CO, PO, CLO, PLO, CO-PO Mapping and Bloom's Taxonomy of the Climatology and Biogeography with Course Code: Geo-C-502 of Postgraduate Sikkim University

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Abstract

The continuous improvement of teaching-learning processes in higher education relies on clearly defined outcomes and structured assessment mechanisms. Present research is the first report to presenting the Course Outcomes (CO), Course Learning Outcomes (CLO), Program Outcomes (PO), and Program Learning Outcomes (PLO) are crucial components in outcome-based education (OBE) of the Climatology and Biogeography with Course Code: Geo-C-502 of Postgraduate subject of Sikkim University. Bloom's Taxonomy provides a hierarchical classification of cognitive skills essential for formulating effective learning objectives. CO-PO Mapping establishes the correlation between what is taught (COs) and the overarching goals of a program (POs). This paper discovers the interrelationship between these elements, emphasizing the importance of systematic curriculum design and assessment of Climatology and Biogeography.

Key words: *CO, PO, CLO, PLO, CO-PO Mapping, Bloom's Taxonomy*

1. Introduction

Higher education institutions across the globe have adopted Outcome-Based Education (OBE) as a framework to ensure quality and accountability in academic programs. Central to OBE are the concepts of CO, CLO, PO, and PLO. They define what learners are expected to achieve and provide measurable metrics for curriculum effectiveness [3, 4]. Bloom's Taxonomy serves as a guiding tool for developing learning outcomes across cognitive levels. The integration of these components through CO-PO Mapping ensures alignment between instructional strategies and program objectives. Course Outcomes are specific statements that describe what students will know or be able to do at the end of a course. COs are measurable, concise, and aligned with program outcomes [5,6,7]. CLOs are detailed learning targets derived from COs. They further break down COs into measurable student achievements for each unit/module within the course. POs are broader competencies that students are expected to acquire upon graduation. These include skills such as communication, problem-solving, ethical reasoning, and professional behavior. PLOs are similar to POs but focus more on the learning achievements through specific program pathways, combining multiple courses and experiences. Developed by Benjamin Bloom in 1956 and revised by Anderson and Krathwohl in 2001 [1, 2], Bloom's Taxonomy categorizes cognitive skills into six hierarchical levels as shown in Table 1,2, and 3 respectively [8,9,10,11].

1. Remembering – Recall facts and basic concepts.
2. Understanding – Explain ideas or concepts.
3. Applying – Use information in new situations.
4. Analyzing – Draw connections among ideas.
5. Evaluating – Justify a decision or course of action.
6. Creating – Produce new or original work.

These levels aid in formulating CLOs and COs that progressively challenge students' intellectual development [12,13]. CO-PO Mapping is the process of aligning each course outcome with relevant program outcomes [14,15]. This alignment helps institutions ensure that the curriculum delivers what it promises in the program structure.

Table 1: Course Outcomes (COs) [16, 17]

CO Code	Course Outcomes	Bloom's Taxonomy Level
CO1	Understand the concepts of climatology and biogeography, and interpret theories related to climate and ecosystems.	Understand (Level 2)
CO2	Analyze climatic classification systems, oscillation indexes (SOI), and Indian monsoon variability.	Analyze (Level 4)
CO3	Apply biogeographical knowledge to evaluate climatic indicators and interpret flora and fauna distribution.	Apply (Level 3)
CO4	Examine climate change impacts and interpret sustainable solutions based on climatological and biogeographic understanding.	Evaluate (Level 5)
CO5	Develop scientific presentations, term papers, and research-based assessments related to climatology and biogeography.	Create (Level 6)

1.1.Program Outcomes (POs) [18]

PO1: Apply knowledge of geographical sciences to analyze spatial and temporal phenomena.
PO2: Use technical tools and research methods to investigate environmental and climatic issues.
PO3: Demonstrate awareness of environmental ethics, sustainability, and climate policies.
PO4: Communicate geographical data and findings effectively using scientific formats and tools.
PO5: Critically evaluate and propose solutions for contemporary geographical and climate-related issues.

Table 2: CO-PO Mapping Matrix [19]

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	2
CO2	3	3	2	2	3
CO3	2	3	3	2	3
CO4	2	2	3	2	3
CO5	1	2	2	3	2

Table 3: Bloom's Taxonomy Classification of Cos [20]

Course Outcome	Knowledge Level	Description
CO1	Understand (Level 2)	Explain, Describe, Interpret
CO2	Analyze (Level 4)	Compare, Examine, Organize
CO3	Apply (Level 3)	Use knowledge to interpret ecological relations
CO4	Evaluate (Level 5)	Assess impact of climate change
CO5	Create (Level 6)	Design presentations and papers

2. Conclusion

This study is the first research work to determine the CO, PO, CLO, PLO, CO-PO Mapping and Bloom's Taxonomy of the Climatology and Biogeography of M.Sc. Geography, Sikkim University. The integration of Course Outcomes (COs), Program Outcomes (POs), and Bloom's Taxonomy serves as a powerful framework for designing, delivering, and assessing outcome-based education (OBE) . COs provide specific, measurable learning goals at the course level, while POs reflect broader educational objectives aligned with institutional missions and industry requirements. Bloom's Taxonomy, with its hierarchical classification of cognitive skills, supports this structure by guiding the formulation of clear, outcome-driven learning objectives that range from basic knowledge acquisition to complex problem-solving and critical thinking. In outcome-based education, the synergy between COs, CLOs, POs, and PLOs—supported by Bloom's Taxonomy and CO-PO Mapping—plays a pivotal role in ensuring student success and program effectiveness. Systematic planning, regular review, and data-driven improvement strategies are essential for fostering a competent and capable graduate profile. Mapping COs to POs using Bloom's Taxonomy is not only ensures alignment between teaching strategies and desired competencies. But, also enhances transparency and accountability in higher education of the Climatology and Biogeography with Course Code: Geo-C-502 of Postgraduate Sikkim University. This alignment facilitates continuous curriculum improvement, ensures quality assurance, and prepares students with the skills, knowledge, and attitudes required for lifelong learning and professional success. In summary, the systematic application of these frameworks strengthens academic rigor and relevance, ultimately improving student learning outcomes and employability.

3. References

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