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Student experiences of Problem Based Learning: Lessons for a new module

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Introduction

- Problem-based learning (PBL) is a method of student-led learning that encourages students to explore an authentic, real-world problem through group work and self-directed learning.
- We aimed to
 - explore if and how PBL can be implemented in economics teaching
 - co-develop, with students, a macroeconomic module taught using PBL
- We investigated student perspectives on
 - (1) transition to and preparation for PBL
 - (2) delivery of PBL
 - (3) assessment of PBL

PROBLEM-BASED LEARNING (PBL)



PBL as a teaching pedagogy

Originated in medical education in the 1960s and aimed to shift focus from memorisation to problem-solving

- Problem types can include, e.g., dilemmas and scenarios (Barrett et al., 2010; Savery, 2015; Marra et al., 2014).

- Groups of students determine what they need to know to address the problem and undertake self-directed learning to fill the knowledge gaps (Hmelo-Silver, 2004; Marra et al., 2014).
- The students reconvene to share their new knowledge and apply it to solve the problem.
- The PBL process is supervised by a tutor, acting as a facilitator rather than instructor (Greening, 1998; Neveille, 1999; Hmelo-Silver and Barrows, 2006).
- Formative and summative assessments can vary and may focus on both individual and group work (Jonassen, 2011; Albanese and Hinman, 2019).

7-step approach

Economics at York use the ‘*Seven Steps*’ or ‘*Seven Jumps*’ strategy (Moust et al., 2005).

For each PBL task, students will have

- 1-hour **pre**-discussion seminar
- 1-hour **post**-discussion seminar

Students are required to use the “7-step approach”

1. Clarifying Unfamiliar Terms (**pre**-discussion seminar)
2. Problem Definition (**pre**-discussion seminar)
3. Brainstorm (**pre**-discussion seminar)
4. Analysing the Problem (**pre**-discussion seminar)
5. Formulating Learning Goals (**pre**-discussion seminar)
6. Self-Study
7. Reporting (**post**-discussion seminar)

Transition and Preparation

- Transition from passive to active learning
 - Students can be supported through this transition using scaffolding (van de Pol et al., 2010).
- Preparing staff
 - Training tutors is critical.
 - Tutors provide less support over time as students grow more responsible for their own learning (Hmelo-Silver and Barrows, 2006).
- Designing problems
 - Problems can vary between well-structured and ill-structured problems, and in terms of complexity (Jonassen 2000).
- Pure vs hybrid PBL
 - Evidence suggests that minimally guided educational approaches are less successful than those that guide the student learning process (Kirschner et al., 2006), and in practice most institutions apply a form of “hybrid PBL” (Moro and McLean, 2017).

Delivery

- Teachers/tutors are expert learners.
 - They have educational goals and performance goals.
 - They play an important role in promoting effective interpersonal dynamics (Marra et al., 2014).
- Other key parameters
 - Problem design, group size, and standards governing group work will support facilitators in achieving the goals (Moust et al., 2005; Servant-Miklos, 2019a).
- Challenges
 - ensuring active contribution and manageable workloads for students (Hmelo-Silver, 2004)
 - practical challenges related to timetabling (Moro and McLean, 2017)



Assessment

- Challenging
 - Balancing knowledge acquisition and skills development
 - Assessing participation and contribution
- A variety of individual- and group-based assessment techniques have been studied (Albanese and Hinman, 2019; van der Vleuten and Schuwirth, 2019).
 - Can include formative and summative assessments.
 - Unequal contributions can pose a challenge to group-based assessment.
 - The portfolio of assessments should capture subject knowledge and skills such as problem-solving and teamwork.
- Reflection and feedback are essential in PBL (Armitage, 2013; Gonzalez, 2019), although students need support to understand how to constructively self-reflect (Hmelo-Silver, 2004).

Data

5 in-person focus groups

- 3 groups from BSc/BA Economics courses
 - students with no or very little experience with PBL
 - students with diverse backgrounds, who study single honours or interdisciplinary joint honours degrees
- 1 group from BA Global Development
- 1 group from MSc Sustainable Business, Environment and Society
 - The last 2 groups had extensive prior PBL experience

6 interviews with York Law School students

- Students with extensive prior PBL experience

Focused on three main topics:

- (1) transition to and preparation for PBL
- (2) delivery of PBL
- (3) assessment of PBL



Results: Transition and preparation

- Participants with extensive prior PBL experience found the transition to a new learning style challenging.
“[...] The big challenge with PBL is [...] that you're moving from a very passive form of learning to quite an active form of learning, and getting your head around that is quite a big shift. You're having to re-learn how to learn in this context.”
- Students found the expectation to learn and work independently and as a group the hardest to grasp.
- Preparing students for learning and working in a group, communicating the benefits of PBL, setting expectations for PBL as an approach to learning from early on can help with transition, and increase student motivation.
- Essential for tutors to be provided with a clear guidance on the requirements of the role.
“[...] It's very important that the tutors know very explicitly what their jobs are, [...] what's expected of them, [...] how they should handle different situations that would come up in PBL.”

Results: Transition and preparation



- Participants felt that team building activities and co-creating the rules for group work at the beginning can help students build relationships and support each other through the process.
- Good problem design can complement scaffolding. Participants suggested the following to support students:
 - designing well-structured problems
 - demonstrating how PBL problems are related to lecture content
 - reading lists containing resources that are essential for solving a problem in the first few weeks of the module

Results: Delivery

- The composition and dynamics of PBL groups emerged as a crucial aspect and students had a preference for smaller groups:

“[...]because you can develop connections with everyone in the group. [...]not only does that give you more of a platform to speak confidently, but it also initiates more connections just in general throughout the course [...] when you have such a large cohort like economics you want to make connections with your cohort. [...]having a smaller group, there is a benefit to it”

- Having group members with diverse backgrounds is desirable as students value learning from different perspectives.

Results: Delivery

- The composition and dynamics of PBL groups can lead to challenges relating to unequal contributions, relying on others for one's own learning, and managing time effectively in and out of class.
- Participants corroborated that the tutor could have a significant effect on their learning outcomes by
 - keeping the discussion on topic,
 - discussing relevant materials to guide the conversation, and
 - responding effectively to the various challenges resulting from group dynamics.

Results: Assessment

- Participants had undertaken a range of assessments, including individual and group assessments, written and oral assessments, contribution, and reflection.
- Broad agreement on the drawbacks of being assessed as a group, where fairness and free riding stood out as significant.

“[...] Free riding, which is what I explained happened to me [...], is a massive issue and I know it happens across the board with so many other degrees as well.”
- Participants believed having group assessments as a formative and individual assessments as a summative could be a useful alternative.
- Lecturers and tutors can incentivise students to complete the formative assessment by:
 - clearly communicating the link between the formative and the summative
 - providing relevant feedback on their formative with actionable points to improve their work

Results: Assessment

- Reflection is an essential part of the PBL model (Gonzalez, 2019), but participants found reflective assessments burdensome.
“When I was doing reflection [...], I didn't like it because it took a lot of time but like looking back on it now [...], I think that it was useful.”
- Students believed marking contributions incentivised their peers to participate.
- Participation marks can put pressure on students who are shy or have learning difficulties:
“[...] Contributing [...] may be more of a personal issue. Like if you have social anxiety, [...] that would factor into the level of contributions that you make.”
- Some participants thought that having reflection as part of the contribution mark could help overcome this:
“[...] Self-evaluation being an aspect of the participation mark allows the people who otherwise are a bit quiet to kind of contribute to their participation mark in a way that's a bit more accessible to them.”



Conclusions

- Students are overall happy with learning through PBL.
- Many of the issues raised by students can be resolved through clear communication, explaining the process of PBL, its philosophy and the role of assessment.
- PBL can be enhanced by developing and communicating module learning outcomes that illustrate the links to both subject content and transferable skills.



Conclusions

- The role of the tutor in scaffolding and facilitating group discussions in PBL should not be underestimated.
- Discouraging free-riding and encouraging participation in PBL through a mix of different forms of assessment is desirable.
- Despite the range of issues raised by participants, it was evident that they enjoyed learning through PBL.
- PBL was acknowledged to have a steep learning curve but recognised as a valuable learning experience.



Module development

Transition and preparation

- 2 lectures on the importance of
 - group work
 - reflection
- The first seminar on
 - induction of PBL
 - team building activities
- One problem designed together with HM Treasury

Delivery

- Hybrid PBL
- Training and handbook for PBL tutors

Assessment

- Summative assessment of individual work
- Formative assessment of group work
- Reflection included in summative assessment
- Participation and contribution not assessed