Optimizing Pedagogy for ECO415 (Economics) Part-Time Students: An AHP Analysis

Zarul Azhar Nasir[1], Muhammad Adidinizar Zia Ahmad Kusairee*[1], Noormahayu Mohd Nasir[1], Siti Nur'amalina Syeddin[2], Nor Zarina Mohd Salim[2], Hafini Suhana Ithnin[2]

[1]Faculty of Business and Management, Universiti Teknologi MARA Perak Branch Tapah Campus, Malaysia

[2]Faculty of Business and Management, Universiti Teknologi MARA Perak Branch Sri Iskandar Campus, Malaysia

***Corresponding Author**

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ABSTRACT

This study ranks five educational techniques (Constructivist, Collaborative, Inquiry-based, Integrative, and Reflective) for part-time degree programme students enrolled in the ECO415 (Economics) course at the UiTM Perak Branch Sri Iskandar Campus using the Analytic Hierarchy Process (AHP). We apply the given pairwise geometric-mean ratios to construct the full 5×5 reciprocal matrix. We compute final weights to four decimal places and display all calculation processes, including row averages, column sums, normalisation, and the geometric mean approach. A consistency check (λ_{max}, CI, CR using RI=1.12) confirms acceptable consistency (CR ≈4.79%). The resulting ranking is: Constructivist > Collaborative > Inquiry-based > Integrative > Reflective. Lastly, we provide ECO415 lecturers with practical teaching suggestions. The favoured approaches are constructivist and collaborative, which is consistent with research showing that adult and part-time learners favour hands-on, active learning. Group work, real-world projects, and flexible delivery to meet the needs of part-time economics students are among the recommendations.

Keywords: Pedagogical Approaches, Economics Education, Analytic Hierarchy Process (AHP), Constructivist Approach, Collaborative Learning, Higher Education, ECO415

INTRODUCTION

In recent years, higher education has emphasised student-centred pedagogy over passive lecturing. Economics instruction, traditionally lecture-based, is incorporating more active learning (Brunelli, 2014) and collaboration to enhance understanding of complex concepts. However, learner characteristics matter. Part-time students – often mature adults balancing studies with work or family – typically differ from full-time undergraduates. They are usually highly motivated, career-focused, and benefit from practical, relevant instruction. Andragogy theory (Knowles, 1980) argues adults learn best when content is tied to experience and self-directed, not just told what to learn. Therefore, identifying which pedagogical approaches best suit part-time economics students is critical.

This study uses Analytic Hierarchy Process (AHP) to evaluate five teaching approaches for ECO415. AHP is a structured decision-support tool (Saaty, 1980) that converts subjective pairwise comparisons into numerical weights. The given geometric-mean comparisons (ratios) among Constructivist, Collaborative, Inquiry, Integrative, and Reflective methods provide the input data. We reconstruct the full 5×5 reciprocal matrix from these ratios, then compute priority weights by normalising and averaging (aligning with Saaty's eigenvector approach). A consistency check (using λ_{max}, CI, CR) ensures the judgments are reliable.

The results will reveal which teaching strategies most effectively serve part-time ECO415 learners. By analysing the given pairwise ratios among Constructivist, Collaborative, Inquiry-based, Integrative, and Reflective methods, we can objectively rank these approaches. We also perform a consistency check (Consistency Ratio <10%) to validate the comparisons. We interpret findings considering research on full-time vs part-time student learning preferences and offer actionable teaching recommendations for UiTM lecturers.

LITERATURE REVIEW

Pedagogical Approaches in Education

Various pedagogical frameworks have been advocated to enhance learning. Constructivist pedagogy posits that learners actively construct knowledge through experience (Piaget & Cook, 1952; Vygotsky, 1978). In constructivist classrooms, students engage in hands-on activities (simulations, case studies) to build their understanding. Research highlights its benefits: learner-centred constructivism promotes active knowledge-building, cooperative learning, critical problem-solving, and reflective thinking (Hussain, 2012). For example, Mishra (2023) notes that constructivism fosters active knowledge building and cooperative learning, and Kumari (2022) discusses scaffolding students' prior experiences. Such methods can deepen part-time students' grasp of economic concepts by anchoring theory in practical tasks.

Collaborative learning emphasizes peer interaction and group work (Johnson & Johnson, 1999). It can be highly effective in economics education: students discuss market scenarios or policy debates together, enhancing understanding through multiple perspectives. G. R. Scott and Ghosh (2016) report that collaborative projects in construction education improved student outcomes via teamwork. Collaborative learning also develops communication and negotiation skills critical in economics. Constructivist and collaborative approaches often overlap: group-based, active activities are both constructivist and collaborative in nature.

Inquiry-based learning (IBL) encourages students to ask questions and explore answers through guided research (Dewey, 1938). In economics, IBL might involve investigating the impact of policies on growth or conducting mini research on inflation drivers. Studies in higher ed show IBL enhances innovation and engagement (Acar & Tuncdogan, 2018; Kori, 2021). McKinney (2014) found that inquiry-based curricula improve student autonomy but require support structures. For adult learners, inquiry methods can be motivating if clearly connected to real work challenges. A study by Khan & Arch in 2020 suggested that inquiry-based pedagogy promotes student exploration, enabling learners to investigate many sources, pose inquiries, and implement ideas across different contexts.

Integrative pedagogy merges multiple disciplines for holistic understanding (Fogarty, 1991). In economics, this means linking concepts to history, politics, or sociology to contextualise them. Azamatovna (2020) highlights that integrative teaching, including digital tools, boosts engagement and interdisciplinary competence. Although valuable, integrative approaches may be perceived by part-time students as less immediately relevant to exam success, which may explain their lower priority in our results.

Reflective learning involves students thinking critically about their learning process (Schön, 1983). Methods include learning journals or debriefing discussions. Reflective pedagogy fosters metacognition and self-directed learning, key for lifelong learning (Moon, 2013). Research emphasizes its role in teacher training and professional development (Navaneedhan, 2011). For adult students, reflection can consolidate learning from real-world experiences, though it often takes a backseat to more interactive methods. In sum, each approach offers unique benefits, but their effectiveness depends on student context and priorities.

Part-Time vs Full-Time Learner Preferences

Part-time (often adult) students differ from full-time students in motivation and context. Cosgun (2022) found higher academic motivation among part-timers than full-timers, indicating they engage deeply with coursework. These students are typically older, have work experience, and study to advance careers or for personal growth. They value flexibility, relevance, and autonomy in learning. For example, a 2022 study of online learning satisfaction by Fiorini, Borg and Debono reported that many adult part-time students favoured a blended

approach, enjoying recorded lectures but seeking interactive elements. Adult-learning theory (Knowles, 1980) stresses that mature learners are self-directed and bring life experiences to class (Moberg, 2006).

In contrast, full-time students, oftentimes younger may be more familiar with traditional pedagogies and might not require as much flexibility. Published comparisons show part-time students often juggle multiple responsibilities, so they prefer concise, applied instruction (Boyle, 2021) and pragmatic assessment. These differences suggest teaching for part-timers should emphasize applicability and collaboration, whereas full-timers might accept more lecture and exam focus. Understanding these distinctions underpins our interpretation: student-centred, experiential learning such as constructivist and collaborative tends to align better with part-time adults' needs (Moberg, 2006; Cosgun, 2022).

METHODOLOGY

This paper used Analytical Hierarchy Process (AHP) as a multi criteria decision-making method (MCDM). AHP is one of the Multi Criteria decision-making methods described by Saaty (2012), to derive ratio scales from paired comparisons.

Geometric Mean in AHP

In the Analytic Hierarchy Process (AHP), the geometric mean is commonly used to aggregate multiple respondents' pairwise comparison judgments into a single representative value for each comparison, because it preserves the reciprocal property of the comparison matrix and is consistent with the ratio-scale nature of AHP (Saaty, 1980; Forman & Peniwati, 1998). Specifically, when several decision-makers provide judgments for the same pair of criteria, their individual values are combined using the geometric mean rather than the arithmetic mean, ensuring proportional consistency and avoiding distortion of relative importance. This approach is widely accepted in group decision-making contexts because it yields a mathematically sound consensus matrix from which priority weights can be derived reliably (Saaty, 2008; Ishizaka & Labib, 2011).

Making a Judgements in AHP

In making judgments about the priority of the criteria, there are three steps in AHP that the researcher must follows (Brunelli, 2014). In step 1, the respondents are asked to perform pair-wise comparisons among the criteria. The scale is from 1 to 9, and its definition is described as in Table 1.

Table 1: Saaty's pairwise comparison scale

Intensity of Importance	Definition
1	Equal importance
2	Weak
3	Moderate importance
4	Moderate plus
5	Strong importance
6	Strong plus
7	Very strong or demonstrated importance
8	Very, very strong
9	Extreme importance

Source: Saaty, (2012).

If there are m criteria to be evaluated, then the respondent must make m(m-2)/2 comparisons. For example, 10 pairs of criteria will be compared if the number of criteria is 5. Suppose criterion 1 is compared with criterion 2. If criterion 1 is 'strong importance' compared to criterion 2, then $m_{12} = 5$, and $m_{21} = 1/5$. All the pair-wise comparisons collected from each respondent were transferred into matrix form, M, where $m_{jk} = 1/m_{kj}$, $k>j$ such as in Figure 1 below.

$$M = \begin{bmatrix} 1 & m_{12} & \dots & m_{1n} \\ m_{21} & 1 & \dots & m_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ m_{n1} & m_{n2} & \dots & 1 \end{bmatrix}$$

Fig. 1 Matrix M

Evidently, one of the major drawbacks of AHP is that the number of pair-wise comparisons increases exponentially as the number of criteria increases. In Step 2, the degree of consistency is then measured by the Consistency Index (CI). Perfect consistency implies a value of zero, but as individuals' judgments are often inconsistent, it is difficult to comply. Therefore, inconsistency up to a certain degree is acceptable in computing pair-wise judgements. The CI for M is calculated as

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (1)$$

where λ_{max} is the maximum Eigen vector of matrix M. If the consistency ratio, CR = CI/RI < 0.10, then the degree of consistency is acceptable, where the random index, RI values are given in Table 2 (Taylor III, 2004).

Table 2: Random Index, RI, Values

Number of criteria, (n)	Random index (RI)
2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41

Source: Saaty, (2012).

In the third step, the weight for criterion j,j = 1,2,…,n, for each respondent's evaluation is calculated by using the following formula:

$$w = \frac{1}{\sum_{k=1}^{n} m_{jk} \left(\overline{\sum_{i=1}^{n} m_{ik}} \right)}$$

This process is repeated for every criterion considered. Next, the rule for aggregation of judgments in a comparison matrix is to combine the judgments using the geometric mean if a study involves more than one respondent. Ranking of the criteria can then be determined with the weight values. The higher the weight of a criterion the higher its ranking when compared with other criteria. (Saaty & Peniwati, 2007; Saaty & Alexander, 2013). If p respondents were involved in the assessment, the final weight for criteria j is obtained as a geometric mean, that is, by taking the pth root of the product of all p weights of that criterion, as follows:

Number of samples in AHP

The number of samples in AHP is flexible and can range from a single expert to multiple participants, depending on the study design and research objectives. AHP was originally developed as an expert-based decision-making tool, meaning that valid results can be obtained even from a single knowledgeable decision-maker; however, incorporating multiple respondents is often preferred to enhance robustness, reduce individual bias, and better reflect group consensus (Saaty, 1980; Forman & Peniwati, 1998).

In applied research, especially in education and social sciences, purposive sampling is frequently used to select participants with relevant experience, and their judgments are aggregated (typically via the geometric mean) to form a collective decision matrix (Ishizaka & Labib, 2011; Brunelli, 2015). Thus, AHP is highly adaptable, supporting both individual and group decision-making contexts without strict minimum sample size requirements.

ECO415 (Economics) Part-Time Students' Data Collection and Analysis

This study employed a purposive sampling technique targeting part-time students enrolled in the ECO415 course at the Universiti Teknologi MARA, UiTM Perak Branch during the semesters of 2025. A total of 35 students were invited to participate, of which 23 responses were successfully obtained, yielding a response rate of approximately 65.7%. Data were collected via an online questionnaire developed using Google Forms and distributed electronically. Prior to data collection, all respondents were provided with clear instructions and guidance on how to complete the pairwise comparison questionnaire for each criterion included in the study.

There are five main criteria that were identified, which are constructivist, collaborative, inquire-based, integrative and reflective. The AHP framework were then developed based on literature review that has been discussed are shown in Figure 2.

After the criteria had been identified, each respondent will be asked to compare the importance of each criterion to another criterion, and the evaluation will be transformed in a matrix as in Figure 1. Then the weights of the criteria will be calculated by using equation (1). All judgments will be aggregated by using the geometric mean approach as in equation (3).

Table 3 and Table 4 below shows the Pairwise Comparison Matrix (A) and Column Normalisation of A and Priority Calculation

Table 3: Pairwise Comparison Matrix (A)

Criteria	C1	C2	C3	C4	C5
C1 Constructivism	1.0000	1.9140	1.6460	1.9190	3.1990
C2 Collaboration	0.5225	1.0000	2.0360	1.6280	1.8850
C3 Inquiry-based	0.6075	0.4912	1.0000	2.2270	3.1990
C4 Integrative	0.5211	0.6143	0.4490	1.0000	2.4420
C5 Reflective	0.3126	0.5305	0.3126	0.4095	1.0000

Table 4. Column Normalisation of A and Priority Calculation

Criteria	C1	C2	C3	C4	C5	Row Sum	Priority Weight	Rank
C1 Constructivism	0.3374	0.4207	0.3024	0.2671	0.2728	1.6004	0.3201	1
C2 Collaboration	0.1763	0.2198	0.3740	0.2266	0.1608	1.1575	0.2315	2
C3 Inquiry-based	0.2050	0.1079	0.1837	0.3100	0.2728	1.0794	0.2159	3
C4 Integrative	0.1758	0.1350	0.0825	0.1392	0.2083	0.7408	0.1482	4
C5 Reflective	0.1055	0.1166	0.0574	0.0570	0.0853	0.4218	0.0844	5

The priority weights are Constructivism at 0.3201, Collaboration at 0.2315, Inquiry-based learning at 0.2159, Integrative learning at 0.1482, and Reflective learning at 0.0844. The ranking is therefore Constructivism, Collaboration, Inquiry-based learning, Integrative learning, and Reflective learning. The consistency test produced λ_{max} = 5.2146, CI = 0.0536, and CR = 0.0479, which is below the acceptable threshold of 0.10. This indicates that the pairwise comparisons are internally consistent and suitable for interpretation (Saaty, 1980).

AHP Consistency Check

To verify the reliability of judgments, we compute the consistency indices. The principal eigenvalue of A is $\lambda_{max} \approx 5.2146$. Then:

$$CI = \frac{\lambda_{max} - n}{n - 1} = \frac{5.2146 - 5}{4} = 0.0536.$$

Using Saaty's Random Index RI=1.12 for n=5, we get:

$$CR = \frac{CI}{RI} = \frac{0.0536}{1.12} \approx 0.0479 \ (4.79\%).$$

Since CR < 0.10, the matrix is acceptably consistent. For reference, Kusairee, Nasir, Nasir, Syeddin and Salim (2024) obtained CR≈0.027 in a similar ECO120 AHP analysis.

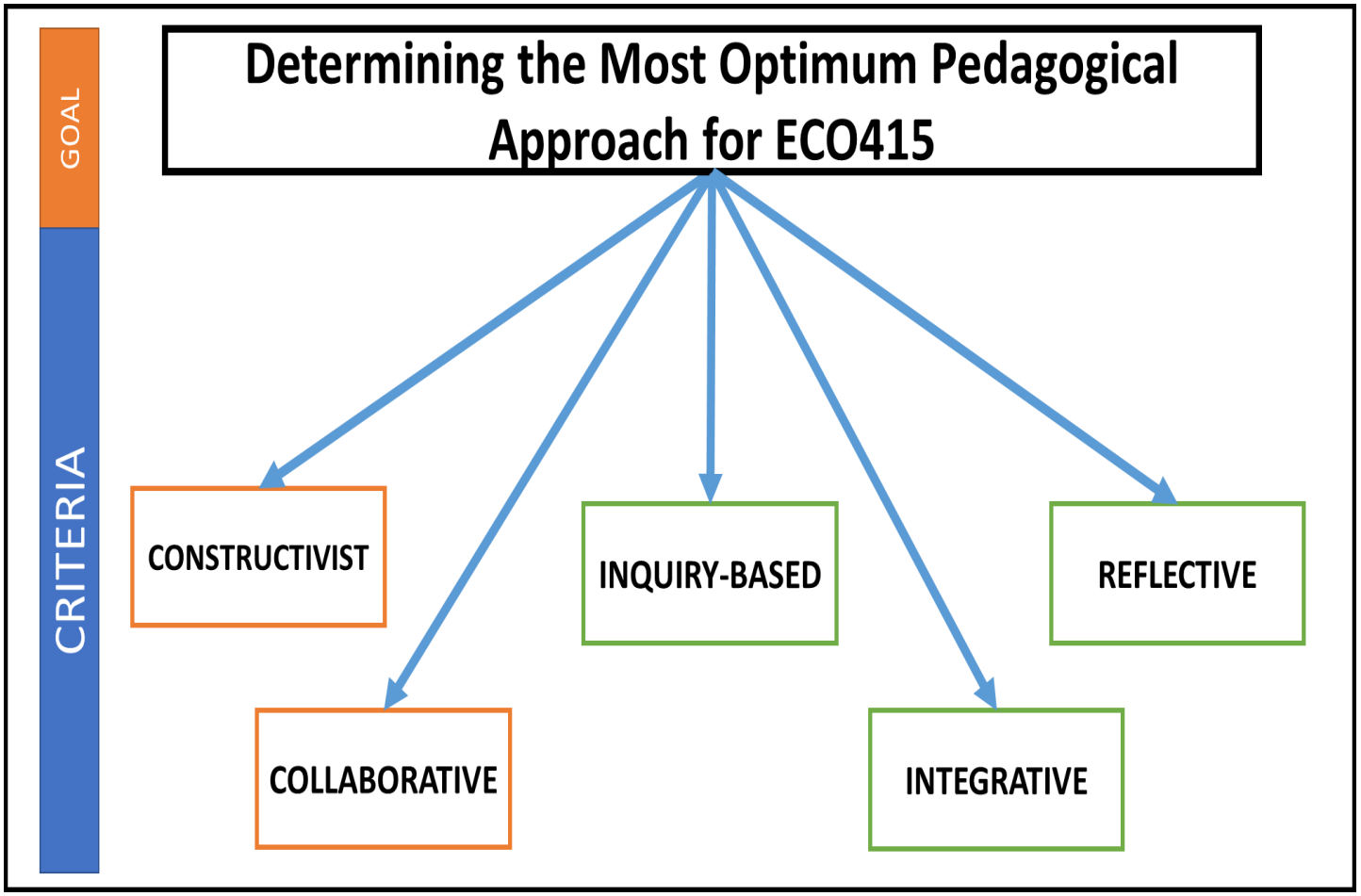
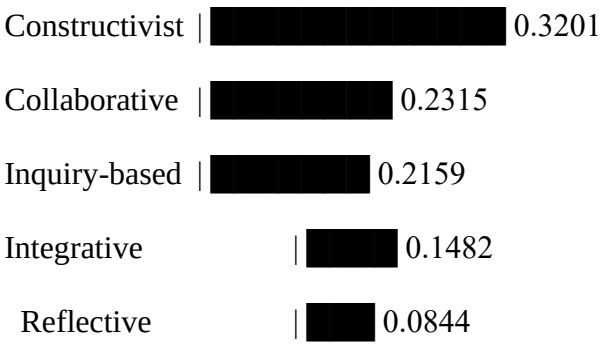


Fig. 2 AHP Framework

FINDINGS

The analysis clearly identifies Constructivist pedagogy as top priority (0.3201), followed by Collaborative learning (0.2315). Inquiry-based methods (0.2159) come next, with Integrative (0.1482) and Reflective (0.0844) last. In practical terms, this means that strategies encouraging active student engagement and group collaboration should be emphasised for ECO415 part-time learners.

Bar-chart of Priority Weights (Normalized):



These results align with literature on adult learning. Part-time students tend to be self-motivated and practical. They often prefer learning by doing, and value peer interaction (Moberg, 2006; Cosgun, 2022; Poquet & De Laat, 2025). Constructivist activities (e.g., economics simulations, project-based exercises) allow them to construct understanding from concrete examples, which fits Andragogy principles (Cosgun, 2022; Poquet & De Laat, 2025). Similarly, Collaborative learning leverages their collective experience: working in groups on case studies or policy debates can deepen insight (Johnson & Johnson, 1999; Slavin, 2011). In fact, a recent survey-based AHP study on ECO120 also found collaborative learning rated most critical (Kusairee et al., 2024), supporting our emphasis on interaction.

Inquiry-based learning remains important (third-ranked). Guided research tasks help maintain engagement and innovation (McKinney, 2014; Acar & Tunçdoğan, 2018; Kori, 2021; Sheng-Li, Yeyao & Shabaz, 2023), which suits the high-motivation profile of adult learners. Integrative and Reflective approaches, while educationally valuable, are less critical given time constraints. These methods (e.g., connecting economics to other fields or requiring metacognitive journaling) can still enrich learning but should be balanced to not overload busy learners.

CONCLUSIONS AND RECOMMENDATIONS

This AHP analysis, grounded in Saaty's framework, reveals that Constructivist and Collaborative teaching are most crucial for part-time ECO415 students, consistent with adult learning theory. These methods actively engage students and connect theory to practice, meeting the needs of mature learners (Cosgun, 2022; Poquet & De Laat, 2025). Inquiry-based learning also deserves attention as a motivator, while integrative and reflective techniques, though beneficial, are of lower priority.

UiTM ECO415 lecturers should design coursework around active, group-oriented activities. This could include problem-solving workshops, case simulations, and peer instruction sessions. Clear real-world applications (current economic issues, industry examples) should frame all lessons, leveraging part-time students' professional experience. Provide flexible options: record lectures for review and allow asynchronous collaboration tools (forums, shared documents) to accommodate schedules (Cosgun, 2022; Kusairee et al., 2024). Use inquiry projects (e.g. mini research on local economy) to stimulate engagement, ensuring sufficient support and milestones. Reflection exercises (brief logs or discussions) can be included but kept concise to avoid extra workload.

Emphasising these approaches may improve understanding and satisfaction among ECO415 part-timers. As one survey of online learners found, students recommended blending recorded content with interactive elements (Kusairee et al., 2024). Our findings similarly suggest that an instructor who "flips" lectures into collaborative problem-solving or case analysis can better meet part-time learners' needs.

One limitation is the analysis used limited numbers of sample size; surveying more ECO415 students could validate these weights. Future research might apply fuzzy AHP to incorporate uncertainty (Xu et al., 2023) or extend the criteria hierarchy to include assessment types or resources. Investigating outcomes (grades, satisfaction) for different teaching mixes would also be valuable.

Ethical Approval Statement

This study was conducted in accordance with established ethical standards for research involving human participants. The research involved respondents from the part-time degree programme at Universiti Teknologi MARA, specifically at the UiTM Perak Branch, Seri Iskandar campus. A purposive sampling technique was employed, targeting part-time students enrolled in the ECO415 course during the second semester of 2025. A total of 23 students participated in this study.

Data were collected via an online questionnaire developed using Google Forms and distributed electronically. Prior to participation, all respondents were provided with a clear explanation of the study objectives, procedures, and detailed instructions on completing the pairwise comparison questions for each criterion included in the AHP analysis. Participation was entirely voluntary, and informed consent was obtained from all respondents before data collection commenced.

All responses were collected anonymously, and no personally identifiable information was recorded. The data were analysed in aggregate form to ensure the confidentiality and privacy of all participants. This study adhered to the principles of research integrity, voluntary participation, and data protection in line with internationally recognised ethical guidelines, including those established by the Committee on Publication Ethics.

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