

1. UNDERSTANDING ENQUIRY-BASED LEARNING

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INTRODUCTION

The emphasis of this handbook is on the practical implementation of enquiry and Problem-based Learning initiatives, informed by research and best national and international practice. This first chapter draws on the authors' existing 'Guide to Curriculum Design: Enquiry-based Learning,' (URL listed in references section) a guide to stimulate thinking and promote good practice in Enquiry-based Learning (EBL) curriculum design.

We would like to add that this chapter will also be informed by tutors' case-studies as well as the student voice, and to this end each practical and theoretical aspect will be complemented wherever possible by the tutor and student perspectives in order to provide a full and realistic picture of the processes, barriers, challenges and benefits of Enquiry-based Learning. All quotations are from students and are taken from:

- 'End of course' evaluation forms
- Focus groups
- Student feedback
- Observation

They are responses of students new to EBL at the University of Manchester. As a result of its outstanding track record in Enquiry-based Learning, the University of Manchester was recently designated by the Higher Education Funding Council for England (HEFCE) as a Centre for Excellence and will thus act as a future resource for the dissemination and promotion of EBL as well as offering support for related initiatives across the UK higher education sector and beyond.

What is Enquiry-based Learning?

Enquiry-based Learning (EBL) is used here as a broad umbrella term to describe approaches to learning that are driven by a process of enquiry. The tutor establishes the task and supports or facilitates the process, but the students pursue their own lines of enquiry, draw on their existing knowledge and identify the consequent learning needs. They seek evidence to support their ideas and take responsibility for analysing and presenting this appropriately, either as part of a group or as an individual supported by others. They are thus engaged as *partners* in the learning process:

...it promotes personal research...the student becomes more familiar with the multifarious resources at their disposal, such as e-journals and databases. There is the opportunity to support one another in research and explore different avenues of information. The whole experience becomes one of interchange where students share opinions, research and experience in order to achieve an end result.

EBL stimulates students to follow up interesting lines of enquiry and supports them in concentrating their efforts where they need to undertake further work. EBL is usually organised

around collaborative work in small groups or with structured support from others, thus promoting the social interaction and cohesion that can be difficult to achieve in a mass system.

I believe that PBL classes play an important part in promoting student interaction and debate. As the group gets together, friendships develop and students get to know one another better. Not only have we been able to provide academic support to each other, we have begun to socialise outside the classroom.

As a student who lives at home, who belongs to such a large department, on such a non-practical course, it has been quite lonely. Making friends has been a challenge. The opportunity to work in small groups from year to year would have been ideal for me.

Research into EBL suggests that it can improve the student experience, with enhanced recruitment, satisfaction and retention. However, it should be mentioned that students and staff need to be supported when making transitions in adopting or adapting to new approaches to teaching, learning and assessment, especially with the more open-ended approaches involved in EBL.

Characteristics of Enquiry-based Learning

We can summarise some of the characteristics of EBL as follows:

- Engagement with a complex problem or scenario, that is sufficiently open-ended to allow a variety of responses or solutions
- Students direct the lines of enquiry and the methods employed
- The enquiry requires students to draw on existing knowledge and identify their required learning needs
- Tasks stimulate curiosity in the students, encouraging them to actively explore and seek out new evidence
- Responsibility falls to the student for analysing and presenting that evidence in appropriate ways and in support of their own response to the problem

EBL offers flexibility to develop a range of abilities, including those required for lifelong learning:

- The modern economy places a premium on the ability to create knowledge; open enquiries allow the development of this skill and other key transferable skills
- Leadership skills in managing complex enquiries and projects are particularly important in employment
- The focus on enquiry helps in synthesising learning, which can be an issue in modular and inter-disciplinary programmes; enquiries typically cross 'boundaries'

EBL addresses some of the major contemporary issues in higher education as the following figure illustrates.

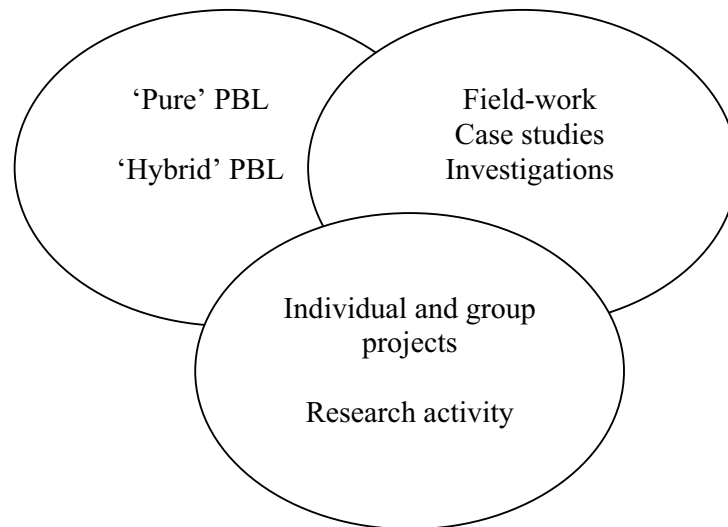
Figure 1: The match between selected current issues in higher education and Enquiry-based Learning

Contemporary issues in higher education		Advantages of EBL
Issues around goals for student learning	<i>Employability and the development of skills and personal qualities</i>	Allows the development of a wide range of abilities: knowledge-creation; team-working; presentation; information literacy; ICT; problem-solving; creativity; project management
	<i>Gaps in students' knowledge, given variation in prior experiences</i>	Incorporates a method by which students can identify and fill gaps in their knowledge base
	<i>Disparity between theory and practice</i>	Allows theory to be explored within realistic contexts
	<i>Fragmented learning on modular programmes</i>	Enquiries involve integration of knowledge
Issues around the learning process	<i>Traditional passive/transmission approaches foster surface learning</i>	Typically involves a deep approach to learning; students make their own connections between ideas
	<i>Divergence between research and teaching</i>	Draws on staff research interests and skills, and on the research infrastructure
	<i>Mass higher education can lead to a sense of anonymity and social isolation</i>	Enquiries conducted in small groups and supported by a facilitator foster peer relationships and relationships with staff
	<i>Poor student motivation</i>	Scope for students to choose the topic and lines of enquiry; open nature of an enquiry ensures learning is more realistic and relevant and peer interactions foster engagement
	<i>Diversity of learner needs</i>	Students able to work at their own pace and in their own way on issues of interest
	<i>Awareness of the need for sensitivity in teaching methods to the subject and the institutional context</i>	Scope to adapt the broad approach to a range of scales and using a variety of resources
	<i>Competitive approaches to learning seen as less appropriate in professional contexts</i>	Enquiries allow for both individual work on sub-tasks and common work on an overall task

Approaches to learning covered by Enquiry-based Learning

In defining the territory of EBL there is evident overlap with **Problem-based Learning (PBL)**, in which the handling of a problem defines and drives the whole learning experience of the students. Students are then challenged, within the context of a small group, to define for themselves what further knowledge they require in order to address these issues, and then undertake the research they have identified as requisite and to apply that research towards the presentation of outcomes. The curriculum is thus structured by a series of problems, rather than, for example, a systematic presentation of subject content. EBL, while incorporating elements of PBL, also covers a broader spectrum of approaches. Defining PBL is discussed in chapter 2 of this handbook.

Figure 2: Approaches to learning covered by the term Enquiry-based Learning (EBL)



There is clearly significant overlap between these various approaches to EBL. Indeed, the synergy that results from this overlap is one of the main advantages of grouping these approaches to learning under the same umbrella term of EBL. Take, for instance, the example of **Problem-based Learning** (PBL). The effectiveness of PBL within such domains as medical education and nursing is now well established as indicated for instance within the meta-review by Albanese and Mitchell (1993). However, consideration of the underpinning ethos of PBL, as afforded by the focus on enquiry, facilitates its adaptation to a wider range of contexts. Curricula where there is PBL and substantial traditional lectures are referred to as “hybrid PBL.”

Small-scale investigations allow particular scope for adaptation to disciplinary contexts, and can be employed at a range of scales (from individual modules to entire programmes). Field-work, for instance within geology or geography, provides evident scope for a series of small-scale investigations, conducted within a limited period of time. Case-studies also provide scope for open-ended enquiry, as occurs in business studies with scenarios drawn from real life, and with students taking on the role of consultants. These are well-established uses of small-scale investigations that are closely tailored to the nature of the discipline.

However, one might imagine a wider range of enquiries that one could pursue within different disciplines. In particular, enquiries may be framed so that students engage with a specific set of resources, as is evident in Case Study 1 below. Within Problem-based Learning, for instance, significant time is often involved in the search for relevant resources. If a sufficient set of relevant resources has already been collated, then the time for searching will be reduced. Of course, information-searching skills are important, but the course unit may not wish to highlight these. It may be more appropriate to wait for extended pieces of work to allow these skills to develop.

Higher education, meanwhile, has traditionally asked students to engage in large-scale **project work or research activity**. One might think of product-design projects in engineering, film production in media studies or research projects within the social sciences. The focus of

learning is often on the ability to carry out an extended piece of project-work, producing a project report or a dissertation.

By contrast, EBL advocates a wider use of project work or research activity, emphasising the use of project-work to master a given body of knowledge itself, and not simply to make connections within an existing body of knowledge. Toohey (1999) indicates that this kind of approach is a key factor that distinguishes an enquiry-based approach from a more traditional use of projects. This would suggest the use of project work, perhaps of a smaller scale, at earlier stages within the degree programme.

Case-study 1: Making a bail application (adapted from Feld and Brogan, 2004)

Feld and Brogan introduced EBL into a final-year course unit in criminal procedure and evidence on the LLB programme at the University of Western Sydney Law School. Their initial intention was to address the concern that theoretical issues had been marginalised in the existing curriculum.

The enquiry that formed the basis for an element of the course unit was a bail application. The intended learning outcomes related to the students' ability to understand relevant legislation, case law, theoretical principles and procedural rules, and (more explicitly addressing a link between theory and practice) to be able to apply this understanding in a specific situation.

In order to achieve these outcomes, they modified the 8-step PBL (ParaBLE) model developed at the University of Manchester (see the List of Further Resources below). Modifications were necessary partly because only a limited amount of time was available for the whole investigation, only a single day in fact. In addition, they presented students with a package of reading materials, rather than expecting students to locate their own information. This package of materials included a range of practical and theoretical material, which was largely, but not entirely, relevant to the bail application. The day concluded with a written examination lasting one hour, drafting a formal bail application. The modified 8-step process they followed may be outlined as follows:

- Initial discussion (reading the problem in groups of no larger than four for 30 minutes, with clarification of any unknown terms)
- Definition of problem (15 minutes)
- Brainstorming and discussion of solutions (15 minutes each)
- Generating list of questions and resources to consult (15 minutes)
- Lecture, followed by private study (lasting 2 hours)
- Pooling discussion (30 minutes)

EBL represents a shift away from more passive methods, which involve the transmission of knowledge to students to more facilitative teaching methods through which students are expected to construct their own knowledge and understandings by engaging in supported processes of enquiry, often carried out in small groups. EBL is thus situated within the broader tradition of student-centred learning (Dewey, 1938). One student remarked that:

You go out of PBL with your head buzzing, rather than feeling you've just passively sat there. You can't be passive, you have to be active and committed on this course.

SUPPORT FOR ENQUIRY-BASED LEARNING

In many ways, the challenge is to find effective ways to support students within this process so that the enquiry is able to yield effective outcomes. It is not enough to ask students to complete a finished product; the process needs to be supportive, as Edelson (1999) recognises. Edelson highlights the need to address student motivation, accessibility of the tasks, level of background knowledge, ability to manage an enquiry and the resource constraints. In this, it is worth observing that the learning will primarily occur within parameters set by the tutor, even if it remains the students who determine how to proceed within these confines. The tutor will broadly determine such factors as the time available, the nature of any interactions with peers

and access to resources. In addition, the person facilitating the enquiry may find that they need to intervene to ensure that it remains relevant. It is therefore worth offering some observations as to how the tutor may establish an appropriate environment for learning.

Introducing EBL

Given that this approach to learning differs from more traditional approaches, the way in which students are equipped to take on the challenges of EBL can be a crucial factor to its success:

- It may help to run a session in which students are introduced to the process and allowed to 'have a go'
- Experienced students might be willing to model the process
- Students can be provided with written or web-based information, guidelines or reference material on EBL
- If using student groups, allow time for them to 'gel'
- Explain the role of the facilitator

The course is highly supported. Safety nets are in place for us – we can try it [EBL] beforehand, we do a practice problem at the start.

The way we were introduced to EBL wasn't in any way intimidating. We had a practice problem to allow us to make our mistakes....

A clear, but open, starting point

The starting point for an enquiry must be clearly stated, but sufficiently open to provide the basis for the enquiry; an open-ended task is central to the activity. This provides the freedom that is essential for any enquiry to take place. In general, the starting point and stimulus for learning can be an intriguing problem, an interesting case-study or a 'real-life' project.

Case Study 2 – Literary Studies (Hutchings and O'Rourke)

As a self-directed approach to learning that prioritises co-operative learning and group management of tasks as a key vehicle of delivery, EBL seems ideally suited to a discipline such as Literary Studies that works so much through discussion and debate, with a relative lack of clear target responses to questions. A literary text seldom, if ever, has a single issue or problem as its concern, even when a critic or author claims that it does. There will always be a diversity of potential response generated among diverse readers.

Literary Studies involves:

- Exploratory research into the nature and constitution of texts, their reception within the time of their creation and their reception through time, their language, style, meaning, intention and interpretation(s)
- A recognition that the interpretive context within which the act of criticism takes place may be historical, contextual, philosophical, linguistic, semiotic, etc.
- Above all the **active**, creative engagement of the reader to meet the creative power of the literature

The traditional form of literary studies teaching in higher education has been tutor-centred. However open-minded the tutor, the resultant pedagogy operates according to a model in which the approach to the topic, the parameters of discussion, and the questions to be addressed lie within the control of the tutor rather than the student. Of course it is possible to forge exciting and productive learning situations using this procedure, and there are occasions when a tutor can provide inspiration that illuminates. We can and do learn from each other, but how much more learning could take place if the number of sources of learning could be increased and if creative interplay between the individual response and collective discussion could take place? The purpose of an EBL model is to facilitate such a process by setting up a situation to release **active** and co-operative learning.

If we want to encourage students to become **actively** involved in the process of literary scholarship, what if we gather a student group together and instead of giving them a specific poem to read, a bibliography of critical essays, and an essay title we present them with the following:

The English Tourist Board (ETB) is initiating a campaign to attract people back into the countryside after a serious outbreak of foot and mouth disease. As part of this campaign, it is sponsoring an exhibition documenting visitors' responses to the English countryside through the ages. The exhibition is to be called 'The Eye of the Beholder: Landscape Description.' The booklet will present representative examples of landscape description from the three centuries, together with commentary and notes. The booklet will be aimed at a wide public, but is intended to be scholarly and informed.

The ETB invites applicants for the post of compiler of the booklet to submit a specimen example(s) from the eighteenth century. Submissions should be within the range 2250-2750 words, including texts.

Resources to support EBL

All forms of EBL can utilise a variety of existing resources, appropriately timed to support students in their enquiries. These can include specific time-tabled sessions, such as interactive lectures and seminars, workshops, laboratories, fieldwork, resource sessions and peer assisted study schemes. However, resources that can be accessed more flexibly are also relevant, such as those that are held in a library or available via the internet or by using other technology.

All of us hold a key to loads of information. We are all sources of information as much as the bookshelves and the tutor.

Peer-support

EBL is ideally suited to collaborative student team-working. Operating co-operatively in small groups, with the sensitive guidance of a tutor/facilitator, students learn to take responsibility for specific lines of enquiry to facilitate the scope of research. Clearly, however, the extent to which the tutor facilitates the enquiry and the size of the groups can be varied according to the specific circumstances. In Case Study 3 below, for instance, the support is largely provided by a partner, with the tutors only providing direct facilitation when requested. The presence in the group of a number of students will generate a diversity of potential responses to the material and a range of perspectives. The students will usually make decisions about what to include and how the findings will be presented, thus, in arriving at some point of closure, choice and creativity are within their ownership.

Case Study 3: Learning a language through enquiries carried out in pairs (adapted from Morley and Truscott, 2004)

In order to exploit the benefits of language learning in pairs (involving native speakers of two different languages) Morley and Truscott organised their two-semester course unit at the University of Manchester around a set of research tasks. Previously they had made use of more routine tasks, but after the course unit had operated for two years, the tutors found that the initial enthusiasm of the students had not been sustained over the second semester.

Each pair of students was asked to choose one research-based task from a set of four: a discourse analysis project; a translation project; a newspaper study and a journal survey, with support for the enquiry largely coming from the peer, who is a native speaker of the language that their partner is seeking to learn. Features of this EBL project were:

- Tasks designed so that students rely on their partner as a language resource and as a collaborator in the research process
- Interaction with the partner was supported through an agreed schedule of work
- A series of workshops and online discussion forums employing WebCT was introduced
- Additional support was also available from the tutors

The assessment of the course unit was in the form of a short report, completed with the partner's assistance. Students were required to complete a first draft of the report with corrections added by the partner. The report also included a piece of reflective writing, to enable the student to review their learning.

Facilitation and Tutoring

EBL processes pivot around functional group dynamics and the fostering of an appropriate environment in which co-operative learning can take place. But it would be unrealistic to expect that students will never wander from the main thrust of an open-ended enquiry; and so sensitive facilitation is important. Otherwise, as Crabtree (2004) notes, students may find the tension resulting from the open-ended nature of the experience too challenging. One student said:

There were instances when we needed a second, academic, opinion. We would ask for the help of our tutor...who was there to advise us...and to point us in the right direction if our focus began to wander.

In setting students off on a path of independent enquiry, the most unsettling experiences for a tutor can be the change in role. The shift from content expert to facilitator may require as much, if not more, preparation as given to the students.

When both students and tutor are adjusting to EBL methods together, there may be an initial period of 'learning to do it' where the facilitator needs to take a more active role in the process until an appropriate level of trust has been achieved. The balance appears to be a delicate one; too much tutor intervention and the EBL process is stifled, too little facilitation and the students may feel anxious or unsupported.

Facilitation techniques and processes are discussed in more detail in Part 3 of this handbook.

ASSESSMENT OF ENQUIRY-BASED LEARNING

A further means to support student learning occurs through assessment; indeed assessment drives the learning experience, especially when the large majority of learning occurs outside of the classroom, as Gibbs (1999) notes; a situation typical of EBL. Assessment should thus facilitate the conduct of the enquiry, and also align with the achievement of the desired learning, as Biggs (1999) has emphasised. We must evidently ensure that the assessment does indeed align with an enquiry, and with the range of abilities that are being developed. Given the wide range of learning outcomes that are usually advanced during EBL, a range of assessment methods will usually be desirable, matching the complex open-ended nature of an enquiry.

You learn to rely on your own resources more. For the exam, my way of working was completely different from ever before...I went away and found the readings and stuff...and I was taking it in because I was interested in it and I wasn't just reading it for the exam.

The content from this course really has stuck in long term. A lot of the courses you can do very little all year and then cram for two weeks. In this course, because it was course work and problem-based, you had to plan and so you learnt so much and it was work you wanted to do because you chose to do it.

Evidence for assessment ideally should be generated as a natural product of the enquiry, rather than as a separate exercise. However, an enquiry will lead to one or more outputs, and these too should form part of the assessment. Indeed, the nature of the products that are required from the process will significantly influence the learning that occurs during the process, as is evident in Case Study 4 below.

Case-study 4: Biological Sciences (adapted from Gunn and Raine, 2004)

Enquiry-based Learning formed the basis for a development in two separate undergraduate modules: a first year module in human physiology and a third year module in parasitology at Liverpool John Moores University. In each case the students were divided into small groups and asked to choose a specific problem (each problem being stated in an open-ended fashion within one or two sentences) from a given list of 20. These problems addressed issues that had not been covered within the lecture-based element of the modules. The students were then required to give a group presentation on the topic.

In order to support this process, students were provided with a range of feedback, including comments from a tutor at the end of a group session opportunity for individual feedback, and an analysis of students' peer assessment.

Regular and comprehensive feedback from the facilitator and from peers...feedback was very specific, broken down and not just general.

We did a reflection on our last presentation and we were absolutely astounded at how much we had learned, about the problem and about group skills.

It is worth noting that the assessment criteria will need to closely reflect the nature of the enquiry, as well as the characteristics of the specific method of assessment. In particular, the criteria will need to allow for the full range of lines of enquiry that support the achievement of the intended learning outcomes.

Assessment is covered in greater depth in section 4, of this handbook.

CONCLUSION

This introduction has outlined how learning that is driven by a process of enquiry can help to address current concerns and needs for student learning. The flexibility of the method allows for the development of a wide range of student abilities. It must be recognised, of course, that adopting EBL will usually involve a significant adjustment for teachers and students. The flexibility of the method and adaptability to different disciplinary contexts, however, offers evident scope to effect the transition. Subsequent chapters in this book will expand on these issues and more.

Finally, in the true spirit of EBL, we must of course encourage the student voice...

I did feel I was at university...there's a collegiate feeling within the course. It's good that we are encouraged to learn for ourselves, that's what life is like. Makes a change from being spoon-fed information – better to form your own opinions...

ACKNOWLEDGEMENTS:

This chapter is based on a guide that was commissioned by the LTSN Imaginative Curriculum Project and its reproduction is with the permission of the Higher Education Academy. The electronic version of the guide can be found at <http://www.heacademy.ac.uk/1646.htm>.

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Further Resources:

Centre for Excellence in Teaching and Learning: Enquiry-based Learning

The University of Manchester

www.manchester.ac.uk/cefl

Learning based on the process of enquiry

www.intranet.man.ac.uk/rsd/ci/eb/

Resources developed during the LTSN Generic Centre funded programme of staff development on EBL that helps to underpin this curriculum guide. (Includes case study material.)

Learning based on the process of enquiry: conference proceedings

www.intranet.man.ac.uk/rsd/ci/eb/cproceed.pdf

Proceedings of the conference that completed the above staff development programme on EBL, including further case study material.

'Guide to Curriculum Design: Enquiry-based Learning'

www.heacademy.ac.uk/resources.asp?process=full_records§ion=generic&id=359

A guide to stimulate thinking and promote good practice in EBL curriculum design, with an accompanying 'Guide for Busy Academics'

A 'How-to-do it' guide to Problem-based Learning for students and tutors

www.parable.man.ac.uk/

A guide to Problem-based Learning in 8-steps, developed at the University of Manchester.