**UNIVERSITY OF RWANDA**

# GUIDELINES ON PROJECT-BASED LEARNING APPROACH

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## 1. Purpose statement

The purpose of this paper is to examine the Project-Based Learning (PBL) approach, to assess its aim, its meaning, its features, benefits and risks, and make recommendations about its use, and to assess the contribution of PBL to Intended Learning Outcomes (ILOs) and Graduate Attributes (GAs).

## 2. Aim of the Project-Based Learning approach

The aim of the PBL pedagogy is to equip students with important Graduate Attributes: global citizenship; research, creativity and innovation, scholarship and enquiry; collaboration, teamwork and leadership; communication and information literacy; subject knowledge and professional skills; and lifelong learning.

## 3. Definitions

Project-Based Learning is defined as '*a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge*' (see at Bie.org, 2014)

Project-Based Learning requires '*complex tasks, based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations*'(Thomas, 2000) .

Project-based instruction often has a '*driving question' encompassing worthwhile content that is anchored in a real-world problem; investigations and artifacts that allow students to learn concepts, apply information, and represent knowledge in a variety of ways; collaboration among students, teachers, and others in the community so that participants can learn from one another; and use of cognitive tools that help learners represent ideas by using technology*'.(Marx et. al., 1994)

## 4. Project Based-Learning

Project Based-Learning is a learner-centered pedagogy where the whole process of acquisition of knowledge, skills and competencies is focused on the needs and competences of the learner.

Students gain knowledge and skills by undertaking and building up projects, or resolving progressively complex problems, throughout the duration of their studies. As they develop projects, and diagnose, analyze and solve problems, they continuously assemble **portfolios** as evidence of their work.

Throughout the process, the learners must be assessed formatively. The portfolios are evaluated, marked and feedback provided to the learner for the purpose of improving the project or finding appropriate and effective solutions to the problems posed or real challenges encountered.

At the end of learning period, the final project should be summatively assessed and graded.

## 5. Essential elements in designing student projects

According to Buck Institute for Education (https://www.bie.org/about/what_pbl), essential Project design elements include:

- *Key Knowledge, Understanding, and Success Skills* - Projects are focused on student learning goals, including standards-based content and skills such as critical thinking, problem solving, collaboration, and self-management.
- *Challenging Problem or Question* - Projects are framed by a meaningful problem to solve or a question to answer, at the appropriate level of challenge.
- *Sustained Inquiry* - Students engage in a rigorous, extended process of asking questions, finding resources, and applying information.
- *Authenticity* - Projects features real-world context, tasks and tools, quality standards, or impact – or speaks to students' personal concerns, interests, and issues in their lives.
- *Student Voice & Choice* - Students make decisions about the project, including how they work and what they create.
- *Reflection* - Students and teachers reflect on learning, the effectiveness of their inquiry and project activities, the quality of student work, obstacles and how to overcome them.
- *Critique & Revision* - Students give, receive, and use feedback to improve their process and products.
- *Public Product* - Students make their project work public by explaining, displaying and presenting it to people beyond the classroom.

## 6. Key features of the Project-Based Learning approach

PBL style presents 6 major characteristics: learning by doing, real-world problems, role of the instructor as facilitator, interdisciplinary, collaboration and group work, and an end product (Harmer Nichola, 2014).

### 6.1. Learning by doing

In PBL the student role changes from 'learning by listening' to 'learning by doing'.

### 6.2. Real-world problems

In PBL there is a connection between academia and external social, political, and environmental processes to engender and sustain student interest and motivation. Real-life problems drive the research and the students' learning. The learning is driven from a real world problem without

anticipated obvious, clear and 'right' answers. The problem needs deep investigation, analysis and evaluation in order to get an answer.

## 6.3. Role of the instructor as facilitator

As a student-centered approach the role of the instructor in PBL shifts from lecturing to facilitating the acquisition of knowledge by students. The facilitator doesn't consider her/himself as holding knowledge to 'give' to learners who would benefit from this, but helps learners to discover knowledge. Learning derives from the knowledge, ideas and interactions between group members. Lecturers are active in guiding and supporting the students through the whole process of identifying, investigating and solving a problem.

## 6.4. Inter-disciplinary

A further key feature of PBL is an emphasis on interdisciplinary learning. Projects often run across disciplines e.g. within the physical sciences or combine the natural and social sciences. This stress on interdisciplinary reflects a belief that the complexity of pressing contemporary social or environmental problems means higher education must equip students with the adaptability and holistic thinking to tackle issues which defy disciplinary boundaries.

## 6.5. Collaboration and group work

Students work as self-directed, active investigators and problem-solvers in small collaborative groups (typically of about five students) to find appropriate answers.

## 6.6 An end product

In the PBL approach, significant emphasis is placed on the process of reaching the product, and reflection on it, is critical. Production of a quality product is a distinguishing feature of PBL and one that drives the project planning, production, and evaluation. The student team presents their findings of the cumulating project to the rest of the class.

## 7. Problem-Based Learning vs. Project-Based Learning

Since they have the same acronyms, questions are often raised about their similarities and differences. However, in a general way of understanding, problem-based learning is a subset of project-based learning.

Similarities and differences are presented below:

| Similarities |
|---|
| 1. Focus on an open-ended question or task |
| 2. Provide authentic applications |
| 3. Build 21st Century skills (collaboration and teamwork, creativity and imagination, critical thinking and problem solving) |
| 4. Emphasize student independence and enquiry |
| 5. Longer and more multi-faceted than traditional lessons and assignments |

| Differences | |
|---|---|
| **Project-Based Learning** | **Problem-Based Learning** |

| | |
|---|---|
| 1. Often multi-subject | 1. More often single-subject, but can be multi-subject |
| 2. May be lengthy (weeks or months) | 2. Tend to be shorter, but can be lengthy |
| 3. Follows general, variously-named steps | 3. Classically follow specific, traditionally prescribed steps |
| 4. Includes the creation of a project or a performance | 4. The product may be tangible or a proposed solution, expressed in writing or in a presentation |
| 5. May use scenarios but often involves real-world, fully authentic tasks and settings | 5. Often uses case studies of fictitious scenarios as ill-structured problems |

Source: Larmer, J. (2014).

## 8. Benefits, challenges and potential solutions of Project-Based Learning

Project-Based Learning has evident benefits but also has some challenges:

### 8.1 Benefits of Project-Based Learning
- Learning by doing has great benefit in shaping students' learning (Dewey, 1938).
- Project based learning transforms students work habits and effectiveness(Thomas, 2000)
- Students learn how to capitalize on the wisdom of the group and most importantly, they continually learn how to learn together (Boss and Krauss, 2007).
- Students demonstrate a greater interest, engagement and mastery approaching various disciplines (Przybysz-Zaremba Malgorzata et al, 2015)

- PBL develops lifelong learning skills, encourages greater understanding and students find it more enjoyable and satisfying (Pawson, E. and al, 2006 and Harmer and Stokes, 2014)

### 8.2. Challenges and Potential Solutions
Harmer and Stokes (2014) identified major challenges and potential solutions for success of PBL. Here are presented those challenges and solutions that are relevant in UR.

| Challenge | Potential solution |
|---|---|
| **Group work** | • Allocate fixed or rotating group roles |
| | • Provide formal training in group work for students prior to and/or during the project |
| | • Provide time and support for the groups to feel comfortable together |
| | • Provide staff training in group work and facilitation |
| | • Clear guidelines and rules on the expectations regarding individual contribution to group work and how this will be assessed |

| Planning and preparation | • Pilot the project |
|---|---|
| | • Use a real-world problem as a driving question for the project |
| | • Choose projects which can be scaled up or down depending on student numbers |
| | • Advance identification of and negotiation with external partners |
| Scaffolding and student support | • Provide a thorough briefing for students about the aims, methods and content of the project |
| | • Use of past student experiences to help brief new students |
| | • Use of sample projects or written project guides |
| | • Appropriate levels of scaffolding, often providing greater lecturer input in the early stages and reducing as the project continues. |
| | • Appropriate materials and resources provided |
| Maintaining motivation | • Choose projects which interest students and have real world significance |
| | • Showcase performances to external or professional audiences |
| Assessment | • Assess appropriately to the task and the learning outcomes targeted |
| | • Include several types of assessment (summative and formative; peer and staff; group and individual) |
| | • Give formative assessment through cycles of feedback and revision |
| | • Train staff in alternative forms of assessment |
| | • Include time and space for students to reflect on their learning throughout the project |
| Staffing | • Train for staff in PBL approaches |
| | • Provide access to materials and resources for lecturers regarding PBL |
| | • Institutional or management recognition of the extra staff time and resources needed for PBL |

## 9. Importance of the Project-Based Learning approach on the achievement of Graduate Attributes at the University of Rwanda

With PBL approach, students are socially active, interact each other, develop a behavior of working in teams where they ask and answer questions and support each other to succeed in the common project. They discover how PBL experiences are more engaging and motivating.

The model helps to equip students with the competences needed by the workplace. Students learn how:

- To collaborate with others, to develop and defend their own point of view and to process others' convincing arguments

- To read, to present orally, in writing and using ICT and multimedia and other forms of communication
- To pose and solve complex problems through critical thinking, analysis, evaluation and synthesis of ideas to devise solutions
- To be innovative and creative
- To apply their prior knowledge and skills to investigate and solve problems
- To become lifelong learners through reading, inquiry, and by selecting appropriate methods to find solutions
- To become world citizens in focusing on real world problems, tangible problems occurring in a village, city, rural area, nation, region or in the world.

## 10. Implementation strategies
- To disseminate the PBL approach document to all students and lecturers
- To organize students in groups of four or five (peer learning groups) in all classes and for all programmes
- To appoint supervisors of group projects in all classes
- To invite students to imagine each trimester a project to develop or a real interdisciplinary world problem to solve
- To allocate time to this learning approach and commitment from all involved
- To request students to constitute a portfolio after each session
- Supervisors to evaluate progressively the portfolios constituted and to provide feedback to students
- To develop robust assessment tools

## 11. Conclusion and Recommendation

UR welcomes examples of current teaching pedagogies that use project-based, problem-based and other similar learner-centred approaches.

Implementation of PBL doesn't necessitate a complete review of the curricula as group work and projects are already components of the teaching and learning strategies for all programmes.

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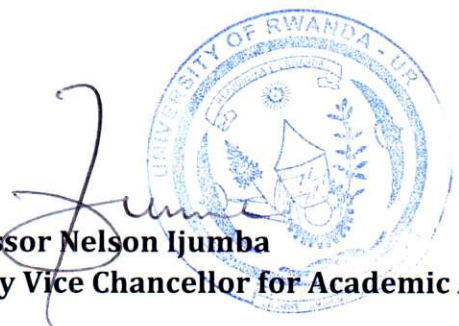
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