivation” of solving the problem.
5. The “5D” Development Process

The creation of online teaching material should be treated as a project and is generally created using a “5-D” process as outlined below.

The key to the success of this process is regular contact between the academic, technical and administrative members of the team. The eLearning technologist (eLT) co-ordinates this and serves as Project Manager.

It is important to note that, despite the sequence implied by the flow-diagram, in practice it is highly likely that these stages will be entirely separate and discrete – for example, it is unlikely that all activities in the “Define” stage will be fully complete before “Design” begins. In practice, the stages tend to overlap and this is embodied in the feedback loops shown in the diagram. Experiences during “Delivery” can and should go back to affect the original design of the course – in this way continuous improvement can be achieved.
Each stage of the process will be outlined in more detail in the following sections and a “checklist” of the activities at each stage can be found in appendix 3.

5.1 Define

The first stage is to define exactly what the project will involve, what timescales and other restrictions need to be considered, what resources are available and how they will be deployed. By the time this point is reached, a business model should be in place based on solid market research and the necessary funding or approvals will have been secured if required.

As with all the stages in the 5D process, the exact elements will vary from project to project, but the following should be considered in almost every case.

5.1.1 Stakeholders

Early in the definition stage it is important to identify all relevant stakeholders and be clear on their involvement in the project. This may range from the distant but extremely important, such as funding bodies – to the everyday consumers (usually students).

The RACI model (Responsible, Accountable, Consult, Inform) is an excellent tool for this task as it involves creating a matrix of all tasks and everyone involved (stakeholders) and then assigning a level of involvement in each case. A fuller explanation of this approach can be found at: [http://www.projectsmart.co.uk/raci-matrix.html](http://www.projectsmart.co.uk/raci-matrix.html).

5.1.2 Roles and responsibilities

Closely linked to the identification of stakeholders is the assignment of roles and responsibilities within the project team. To some extent, this can be rolled into the RACI analysis described above, but this group will also need more detailed role descriptions – a bullet list of key responsibilities is usually sufficient. This is important for two reasons: firstly to clarify the roles for everyone involved as it is easy for different people to have different views of what a “Project Manager” or “Administrator” should be doing. Secondly it helps to ensure that no key tasks get missed, which generally happens because everyone assumed the task was someone else’s responsibility. Deciding and negotiating these roles at the outset of the project can be time-consuming but can save a great deal of problems further onto the project.

Again, the precise roles will vary on each project – but in most cases, when developing flexible learning courses, the following will be included:

- Course Leader – ultimately responsible for delivery of the course.
- Course Tutors – response for delivery of specific course elements/topics.
- Project Manager – overall coordination and communication.*
- Learning Designer – design over learning activities and online content.*
- Developer – build of online materials and resources.*
- Course Administrator – primary student contact.

* EPS eLearning Technologists are trained and experienced in these areas.
Tied in to the identification of stakeholders and the allocation of roles and responsibilities is the creation of a communications plan. This plan may be as simple as a schedule for project meetings, but may also include chains of communication for disseminating information to individuals or groups of stakeholders.

5.1.3 Project Management
A significant amount of project management activity will need to happen, or at least begin, at the Define stage. Most of this activity will be in the following areas:

- Scoping and requirements definition
- Planning and milestone setting
- Risk analysis and mitigation planning

In general the Project Manager (PM) will be responsible for producing the documentation for these areas, but they will generally need to gather information from everyone in the project team in order to do so. In most cases the PM will seek agreement and sign-off for these documents from the immediate project team, key stakeholders and particularly the project sponsor. Initial plans set at this point are not set in stone and will be expected to change as more detail becomes available and possibly under the influence of external factors. The PM will be responsible for communicating these changes in line with the agreed communications plan.

5.2 Design
The Design stage is where the flexible learning course begins to take shape. The unit tutors and learning designers will work together to develop the following elements in line with sound pedagogical practice and the available technology. At this stage the design team should be focussed on innovation to deliver the best possible learning experience. It will then be the role of the PM to possibly impose some restrictions based on resource limitations or project deadlines.

During the design stage – the following activities will be undertaken by the Project Manager (PM), Course Tutors (CT) and Learning Designer (LD)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish learning objectives</td>
<td>CT</td>
</tr>
<tr>
<td>Establish unit/topic structures</td>
<td>CT, LD</td>
</tr>
<tr>
<td>Prioritise key concepts</td>
<td>CT, LD</td>
</tr>
<tr>
<td>Identify critical activities</td>
<td>CT, LD</td>
</tr>
<tr>
<td>Identify/create design guide and templates</td>
<td>LD</td>
</tr>
<tr>
<td>Create storyboards or prototypes as appropriate</td>
<td>LD</td>
</tr>
<tr>
<td>Identify/purchase specialists and/or development tools required</td>
<td>LD, PM</td>
</tr>
<tr>
<td>Revise initial plan and risk analysis as appropriate</td>
<td>PM</td>
</tr>
</tbody>
</table>
At the end of the Design stage, the agreed design should be made available to the wider project team and appropriate stakeholders for comment. For this reason the design must be communicated in a clear format – such as storyboards. Prototypes of activities or innovative solutions may be useful for illustration.

5.3 Develop

During the Develop stage, the developers (usually the EPS eLearning Team) will undertake the build of the flexible learning course materials in line with the agreed design and templates. In practice, issues may become apparent during the build that require amendment to the agreed design and in turn the resource plan. It is the responsibility of the PM to manage and communicate these revisions.

The Develop stage will generally involve the following as a minimum:

- Build online content in line with design and templates
- Create and test activities
- Create online assessments
- Create or source graphics
- Co-ordinate specialist resources and integrate into material
- Identify and test collaboration tools

In addition to the online material, the Develop stage might also involve the creation of other resources that could, for example, be used in face-to-face events on a blended course. It could also involve the development of training materials or guidance, such as that for Teaching Assistants acting as eTutors or for students in the use of new technologies.

It will also be the responsibility of the development team to capture anything that may have implications for the on-going maintenance and support of the course and to communicate such issues to the PM.

5.4 Deploy

The Deploy stage is the least well-defined in the 5D process and represents the transition from a set of constructed learning resources and activities to a fully-realised course. IT generally includes a number of one-off activities that need to take place before the continual cycle of course delivery can take place.

Activities at this stage fall into 3 categories: technical – setting up and installing courses on Blackboard (or similar VLE), administrative – registering staff and students and assigning appropriate roles and finally, training – including the training of teaching staff in the use of new tools and the training of Teaching Assistants in their roles as eTutors.

At this stage the development team will hand over support of the course to the core eLearning Team, together with any instruction and/or documentation as required.
5.5 Deliver

The final step in the process is to Deliver the course to students. Since most knowledge transfer materials will already have been produced by this stage and will be hosted online, the key teaching activities for course tutors will be:

- Participation in online discussions, web conferences or similar activities, possibly including “tweets” or blog posts for added engagement.
- Setting and marking assignments and provide feedback, either written, by audio podcast or by some other means.

During this time the eLearning team will usually take on the responsibility for on-going support and maintenance. Online materials are an even more vital component of learning for distance and blended learning students than for campus-based students. This means that reputable flexible learning programmes require an enhanced level of support that focuses on proactive quality checking and preventative maintenance rather than traditional responsive models. Experience with existing programmes has shown that a full MSc programme requires dedicated technical support equivalent to 0.25 FTE/year. It is generally expected that although the eLearning Team can provide this service, the cost will be borne by the School offering the programme then in turn treated as overhead and recovered from fees.

5.6 Quality Assurance

After each major stage in the process there should be a deliverable that can be reviewed to ensure the project is proceeding as planned and is of suitable high quality. These deliverables should then be formally accepted (signed off) by the Project Sponsor and Project Manager. Suggested deliverables at each stage are:

- QA Review 1 – after Design stage: At this point a full set of storyboards or outline of the proposed course structure and content should be available. These design documents will also allow a firm project plan to be completed. All of these deliverables should be reviewed and agreed at this stage – design documents by the teaching staff and project documents by the sponsor.

- QA Review 2 – after Development: The full set of course resources are now available and will be checked by internal peer review within the development team, ensuring internal consistency of quality and making sure that only working elements are published for review by teaching staff.

- QA Review 3 – after Deployment: At this stage the full course is up and running in Blackboard for review by the teaching staff. It can also be useful at this stage to conduct User Acceptance Testing with a sample student audience to gather their comments and opinions. Focus groups work well for this purpose.

- Final Review – after/during Delivery: The final review is slightly different in that it represents a continuing process of gathering feedback from the audience, and
teaching staff and refining/enhancing the online material in response. Ideally, this will be an on-going process of refinement built into the support and maintenance costs, but in the worst case, may require reworking of the design or even the project requirements.

It is worth noting at this point that testing is of little value unless sufficient “reworking” is set aside to allow any identified issues to be corrected. The PM is responsible for incorporating this activity in the project plan.

6. Massive Open Online Courses (MOOCs)

A recent variation on the usual distance eLearning model is the Massive, Open, Online Course (MOOC) – essentially a pure distance learning course offered free, generally by a University, to anyone in the world who wants to take it. Take-up on these courses can easily run into thousands of learners. In their first trial of a MOOC on Circuits and Electronics in Dec 2011, the Massachusetts Institute of Technology (MIT) reported that 155,000 people from 160 countries signed up and 7,157 completed. So even with a drop-out rate of 95% the completion numbers are still very impressive.

The current strategy of the University of Manchester is to produce a limited number of high quality MOOCs to act as a showcase for our key areas of expertise and to illustrate high-quality teaching resources. As with all other HE institutions to date, MOOCs will not be used as a core teaching element and while completion will grant some form of certificate it will not be counted as credit towards a degree or other qualification.

6.1 Building a MOOC

The typical activities involved in creating a MOOC are listed below. This list assumes a 6-week course where each week includes a video lecture or narrated slide presentation, further reading or similar activity, formative self-test with feedback, an active discussion forum/blog or similar. Self-tests will be automatically-marked, multiple-choice format and should not need intervention but discussion forums will require monitoring by teaching assistants and active participation by teaching staff. In addition a short introductory video is recommended and a final assessment is required that may need to be marked.

Anticipated teaching support/time required for MOOC development & delivery:

- Course design and planning
- Preparation/selection of teaching materials
- Lecture capture/filming
- Review of online materials prior to delivery
- Participation in discussion forums (academic staff)
- Monitoring/facilitating of discussion forums (TAs) – (10-15 days based on 3-4 x 1 hour sessions per day – this may increase depending on participant numbers)

• Marking final assessment

Anticipated support required from EPS eLearning for MOOC development & delivery:

• Set up online structure and assistance with course design
• Conversion of teaching materials to online format
• Storyboarding for enhancing video materials
• Graphic design of enhanced learning materials
• Lecture capture/filming and post-production
• Creation of self-tests from provided material
• Set-up of forum/blog, final assessment and other linked activities
• Project management and quality assurance
• Technical support /assistance during delivery
Appendix 1: DL Course Development – Cost Model

This model illustrates the outline of the costs and income from the development of a full MSc into a flexible learning format. In this example the investment can be recovered within 3 years given a fairly low but consistent level of student recruitment.

Development Costs, annually

Aiming to achieve 1 full MSc course (6 x 15 credit units)

1 faculty-based developer (L5-6) supporting teaching staff and dedicated admin, focussed on DL development…
- Capture of all lectures – screen-flow
- Supplement with interactive elements, formative quizzes etc.
- Coaching and set-up of online collaboration tool & approach
- Redesign of assessments for DL delivery with course instructors
- Redesign of lab/workshop/demo activities to DL model

eLT Developer cost, (1.0 FTE eLT): £40K
Release of academic time (20% x 6 units) – materials, Review/QA, redesign £60K
Market research & brand development, (0.25 FTE) £10K

Scaling support costs, to be recovered from schools/fee income

Teaching time allocation – as for campus-based , 20% x 3 units (or dissertation)/yr £30K
Dedicated admin support (0.2 FTE for full MSc programme w/ 10 students) £5K
Dedicated tech support/maintenance (0.25 FTE L5 for full MSc) £10K

Investment (based on full DL MSc, development + support) £110K + £45K/yr

Projection Model
Assuming 10 students recruited each year, £15K fees over 3 years

<table>
<thead>
<tr>
<th>Yr</th>
<th>Investment (K)</th>
<th>Total Investment (K)</th>
<th>Income (K)</th>
<th>Total Income (K)</th>
<th>Total Surplus (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>110</td>
<td>110</td>
<td>0</td>
<td>0</td>
<td>-110</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
<td>155</td>
<td>50</td>
<td>50</td>
<td>-105</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>200</td>
<td>100</td>
<td>150</td>
<td>-50</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>245</td>
<td>150</td>
<td>300</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
<td>290</td>
<td>150</td>
<td>450</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>335</td>
<td>150</td>
<td>600</td>
<td>265</td>
</tr>
</tbody>
</table>
## Appendix 2: Development and Support Costs

The following breakdown of costs reflect the time required for an eLT to build a full unit and does not include teaching staff time required (see 3.1 for estimated requirements).

### E2E Development Process – Single distance learning unit

*(LT = learning Technologist, UL = Unit Leader, C = Academic Contributor, Ad = Administrator, eD = eLearning Developer, eR = eLearning Reviewer)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Who?</th>
<th>#Days</th>
<th>#eL Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Kick-off Meeting</td>
<td>LT / UL / C</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>1b Assist Design</td>
<td>LT / C</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>1c Spec Multimedia</td>
<td>LT / C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2 Create Unit in B/board</td>
<td>Ad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Deliver Structure</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Deliver Content</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Deliver Activities</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Review Material</td>
<td>eD</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7 Rework Material</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Build Wks 1-4 v0.1</td>
<td>eD</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>8b Create Multimedia 1-4</td>
<td>eD</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>9 QA Review 1-4</td>
<td>eR</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>10 Ac Review 1-4</td>
<td>C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11 Build Wks 1-4 v0.2</td>
<td>eD</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>12 Build Wks 5-8 v0.1</td>
<td>eD</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>12b Create Multimedia 5-8</td>
<td>eD</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>13 QA Review 5-8</td>
<td>eR</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>14 Ac Review 1-4</td>
<td>C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15 Build Wks 5-8 v0.2</td>
<td>eD</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>16 Build Wks 9-12 v0.1</td>
<td>eD</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16b Create Multimedia 9-12</td>
<td>eD</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>17 QA Review 9-12</td>
<td>eR</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>18 Ac Review 9-12</td>
<td>C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>19 Build Wks 9-12 v0.2</td>
<td>eD</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>20 Identify eTutors</td>
<td>LT / UL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 e-Tutor training</td>
<td>LT / T</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>22 QA Review (full)</td>
<td>eR</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>23 Ac Review (full)</td>
<td>UL / C</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>24 e-Tutor Review</td>
<td>T</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>25 Build/Deploy Unit v1.0</td>
<td>eD</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Total E2E Development Time (days): **85**

eLearning Team Development Time required (days): **70**

eL Time to develop full distance learning MSc (8 units): **560**

Assuming 90% Utilisation: **622**

Working days/ year – Holidays (incl BH) = 215

~ 3 years
The project management and academic liaison aspects of eLearning development require one eLT at Grade 6 but remaining developers could be Grade 5 eLearning Support Officers.

**Sustainability: Maintenance - Support & Continual Improvement (Upgrades)**

Assuming typical industry standard of changes/updates to 5% of content and/or structure:

<table>
<thead>
<tr>
<th>Support</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Unit = 12 x Topics</td>
<td></td>
</tr>
<tr>
<td>1 Topic (~30 screens)</td>
<td>30</td>
</tr>
<tr>
<td>Additional (discussions, quizzes etc.)</td>
<td>4</td>
</tr>
<tr>
<td>Total equiv screens/unit:</td>
<td>408</td>
</tr>
<tr>
<td>Maintenance at 5%:</td>
<td>20</td>
</tr>
<tr>
<td>Maintenance required (8 Units):</td>
<td>160</td>
</tr>
<tr>
<td>Workrate (full screens/day):</td>
<td>8</td>
</tr>
<tr>
<td>Maintenance days required:</td>
<td>20 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upgrades</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce 2 new elements per unit (x8 units) – video, animation etc.</td>
<td>16</td>
</tr>
<tr>
<td>Developer days / new element</td>
<td>3</td>
</tr>
<tr>
<td>Upgrade days required:</td>
<td>48 days</td>
</tr>
</tbody>
</table>

Total Maintenance/Support required for one DL MSc 68 days (~30% FTE)
Appendix 3: 5D Checklist

Define

- Identify Stakeholders – contact as appropriate
- Definition/allocation of roles and responsibilities
  - Recruit project staff as required
- Conduct market research and create business plan
- Scoping and requirements definition
  - Course Structure
  - Teaching & assessment model
  - Student contact
- Determination of resource availability and limitations (including deadlines)
- Set up of communications plan to include regular progress review meetings
- Planning and milestone setting
- Risk analysis and mitigation plan

*Key Deliverables:* Scope definition, risk analysis and initial project/comms plans.

Design

- Establish learning objectives
- Establish unit/topic structures
- Prioritise key concepts/activities
- Identify critical activities
  - Formative feedback
  - Virtual labs
  - Collaborative activities
- Identify/create design guide and templates
- Create storyboards or prototypes as appropriate
- Identify/purchase specialists and/or development tools required
- Revise initial plan and risk analysis as appropriate

*Key Deliverables:* Storyboards and/or prototypes for review.

Develop

- Build online content in line with design and templates
  - Create and test activities
  - Create online assessments
  - Co-ordinate specialist resources and integrate into material
  - Identify and test collaboration tools
- Identify tutoring requirements and produce guidance
• Identify ongoing maintenance and support requirements

**Key Deliverables:** *Online course materials*

**Deploy**

• Set up space on VLE  
• Register staff and students to appropriate roles  
• Install course materials on VLE  
• Provide training for teaching staff as appropriate  
• Recruit and train e-tutors if required  
• Handover support to EPS core team  
• Marketing of developed course

**Key Deliverables:** *Deployed course*

**Deliver**

• Participate in online discussions / web conferences  
• Mark assignments and provide feedback (written or podcast)  
• Ongoing support and maintenance

**Key Deliverables:** *Taught course*