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Citation: Sylvester, Cath (2015) More questions than answers? A review of the effectiveness of inquiry based learning in higher education. The Journal of Commonwealth Law and Legal Education, 10 (1). pp. 21-29. ISSN 1476-0401

Published by: The Open University School of Law

URL: http://www.open.ac.uk/law/main/sites/www.open.ac.u... <http://www.open.ac.uk/law/main/sites/www.open.ac.uk.law.main/files/files/ecms/web-content/Article%20More%20Questions%20than%20Answers%20A%20Review%20of%20the%20Effectiveness%20of%20Inquiry%20Based%20Learning%20in%20Higher%20Education.pdf>

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MORE QUESTIONS THAN ANSWERS? A REVIEW OF THE EFFECTIVENESS OF INQUIRY BASED LEARNING IN HIGHER EDUCATION

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The move towards a constructivist approach to learning in Higher Education has led to an increase in the use of inquiry -based learning in law and other disciplines. This article considers the theory behind the method and the key elements of inquiry-based learning. It reviews research in medical education into its effectiveness and considers the implications of this for its development in law. It argues that the development of inquiry-based learning in law will require a greater focus on the learning environment and its context within the curriculum and identifies issues likely to impact on the effectiveness of the method.

Inquiry-based learning (IBL) has been a part of higher education for many years but was widely adopted in medical education in the 1980s. Initially heralded as a panacea for professional education, with its ability to convey both discipline knowledge and professional skills, it was subjected to closer scrutiny in the early 1990s and challenges were made to its effectiveness and its educational theory. Nevertheless inquiry -based learning in a range of forms has persisted across a wide range of disciplines, often generating a committed following amongst staff and students.

As the concept of discipline knowledge becomes harder to tie down and the explosion in accessible information regularly overwhelms and confounds students, IBL has emerged as a method for teaching students how to apply and evaluate information, to solve new problems and develop the intellectual agility required for modern professional life. Increasingly these skills are being recognised by universities as essential outcomes for undergraduate education by incorporating them in specified graduate attributes. For example, since 2015 Northumbria University's graduate attributes include a statement that Northumbria graduates will be able to 'utilise their knowledge through critical analysis to create new knowledge and/or innovative practise'. In law this approach is particularly relevant because the practice of law necessitates the ability to find information and then to apply it to problems or new circumstances, it is inherently 'problem based'. However, the existence of a problem does not define the IBL method. As Bowe states 'it is important to have a clear distinction between learning via problem solving and problem based learning' (Bowe, 2004: 172).

The term IBL is an umbrella term for a number of different IBL learning environments all of which adopt a constructivist approach to learning. Constructivism explains how students learn and achieve deep learning and is a prevailing theory in all aspects of education. As Konings observes, 'in the current view on learning, constructivism has a central position' (Konings, 2005: 646). Constructivism originates in the theories of Dewey (1933) and Piaget (1950). It is a method which requires students 'to process information actively and construct the knowledge through experience' (Konings, 2005: 646) this is achieved by drawing on pre-existing knowledge and cognitive structures or schema. The key aspect of the methodology is that students are active in creating and 'building their knowledge in terms of what they already understand' (Biggs,2011: 22) rather than as passive recipients of knowledge. Biggs refers to this as a conceptual change 'The acquisition of information in itself does not bring about such a change, but the way we structure the information and think with it does. Thus education is about conceptual change not just the acquisition of information' (Biggs, 2011:23).

How does this translate into what happens in the IBL classroom? In simple terms the problem comes first. There is no preparatory lecture programme or reading list which students can review to find the answer. Knowledge and gaps in knowledge are identified by the students drawing on their existing understanding to identify areas for research. Research findings are then consolidated and applied to the problem. Throughout this process the tutor's role is to facilitate the process and not to provide an 'answer' before students have actively sought it for themselves. Spronken –Smith identifies the common elements agreed on as essential to IBL as follows;

- 'Learning is stimulated by enquiry and driven by questions or problems
- Learning is based on a process of constructing knowledge and new understanding
- It is an active approach to learning involving learning by doing
- It is a student-centred approach to teaching in which the role of the teacher is to act as facilitator and
- It is a move to self-directed learning with students taking increasing responsibility for their learning.' (Spronken-Smith R and Walker R, 2010: 726)

Initially IBL was predominantly adopted in medical education. The method brought together the development of medical discipline knowledge and the practical reality that patients rarely present with text book problems. In addition the problems generated in medical practice and the setting of the medical school in teaching hospitals lent itself to this

approach. Through the work of Tamblyn and Barrows (1986) at McMasters University (Canada), medical schools adopted a highly structured form of IBL referred to as problem based learning (PBL). McMasters eight step approach guided students through the process of analysing the problem and setting learning goals to applying their findings. This was later refined by Maastricht University (Netherlands) which adopted an innovative problem based approach for all its programmes (including its newly formed law programme in 1981). The Maastricht 'seven jump' approach is as follows:

1. Clarifying terms and concepts
2. Formulation of the problem statement
3. Brainstorm
4. Categorise and structuring brainstorm outcomes
5. Formulation of common learning objectives
6. Self study
7. Post discussion, reporting back and reaching common conclusions

(Maurer et al, 2012)

Some variation of these steps remain central to PBL. Whilst the existence of the undefined and unstructured question is at the heart of both medical and legal practice, PBL was slower to be adopted in law schools. This may have been because most legal education and training schemes separate the academic study of law from the development of practical skills required by lawyers and PBL was, at this stage, aligned with practical skills.

PBL is a highly structured form of IBL and in medical education was frequently used to deliver the entire curriculum with problems carefully constructed to ensure coverage. However, many IBL courses are delivered as free standing modules within the curriculum or even within a module for example through project based learning, case based learning or the use of so-called wicked questions (questions that have no pre-determined answer- similar to a research question). IBL may be used to generate new knowledge with clear links to research or as a method of building discipline knowledge. Levy and Petrulis have adopted a classification for IBL which distinguishes between 'inquiry for learning' (an information frame) and enquiry for knowledge building' (a discovery frame) (Levy and Petrulis, 2012).

Despite its parallels with medical education, IBL in law has had limited impact. Most commonly it takes place in law clinics where students advise and represent clients in real legal cases under the supervision of qualified supervisors. At Northumbria University, year 4 students are required to take a compulsory clinic module in the University's Student Law Office in which they experience legal problems presented by real clients. Students work in small groups of six. At weekly meetings they discuss their cases in their Student Law Office

'firm' and identify key issues and the impact of their research findings on the progress of the case. The process is inherently inquiry- based because students cannot know the precise nature of their client's problem prior to taking instructions. In addition the problems are unlikely to be on subject areas or involve procedures covered in prior studies and students must construct their understanding drawing on their prior studies and research capabilities. Broadly described as 'clinical legal education', there is no defining clinical method beyond a requirement that students learn by doing. The focus in the clinical setting is on the client and the requirements of the case and the approach to IBL has to adapt to the professional demands of the case. For this reason the PBL methodology was not widely adopted in clinic.

Outside of the law clinic, IBL has not been widely adopted in the law curriculum and is typically used in modules where staff have an interest in this form of teaching or as inherent part of an open ended research project. Delivery of the full law curriculum through IBL is rare, although York University in the UK have adopted PBL as a method for delivering its core law curriculum. At Northumbria we turned to PBL when devising a preparatory programme for the capstone Student Law Office programme and staff engaged in this module have adopted the method in some of their own modules. However this does not reflect the prominence of constructivism in current educational theory and is a long way from Biggs vision of teaching in higher education as 'a construction site on which students build on what they already know" (Biggs and Tang, 2011: 67).

In a review of the educational objectives of IBL, Adimoto et al (2013) considered the claims made for IBL in higher education across a number of different disciplines. These included skills associated with deep learning around the use and construction of knowledge such as the development of meta-cognitive knowledge, improved skills of problem solving and critical thinking, improved research skills and exposure to the creation of new knowledge. Adimoto identified claims arising from the active nature of the process including the development of a spirit of enquiry, fostering a love of learning and self-regulated and lifelong learning skills which impact on student satisfaction and the student experience. Finally IBL with its typically small group delivery, has been credited with developing transferable skills such as communication, collaboration and leadership skills.

These attributes were mirrored in Dr Sabine Little's 2010 report for the Centre for Inquiry-based Learning in the Arts and Social Sciences at the University of Sheffield. The report considered nine inquiry based projects in a range of disciplines including law. The reasons given for adopting an IBL approach included a view that IBL reflected the way those

disciplines worked (in architecture and sociology), in other subjects IBL was introduced to 'expand existing excellence', create 'more challenging learning environments', 'to teach by example and to excite or stimulate the students' and to 'embed smaller scale group work'. In addition it was believed to 'encourage an interdisciplinary approach and provide a unifying pedagogic approach' (Little, 2010: 7). Interestingly these comments appear to view the method as adding an extra dimension to learning, there is no reference to it as way of establishing core discipline knowledge or the basic building blocks of the discipline.

The limited development of IBL in law may be a result of a number of different factors, but there is no doubt that the process has resource implications for providers both in terms of increasing contact time to facilitate this type of learning but also in terms of requiring staff to learn a different role as facilitator in the classroom. This is particularly evident in law where the traditional lecture/seminar approach has proved cost effective. Accommodating IBL within the law curriculum has substantial redesign and costs implications and as Albanese and Mitchell (1993: 62) observed 'Stated bluntly, if problem based learning is simply another route to achieving the same product, why bother with the expense and effort of undertaking a painful curriculum revision?' Quite apart from the resource problem, other concerns remain. As in medicine, there is a belief that law requires students to build a comprehensive body of discipline knowledge before they can apply it effectively in less structured learning environments. Colliver expressed this as the concern that students will acquire a 'fragmented conceptualisation (learning isolated case –specific facts)' (Colliver, 2003) knowledge of the discipline. There is of course a degree of comfort for both staff and students in the lecture format. However, Biggs observes 'the problem is that both teacher and student see the lecture as a matter of teacher performance, not of learner performance' (Biggs, 2011: 138). These concerns with the structure and coverage of discipline knowledge are persistent. In legal education, where the problem question is central to legal education and the essence of legal method involves applying and evaluating knowledge to construct arguments, many would say that active learning, albeit heavily scaffolded and guided, already takes place.

These issues were explored in research on PBL in medical education. In 2000 Colliver reviewed three reports on PBL in medical education produced in 1993 and a further eight studies. From further analysis of the data in the studies he found that the size of effects on learning when a PBL curriculum had been introduced were relatively low. Colliver concluded that there 'is very little evidence for the practical effectiveness of PBL in fostering the acquisition of basic knowledge and clinical skills'(Colliver,2000: 264) and that PBL 'may provide a more challenging, motivating and enjoyable approach to medical education but its educational effectiveness compared with conventional methods remains to be seen.' (Colliver, 2000: 266). There were also concerns regarding the underlying educational theory behind PBL by psychologists who argued that the minimal instruction approach 'ignored

the structures that constitute human cognitive architecture' and evidence from empirical studies about working memory and long term memory (Kirschner et al, 2006).

It is worth noting that much of the research on PBL in medical education measured the effect of the PBL curriculum by comparing marks of students engaged in a PBL curriculum and those engaged in a non-PBL curriculum. In doing so, as Norman pointed out, the PBL intervention became so 'distant from the learning setting any predicted effects would be disturbed by myriad of unexplained variables'. Whilst he disputed Colliver's conclusions on effect size, Norman conceded that early claims for PBL as a method of developing knowledge had 'been overstated' (Norman, 2000:721). This was also the conclusion of Albenese and Mitchell's meta-analysis in 1993 which concluded that students on PBL curriculums found them to be nurturing and enjoyable. They also performed well and sometimes better on clinical evaluations than students from conventional teaching however they scored lower on basic science examinations and felt themselves to be less well prepared. In the same year Vernon and Blake (1993) found PBL to be slightly superior with respect to students' attitudes and opinions to their programmes. However they found scores relating to clinical and factual performance no different to conventional teaching.

In more a recent meta-analysis of PBL (Dochy et al, 2003) which considered 43 studies the findings were more encouraging. They found PBL students were better at applying knowledge, and that the slightly negative effect on knowledge acquisition disappeared when focussing exclusively on randomised research, although the negative effect was bigger the more PBL was used. They concluded that 'on all levels there is a strong positive effect of PBL on the skills of students" and "the positive effect of PBL on the skills (knowledge application of students seems to be immediate and lasting" (Dochy et al, 2003: 548). Students' remembered what they had learnt through PBL for longer.

This was echoed to some extent by Schmidt's study in 2011 which adopted a micro-analytical measurement approach to PBL. Schmidt used multiple testing at different stages of the PBL process and found that student's situational interest was more constant in the PBL process than in conventional process and that it was the situational interest that drove the learning. (Schmidt et al, 2011).

Nevertheless despite the research findings the growth and interest in IBL has persisted. This may well be a result of the shift in focus away from the results in examinations acquired by students in PBL programmes to a focus on the use and ability to apply knowledge to address new problems. This impact of PBL on application of knowledge was confirmed by Dochy et al (2003). What emerges from the studies and is confirmed by the persistence of IBL in higher education is that IBL does have particular strengths which are important to an

undergraduate education on a number of different levels even though it may not be the most effective way of preparing students for assessments testing declarative knowledge.

In the light of these findings, the place and function of IBL in the curriculum is more nuanced. As with any course, an IBL module will require learning outcomes which are determined by the level the students have reached in their programme, any specific issues the module seeks to address as well as the specialist knowledge which makes up the course. As an active learning technique it is important that we consider carefully what might affect the learning environment and accept that IBL methods are not fixed and the fact of their existence in the curriculum does not ensure the impact promised by IBL is achieved. A number of further developments may help to ensure that IBL is used in the curriculum effectively. These include further classification of different types of IBL, a greater awareness of the learning theory behind IBL (and the factors which might affect that process) and a more careful consideration of the learning environment.

Classification of IBL

As previously mentioned Levy and Petrulis distinguished 'inquiry for learning' (an information frame) from enquiry for knowledge building' (a discovery frame). This is part of a conceptual framework which charts IBL against a continuum of tutor/client framed enquiry to student framed enquiry (Levy and Petrulis, 2012). Spronken–Smith adopts this framework but also differentiates IBL projects with reference to the level of scaffolding provided to students. She adopts the terms structured, guided and open inquiry (Spronken – Smith, 2012). It is helpful to categorise IBL both in terms of developing a taxonomy for this mode of learning and also for clarifying what outcomes should be attached to IBL modules.

The learning Theory

IBL is a constructivist epistemology which focusses on students activating and building on existing knowledge. It is therefore essential to ensure that IBL tutors consider how this can be facilitated effectively within their IBL course. Students may be unfamiliar with an IBL approach and will need to be instructed in its methodology. A shift of emphasis from 'what am I going to learn' to 'how am I going to learn' may be required. Schmidt et al considered the underlying theory of PBL and identified factors which impact on its effectiveness.

Schmidt proposes two possible hypotheses for PBL modules; the activation–elaboration hypotheses and the situational interest hypotheses. Activation–elaboration requires some part of the PBL process to activate students' prior knowledge. This approach relies on the problem to activate the prior knowledge through collaborative group discussion. As the group builds its own theories and research them, a process of modification or elaboration

takes place. This is a reflective and collaborative process which the IBL classroom must facilitate.

The situational interest hypotheses places emphasis on an assumption that human beings like to make sense of the world and when they are unable to do so they experience situational interest because they want to fill the gap. This approach relies on importance of engaging questions which will activate information seeking behaviour (Schmidt et al, 2011). There are, of course, a number of hypotheses as to why IBL generates active learning and no doubt research into this will continue but despite the lack of clarity some themes emerge on what has an impact in IBL.

Schmidt drew on a range of studies and identified the following factors as influencing the process:

- The nature of the problem and whether it is authentic, of relevance to the everyday experiences of the students, adapted to students' level of knowledge, engaging and interesting.
- Establishing effective small groups to assist elaboration (an effective group will also build friendships and develop constructive peer pressure amongst the group members).
- Tutor as facilitator. An effective facilitator models the sorts of questions and enquiry the students are being encouraged to adopt and can model 'a sort of cognitive apprenticeship'. The evidence surrounding whether facilitators need expert discipline knowledge of the issues raised by the problem is not clear but this is helpful where the problem is poorly drafted.
- The importance of social congruence between students and the tutor. The tutor should have an ability to interact with students on a personal level as well as to utilise language that students easily understand.
- Scaffolding. The studies drew no firm conclusions as to the importance of hard or soft scaffolding for PBL.

The learning environment

In addition to the factors which might affect the delivery of IBL, it is also important to take into account the wider learning environment and the place of IBL in the curriculum. Konings et al in their work on powerful learning environments identifies the importance of both tutor and students' conceptions of learning. Students must believe that learning through IBL is both relevant and within their learning capabilities. They identify the importance of demonstrating the skills needed for IBL through modelling and incorporating them into the real world activities of the student (Konings et al, 2005).

Conclusion

The value of IBL appears to be predominantly in its impact on student learning and understanding rather than on acquisition of knowledge. This resonates with the current move towards acknowledging the transferable skills of undergraduate study through graduate attributes and an increasingly competency based approach in legal education. For this reason, amongst others, the ongoing development of IBL within the law curriculum is likely to increase.

There is still much to learn about IBL but for the law curriculum it offers a chance to develop lifelong learning skills which are essential to professional life as a lawyer and in many other professions. Whilst the research suggest that IBL is not the most effective medium for transferring a broad base of discipline knowledge it is accepted that it has a considerable amount to offer in terms of motivating students, encouraging deep learning and the development of analytical skills. A law degree that does not equip students with discipline knowledge is not fit for purpose but nor is a law degree which does not equip students with the intellectual skills and motivation needed for the demands of practice and the evolving nature of the body of legal knowledge. In the light of this, IBL has an important role to play in the law curriculum but its extent and its relationship to the non-IBL curriculum is still being explored. In addition inquiry-based learning is resource intensive and we need to ensure that where it is delivered the environment is such that it has most impact. If we can accept that the measure of IBL is not to be found in the end of year exam results we can start to look at the detail of the method and tailor it to the outcomes we know it can deliver.

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