
ISSN: 2583 5343

DOI: 10.59461/ijitra.v2i2.53

The online version of this article can be found at: https://www.ijitra.com/index.php/ijitra/issue/archive

Published by: PRISMA Publications

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Numerical Techniques for Calculating Attainment of Course Outcome and Programme Outcome under NEP-2020

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ABSTRACT

The Outcome Based Learning (OBL) has been one of the major concerns of most academic institutions in Jammu and Kashmir (UT), especially at the UG level. However, various understandings of the concept have resulted in various Programme Outcomes (PO) based on the Course Outcomes (CO). In the present paper, the authors have developed a numerical technique for calculating the CO and PO for the operationalization of the concept offering a fresh approach towards developing an effective, operational technique of measuring CO and PO.

Keywords: Outcome Based Learning, Course Outcomes and Programme Outcomes

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1. INTRODUCTION

The idea behind OBE is to build the curriculum around the outcomes that students should be able to achieve by the end of their education programme [2]. The implementation of outcome-based education (OBE) has been a major emphasis of academic institutions in Jammu & Kashmir under NEP2020, particularly among UG level programmes. In order to ensure that the curricula design satisfies the programme outcome and programme education aim, which shall reflect the accomplishment of the JK HED mission and vision.

The majority of Jammu & Kashmir academic institutions that offer UG level courses have endorsed the approach toward OBE implementation. In order to facilitate the adoption of OBE, various educational methods have been highlighted [1], [10]. Based on the comments received from the stakeholders, the emphasis of OBE is able to provide the human capital demands as requested by the industry [3].

Abidin et. al. [5] described the step by step algorithm used by the LAB-SPECT using Electrical Engineering Laboratory 2 (EEE361) as a model case. Students’ raw marks from the assessments activities during the December 2008-April 2009 semester session were used as inputs for the system. Outputs plots of average score and ranking of achieved POs as well as the students’ density for the three different ranking levels were shown. These plots were used and analyzed thoroughly by the respective lecturer and later made recommendations to be implemented for Continuous Quality Improvement (CQI) exercise.

The continuous quality improvement (CQI) process plan that was developed and implemented by the Department of Mechanical Engineering (DME), University Tenaga National (UNITEN), Malaysia for its Bachelor of Mechanical Engineering Programme was described by Anuar et. al. [6]. The plan was part of the
Outcome-Based Education (OBE) system that was required by the Engineering Accreditation Council (EAC) of Malaysia.

Jaafar et. al. [7] describes the office automation system and its strength and weakness after one year of its first implementation. Mutilib et. al. [8] developed the measurement of programme outcome as an implementation in Civil Engineering Programmes courses. Assessing the attainment of course outcomes (CO) for an engineering course was given by Abidin et. al. [9].

Amirulddin et. al. [10] presented the analysis of PO achievement based on student's achievement in formal assessments for core subjects in the Bachelor of Electrical Power Engineering (BEPE) and Bachelor of Electrical and Electronics Engineering (BEEE) programmes in UNITEN for four semesters from Semester 1, 2007/2008 to Semester 2, 2008/2009.

In [11] Aziz et. al. enunciates the Malaysian Engineering Education Model (MEEM) and the processes leading to an outcome based engineering education. Kalyani [12] gave an empirical study on NEP 2020 [National Education Policy] with Special Reference to the Future of Indian Education System and Its effects on the Stakeholders. Gupta et. al. [13] reviewed literature on autonomy related to educational institutions in India and overseas on different dimensions perspectives and levels of autonomy. Based on literature review, experiences of the authors and interaction with experts working in the autonomous institutions, guidelines for obtaining and sustaining autonomy were stated. Saxena [14] collects the information related to the glimpse of NEP 2020. Aithal et. al. [15] highlights the various policies announced in the higher education system and compare them with the currently adopted system. Various innovations and predicted implications of NEP 2020 on the Indian higher education system along with its merits were discussed.

2. DEFINITIONS AND PRELIMINARIES USED IN THIS PAPER:

Formula:

\[ C_O = \frac{AE + AI}{W} \times SF \text{ and } P_O = \text{Average of course outcomes} \]

Where

- \( AE \): (Average of external marks)
- \( AI \): (Average of internal marks)
- \( SF \): (Syllabus completion factor)
- \( W \): (Weight age of marks)

Terms and conditions for defining \((CO)^n\) course outcomes:

1. IF \( C_O > 70 \), then highest level of course is attained denoted by \( L_3 \).
2. IF \( 50 < C_O < 70 \), then moderate level of course is attained denoted by \( L_2 \).
3. IF \( 35 < C_O < 50 \), then average level of course is attained denoted by \( L_1 \).
4. IF \( C_O < 35 \), then poor level of course is attained denoted by \( L_0 \).

Terms and conditions for defining \((PO)^n\) Programme outcomes:

1. IF \( 80 < P_O < 100 \), then highest level of programme is attained denoted by grade A.
2. IF \( 60 < P_O < 80 \), then moderate level of programme is attained denoted by grade B.
3. IF \( 40 < P_O < 60 \), then average level of programme is attained denoted by grade C.
4. IF \( P_O < 40 \), then poor level of programme is attained denoted by grade D.
Bhat Altaf et al, Numerical Techniques for Calculating Attainment of Course Outcome and Programme Outcome under NEP-2020
3. Main Results:

In this Section of the paper, we will calculate OBL, CO’s and PO’s of the date which we collect from [4].

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**Course Statistics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBA</td>
<td>13</td>
</tr>
<tr>
<td>BCom</td>
<td>18</td>
</tr>
<tr>
<td>BCA</td>
<td>12</td>
</tr>
</tbody>
</table>

---

**Subject Statistics**

<table>
<thead>
<tr>
<th>Subject Name</th>
<th>Subject Code</th>
<th>Total</th>
<th>View All</th>
<th>Course Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster Management</td>
<td>DJSR1</td>
<td>13</td>
<td>View All</td>
<td>Course Outcome</td>
</tr>
<tr>
<td>English Language</td>
<td>ENGL1</td>
<td>15</td>
<td>View All</td>
<td>Course Outcome</td>
</tr>
<tr>
<td>Gender Sensitisation</td>
<td>GENP1</td>
<td>19</td>
<td>View All</td>
<td>Course Outcome</td>
</tr>
<tr>
<td>Human Geography</td>
<td>HUMA1</td>
<td>12</td>
<td>View All</td>
<td>Course Outcome</td>
</tr>
<tr>
<td>Botany</td>
<td>BOTN1</td>
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<td>View All</td>
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<tr>
<td>Biotechnology</td>
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<td>Chemistry</td>
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<td>Course Outcome</td>
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<tr>
<td>Computer Science</td>
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<td>Course Outcome</td>
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<tr>
<td>Cost Accounting</td>
<td>CACA1</td>
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<td>View All</td>
<td>Course Outcome</td>
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<tr>
<td>Database Management</td>
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</tr>
<tr>
<td>English Literature</td>
<td>ENGL1</td>
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<td>View All</td>
<td>Course Outcome</td>
</tr>
<tr>
<td>Geography</td>
<td>GEOG1</td>
<td>12</td>
<td>View All</td>
<td>Course Outcome</td>
</tr>
</tbody>
</table>
Course outcome for 4th semester (batch -2019) for some specific subjects is as follow:

I. Here course outcome for BO416 is 81.28%, that is $C_O > 70$, then highest level of course is attained $L_3$.

II. Here course outcome for HCT416 is 50%, that is $C_O < 70$, then moderate level of course is attained $L_2$.
III. Here course outcome for CA416 is 44.81%, that is $C_O < 50$, then average level of course is attained $L_1$.

![Course Outcome for CA416 Semester 4 Batch 2019](image)

**Course Outcome for CA416 :: 44.81 %
Average level of Course Outcome is Attained (L1)**

*Fig. 3 Course outcome for CA416*

IV. Here course outcome for MM416 is 44.44%, that is $C_O < 50$, then average level of course is attained $L_1$.

![Course Outcome for MM416 Semester 4 Batch 2019](image)

**Course Outcome for MM416 :: 44.44 %
Average level of Course Outcome is Attained (L1)**

*Fig. 4 Course outcome for MM416*

V. Here course outcome for PH416 is 61.67%, that is $C_O > 50$, then moderate level of course is attained $L_2$.

![Course Outcome for PH416 Semester 4 Batch 2019](image)

**Course Outcome for PH416 :: 61.67 %
Moderate level of Course Outcome is Attained (L2)**

*Fig. 5 Course outcome for PH416*

VI. Here course outcome for POM417 is 40.86%, that is $C_O < 50$, then average level of course is attained $L_1$.
VII. Derivation for Programme outcome for the above Course outcomes:

\[ P_0 = \text{Average of course outcomes} = 53.84 \]

Hence \( P_0 \), lies as follow:

\[ 40 < P_0 < 60 \], then average level of programme is attained denoted by grade \( C \).

4. CONCLUSION

The OBL implementation of CO and PO attainment has been explored for Product Skill Development subject that were offered to all undergraduates Students. Two methods have been incorporated which is direct method and segregated method. The direct method implies that the CO attainment directly reflects the PO attainment. On the other hand, the segregated method implies each individual component in the assessment is mapped to its respective CO and PO and shall be assessed in segregated manner. CO & PO attainment incorporating direct measurement and segregated measurement exhibit varying result. The segregated method is more sensitive towards identifying the issues, which affect attainment of CO and PO.

5. ACKNOWLEDGEMENT

We are very much thankful to Editors, Principal GCW Nawakadal Srinagar Prof.(Dr. Tabasum Rafiq) & IQAC committee GCW Nawakadal Srinagar, valuable and positive suggestions to improve the article.

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