

A Study on the Effects and Sustainability of Course Analysis Consulting at Different Time Points*

Ae Kyung Yang¹, Hyun Yong Jung^{2*}

¹Professor, Center for Teaching and Learning, Hanseo University, Korea,
orange8300@hanmail.net

²Associate Professor, Hyewha Liberal Arts Colledge, Daejeon University, Korea,
hyunyong@dju.ac.kr

* Corresponding author: Hyun Yong Jung

Abstract: This study aimed to investigate the effects and long-term sustainability of self-reported classroom analysis alongside student evaluation outcomes at 6 months, 1 year, and 2 years after classroom-analysis consulting. It further explored the relations between these two metrics and examined how factors influencing teaching practices evolved over different time periods. From November to December 2022, 22 professors at H University participated by being videotaped during approximately 100 minutes of teaching. An objective analysis was conducted by a professional consultant following standardized criteria. The findings indicated that positive changes in both self-reported classroom analysis and student evaluation outcomes accumulated and persisted over time, with the most notable improvement observed at one year after consulting ($p=.038$). Additionally, whereas faculty initially emphasized direct instructional behaviors and methods, communication-oriented aspects—such as classroom interaction and verbal expression—gained greater prominence over time. From these results, it is suggested that universities establish routine classroom-analysis consulting and introduce structured follow-up programs to promote continued enhancement and sustained teaching competence.

Keywords: Lesson Analysis, Consulting, Course Evaluation, Self-Evaluation

1. Introduction

Instructional consultation through classroom analysis constitutes a systematic process developed to enhance teaching and learning through the observation, recording, and interpretation of classroom dynamics based on defined criteria and theoretical perspectives [1]. The aim of this procedure is to both identify instructional characteristics and obstacles, and to develop viable strategies for improvement [2]. Within this process, observation, documentation, and interpretation represent the essential stages of classroom analysis. Classroom observation specifically denotes the organized acquisition of teaching-related data, in which trained evaluators utilize standardized tools to objectively document the full teaching sequence [3–5].

In the university context, classroom analysis consultation offers instructors substantive feedback on their teaching practices and supports them in making pedagogical improvements. Although multiple factors influence instructional quality, the teaching competence of faculty remains central since they serve as the principal agents in academic settings. Classroom analysis and consultation strengthen teaching competence by helping instructors reflect on their own teaching from the learner's viewpoint using video recordings, while also providing objective insights and constructive feedback through systematic expert consultation [5].

* This research was supported by the Institutional Research Grant Program of Hanseo University.

As universities place increasing emphasis on educational competitiveness, there has been a corresponding rise in demand for instructional analysis tools that are specifically adapted to unique institutional contexts and environments. Consequently, differentiated consultation models that facilitate more objective and efficient practices have attracted heightened scholarly attention. Within international frameworks, research has addressed both immediate and enduring outcomes, as well as issues concerning the sustainability of instructional interventions. For instance, Armstrong et al. (2003) demonstrated that participants in the Harvard Macy Program for Physician Educators (1995–1997) maintained positive transformations two years after completing the program, including advancements in teaching behaviors, academic output, career progression, and professional engagement [6]. Similarly, Night et al. (2008) tracked faculty members at Johns Hopkins University after their involvement in a teaching skills development program and found persistent enhancements in instructional practices, teaching behaviors, and self-assessment well beyond the program's conclusion [7].

By comparison, research into classroom analysis consultation in Korea experienced continuous growth until the early 2010s, only to decline after 2013. In recent years, this area of inquiry has resurged with the advent of digital transformation and data-driven methodologies [8,9]. Principal research directions have encompassed investigation into current practices, assessment of program effectiveness, case analyses, model creation, as well as the exploration of digital and AI-integrated approaches. Nevertheless, most domestic research has concentrated on short-term impacts or singular case examinations, with limited attention paid to the enduring effects and sustainability of instructional improvements [10]. Domestic studies have typically emphasized outcomes immediately following consultation or have analyzed instructional practices and student course feedback in a piecemeal fashion. Although these investigations illustrate that one-time consultations may prompt changes, they offer minimal empirical insight into the persistence or further development of such changes over an extended period.

Situated within this context, the current study examines the longitudinal effects of classroom analysis consultation by focusing on 22 faculty members at H University. Data were gathered at three distinct time points - 6 months, 1 year, and 2 years following consultation - utilizing repeated assessments of faculty members' self-reported classroom analysis results alongside student course evaluations. This methodological approach facilitates statistical comparison of both immediate and enduring impacts, while also supplying a more holistic understanding by linking faculty self-perceptions to students' evaluations of instructional effectiveness.

Therefore, this study aims to build upon existing research by empirically examining whether the effects of classroom analysis consultation are sustained over time, and by clarifying the relationship between faculty self-evaluations and student perceptions of teaching quality. The outcomes are intended to offer actionable recommendations for higher education institutions striving to improve teaching effectiveness and promote ongoing instructional development.

2. Theoretical Background

2.1 The Concept of Instructional Consultation through Classroom Analysis

Instructional consultation through classroom analysis indicates structured activities developed to enhance teaching quality, and the concept encompasses similar approaches such as lesson study, classroom analysis, and instructional supervision [11]. The origin of instructional consultation traces back to the 1970s [12]. Bergquist and Phillips (1975) highlighted it as a particularly effective method for producing measurable improvements in classroom instruction, thereby laying the groundwork for its recognition as a field of systematic inquiry [13].

In the United States, the early establishment of Centers for Teaching and Learning (CTLs) facilitated the adoption of instructional consultation as a prominent form of teaching support in higher education from the 1970s onward. In Korea, this approach was introduced during the early 1980s under the term “instructional supervision,” focusing mainly on enhancing classroom practices in elementary and secondary educational settings [2,14].

Subsequent to the formation of CTLs at universities, classroom analysis consultation emerged as a core faculty development initiative. Known variously as lecture recording or lecture analysis, instructional consultation in higher education typically involves video-recording lectures for expert review, during which both verbal and non-verbal instructional behaviors are analyzed and feedback is provided to the instructor [4].

Consequently, classroom analysis consultation constitutes a collaborative, problem-solving approach intended to elevate instructional quality, in which both experts and instructors collaboratively diagnose challenges, develop solutions, and implement changes. Viewed in this way, it functions as a counseling process that centers on the instructor receiving feedback [14,15].

2.2 The Process of Instructional Consultation through Classroom Analysis

Instructional consultation through classroom analysis applies rigorous and systematic methods to observe and record classroom events and phenomena, with standardized criteria and observational instruments frequently employed. By engaging in systematic documentation and interpretation, this process yields insights that facilitate meaningful instructional advancement [5].

The operational process usually starts when an instructor identifies a challenge in their teaching and seeks consultation. Following this, diagnostic tools such as checklists and self-reports are employed to pinpoint specific issues, complemented by classroom video observations and student surveys. The collected information is analyzed to evaluate the instructor’s teaching practices, resulting in customized feedback and targeted recommendations for development. Despite these steps, at Korean universities, such consultations frequently take place as isolated sessions, which poses challenges for assessing sustained instructional improvement. As emphasized by Erickson (1979) and Hick (1999), ongoing monitoring is crucial to accurately measure progress [14,16,17]. To enhance the effectiveness of consultations, it is necessary to establish procedures that confirm whether recommended changes have been implemented in following instruction.

An instructor's positive perception of their teaching plays a significant role in benefiting students, particularly by strengthening communication and interaction, and by promoting instructional advancement. The process of classroom analysis serves to reinforce teaching competencies while addressing noted deficiencies, thus encouraging reflective practice and self-assessment. Ultimately, this process aids not only the instructor’s professional development but also brings about substantive enhancements in teaching effectiveness.

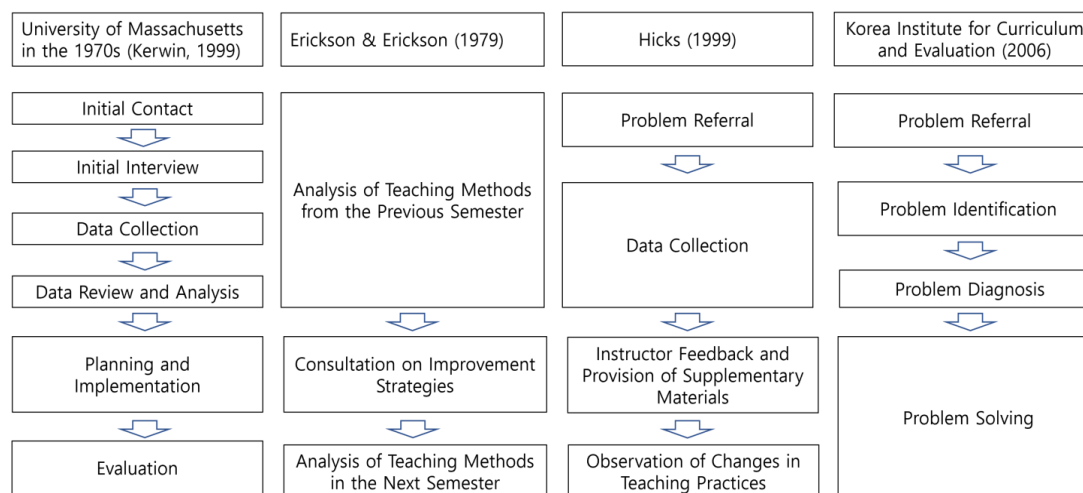


Figure 1. Procedures of Course Analysis Consulting According to the Researcher [14]

2.3 Review of Previous Studies

Scholarship on instructional consultation for university faculty has documented various positive outcomes, such as expanding the range of teaching methods, improving the clarity of explanations, delivering courses with greater organization and fidelity, and strengthening engagement with students [5,14,18–21]. Nonetheless, research has also reported obstacles, including unplanned lesson delivery, limited comprehension of instructional processes, routinized but ineffective habits, inappropriate application of pedagogical strategies, weak classroom interactions, and insufficient support for student learning [22]. Such results underscore the importance of classroom analysis consultation in accurately identifying strengths and areas for improvement, as well as in offering focused guidance to enhance instruction.

Studies conducted internationally have particularly highlighted the importance of long-term, as opposed to short-term, outcomes. Armstrong et al. (2003) showed that positive effects such as improved self-reported teaching behaviors, academic output, and career progression persisted even two years after a faculty development initiative. In a related vein, Knight et al. (2005), in a longitudinal evaluation of the Johns Hopkins faculty development program, found that enhancements in teaching approaches, instructional routines, and self-reflection were sustained over time. These findings indicate that instructional consultation can generate not only immediate benefits but also lasting positive outcomes.

In Korea, early research efforts predominantly sought to assess the short-term impacts of instructional consultation. More recently, innovative methodologies have surfaced, emphasizing digital transformation and the utilization of data-driven analysis. For instance, Jung et al. (2022) examined the body of research published in domestic journals and found that, while there was a decline in studies on instructional consultation after 2013, interest has resurged through advancements involving big data and AI technologies. In a related study, Shin and Lim (2024) identified evolving research patterns from 2003 to 2023, emphasizing not only effectiveness but also advancements in model building, case-based research approaches, and analyses grounded in learner data. Collectively, these developments demonstrate a shift in classroom analysis consultation scholarship from a reliance on qualitative feedback toward the integration of data-driven quantitative and longitudinal research.

Synthesizing past research, it is evident that instructional consultation supports faculty teaching competence and enhances both students' learning experiences and educational quality. Despite these contributions, there remains a noticeable shortage of empirical investigations into the long-term sustainability of such effects within the Korean educational context. Thus, this study aims to address this gap by employing statistical methods to examine the impacts of instructional consultation at intervals of six months, one year, and two years, thereby contributing to and extending the current knowledge base.

3. Method

3.1 Participants

This research included 22 faculty members from H University who engaged in classroom analysis consultation in 2022. Among the participants, 15 (68.2%) were male and 7 (31.8%) were female. In terms of academic affiliation, 8 participants (31.8%) represented humanities and social sciences, while 14 (68.2%) were from the natural sciences and engineering disciplines.

Teaching experience within the sample ranged from 1 year to 25 years, encompassing faculty at early and advanced stages of their academic careers. The courses selected for consultation represented a wide array of major and general education offerings. Examples include Airport Operations Management (Department of Air Traffic and Logistics), Philosophy Encountered in Modern Art Museums (Department of Child Art Education), Practical Radiotherapy (2D, 3D Simulation) (Department of Radiological Science), Introduction to Nursing and Community Health Nursing (Department of Nursing), Oral and Maxillofacial Radiology I (Department of Dental Hygiene), Service Role Play (Department of Airline Tourism), and Creative Thinking (Department of Convergence Liberal Arts). This breadth of course participation highlights the extensive academic diversity within the study sample.

Before the study commenced, faculty participants received comprehensive information about the study's objectives, procedures, scope of data use, and ethical considerations via announcements from the Center for Teaching and Learning. Written informed consent was obtained from participants who agreed to join the study. The consent form outlined the aims of the research, the specific types of data to be collected (e.g., lecture recordings, self-reported classroom analysis results, course evaluation data), privacy and confidentiality guarantees, and participants' rights to freely withdraw at any stage. The study was based on voluntary participation and strict observance of research ethics, thereby ensuring the protection of participants' rights and maintaining the confidentiality of their personal data.

Table 1. Background Variables of the Study Subjects (N=22)

Category		Humanities and Social Sciences	Natural Sciences and Engineering	Total
Male	Frequency	2	13	15
	Percentage	(13.3)	(86.7)	(100.0)
Female	Frequency	5	2	7
	Percentage	(71.4)	(28.6)	(100.0)
Total	Frequency	7	15	22
	Percentage	(31.8)	(68.2)	(100.0)

3.2 Instruments

The instructional consultation and self-report classroom analysis instruments utilized in this research were adapted from Cho (2012) and Cho and Kim (2018) [21,23]. These instruments established explicit criteria and standards for classroom analysis consultation, facilitating evaluations that are both systematic and objective.

The consultation model was composed of six domains: (1) lesson organization, (2) lesson delivery, (3) instructional methods, (4) verbal expression, (5) non-verbal behavior, and (6) interaction. Each of these domains contained five sub-items, resulting in 30 items in total with a maximum score of 150 points. Responses were recorded using a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The reliability coefficients were .814 for the classroom analysis consultation instrument and .848 for the self-report version, reflecting satisfactory internal consistency.

Table 2. Classroom Analysis Consulting Measurement Tool

Factor	Item	Cronbach's α	
		Classroom Analysis Consultation	Self-Reported Classroom Analysis
Lesson Organization	1. Is there an introductory phase in the lesson? 2. Does the instructor effectively engage the students' attention? 3. Are the learning objectives stated explicitly? 4. Are key points sufficiently highlighted? 5. Does the lesson appropriately conclude with a closing phase?	.814	.848
Lesson Delivery	1. Does the instructor make efficient use of time? 2. Is the lesson pace suitable for students? 3. Is the lesson implemented according to the planned schedule? 4. Does the instructor maintain composure throughout the lesson? 5. Does the instructor display enthusiasm for teaching?		
Teaching Methods	1. Does the instructor employ a range of teaching methods? 2. Does the instructor make use of various instructional media? 3. Does the lesson foster students' curiosity? 4. Does the instructor actively encourage student participation? 5. Does the instructor offer timely feedback?		
Verbal Expression	1. Is the instructor's voice volume suitable for the setting? 2. Is the instructor's speaking speed appropriate? 3. Is the instructor's pronunciation easy to understand? 4. Does the instructor utilize vocal variation? 5. Does the instructor's tone reflect confidence?		
Non-verbal Behavior (Body Movements)	1. Are the instructor's gestures purposeful and suitable for the context? 2. Does the instructor regularly shift their position when standing? 3. Does the instructor establish eye contact with students? 4. Does the instructor look at all students, not just a select few?		

	5. Does the instructor utilize body movements to enhance their effectiveness?		
Interaction	1. Does the instructor create opportunities for students to ask and respond to questions? 2. Does the instructor allow students to share their perspectives? 3. Is substantial interaction fostered between the instructor and students? 4. Does the instructor offer praise and positive reinforcement to students? 5. Is mutual trust cultivated between the instructor and students?		

3.3 Addressing Limitations of the Self-Report Instrument

Although the self-report classroom analysis tool enables instructors to engage in reflective assessment of their teaching, it is subject to limitations such as social desirability bias and a tendency toward over- or underestimation. To counteract these drawbacks, the present study implemented the following measures: (1) student course evaluation data were gathered concurrently to allow for comparison between instructor self-assessments and student feedback, and (2) independent analyses of lecture recordings were carried out by expert consultants to yield more objective insights. Additionally, repeated assessments across multiple time points were incorporated to reduce the likelihood of bias from single-time responses and to track longitudinal trends, thereby addressing key limitations of self-report instruments.

It is important to recognize that, although the effects observed in this study are attributed to classroom analysis consultation, other external variables could have influenced the outcomes during the study period. These variables may include faculty members' individual efforts toward professional development, initiatives from departmental or institutional faculty development programs, or variations in student cohort demographics. Despite the inability to fully control for these confounding factors, the study sought to mitigate environmental influences by selecting participants exclusively from a single institution and by collecting repeated measurements at standardized intervals (pre-consultation, 6 months, 1 year, and 2 years).

3.4 Procedure of Classroom Analysis Consultation

The classroom analysis consultation implemented in this study was based on a clearly defined procedure:

Initially, lecture sessions for a designated course, chosen by each participating faculty member, were recorded. Each recording captured approximately 100 minutes of instructional time using both a stationary camcorder and an auxiliary camera, documenting the instructor's teaching practices and student engagement. To avoid unnecessary disruption to faculty activities, the research team minimized the number of personnel involved in the recording process. Informed consent was secured in advance, and all recorded materials were restricted exclusively to research purposes.

Next, consultation experts were recruited from the pool of specialists affiliated with the university's Center for Teaching and Learning. Required qualifications included advanced knowledge in education and classroom analysis, with consultants possessing doctoral degrees and significant experience, exceeding ten years, in instructional consultation.

Subsequently, measurement and assessment procedures were uniformly conducted at four specified intervals: pre-consultation, 6 months, 1 year, and 2 years. Faculty participants completed the self-report classroom analysis at each interval, and parallel data were obtained from corresponding student course evaluations.

By following this structured method, the study ensured a recurring cycle of recording, analysis, review, and subsequent assessment, thereby supporting both the objectivity and reliability of classroom analysis consultation.

3.5 Data Analysis

To assess the impact and persistence of classroom analysis consultation, data collection was conducted with 22 faculty members from H University across four measurement points: pre-consultation, and 6 months, 1 year, and 2 years following the consultation. Sources of data encompassed (1) student course evaluations, (2) faculty self-report classroom analysis outcomes, and (3) video documentation of classroom instruction.

Before commencing data analysis, consultants systematically reviewed instructional analysis instruments and evaluation criteria introduced in earlier research (Cho, 2012; Cho & Kim, 2018). Additionally, they attended a preparatory workshop designed to promote consistency in applying scoring guidelines prior to conducting the analysis.

Self-report classroom analysis was conducted for all courses taught by each participating faculty member (e.g., the mean score across three courses if a faculty member taught three courses). This assessment was completed once prior to the consultation and subsequently at 6 months, 1 year, and 2 years following the consultation. Student course evaluation scores were also obtained at these intervals, enabling a direct comparison with the self-reported data.

Table 3. Classroom Analysis Consulting Measurement Tool

Category	Fall Semester 2022	Classroom Analysis Consultation	Spring Semester 2023	Fall Semester 2023	Fall Semester 2024
Time Point	Pre-Consultation	Intra-Consultation	6 Months Post-Consultation	1 Year Post-Consultation	2 Years Post-Consultation
Course Assessment	○	○	○	○	○
Self-Reported Classroom Analysis	○	○	○	○	○

To evaluate the impact and durability of classroom analysis consultation, repeated measures ANOVA with Bonferroni post-hoc tests was utilized for both student course evaluations and self-reported classroom analysis. Multiple regression analysis was additionally used to determine which instructional factors contributed to outcomes at each time point.

Assumptions underlying the repeated measures ANOVA and multiple regression analyses were rigorously examined in advance. The sphericity assumption for repeated-measures ANOVA was tested using Mauchly's test of sphericity. When violations of this assumption were detected, the Greenhouse–Geisser and Huynh–Feldt corrections were applied to validate the robustness of the analytical results.

For the multiple regression analysis, Tolerance and Variance Inflation Factor (VIF) statistics were used to check for multicollinearity among independent variables. While certain variables exhibited moderately elevated VIF values, all remained under the widely accepted threshold of

10 and tolerance values were consistently above 0.1, indicating an absence of problematic multicollinearity. All statistical analyses were conducted using SPSS version 26.0.

4. Results

4.1 Classroom Analysis Consultation

The mean classroom analysis consultation score for the 22 faculty members at H University was 129.64. Within its sub-dimensions, the highest scores were found in verbal expression ($M = 23.14$), lesson delivery ($M = 23.05$), and lesson organization ($M = 22.23$). Conversely, the interaction category had a mean score of 19.55, which was lower relative to other evaluated domains.

Table 4. Results of Classroom Analysis Consulting (N = 22)

Category	Lesson Organization	Lesson Delivery	Teaching Methods	Verbal Expression	Non-verbal Behavior (Body Movements)	Interaction	Total
<i>M</i>	22.23	23.05	20.05	23.14	21.64	19.55	129.64
<i>SD</i>	1.631	1.430	2.081	1.833	2.804	1.819	6.529

The sub-factors of classroom analysis consultation - lesson organization, lesson delivery, teaching methods, verbal expression, non-verbal behavior, and interaction - were included as independent variables in a multiple regression analysis. Findings indicated that these variables accounted for approximately 97.6% of the variance in classroom analysis consultation scores ($R^2 = 0.976$), confirming the statistical significance of the regression model ($F = 132.669$, $p < 0.000$).

Among the predictors, lesson organization, lesson delivery, teaching methods, verbal expression, and non-verbal behavior showed statistically significant effects at the $p < .001$ level, while interaction was not a significant factor. It is noteworthy that higher non-verbal behavior and verbal expression scores were linked to a stronger positive impact on the dependent variable, classroom analysis consultation. Among the significant predictors, non-verbal behavior ($t = 12.945$) exerted the most substantial influence, followed by verbal expression ($t = 7.108$).

Table 5. Regression Model of Classroom Analysis Consulting

Independent Variable	Unstandardized Coefficient		Standardized Coefficient β	<i>t</i>	<i>p</i>	<i>VIF</i>
	<i>B</i>	Standard Error				
(Constant)	4.367	6.752		0.647	0.527	
Non-verbal Behavior (Body Movements)	1.492	0.115	0.641	12.945	0.000	1.663
Lesson Organization	1.187	0.193	0.296	6.155	0.000	1.576
Verbal Expression	1.134	0.160	0.318	7.108	0.000	1.363
Teaching Methods	1.074	0.184	0.342	5.843	0.000	2.333
Lesson Delivery	0.818	0.203	0.179	4.035	0.001	1.341
$R^2=0.976$, $Adj.R^2=0.969$, $F=132.669$, $p=.000$						

Drawing on the estimated regression coefficients, the following regression model was constructed to predict the classroom analysis consultation scores.

$$\begin{aligned} \text{Consultation Score} = & 4.367 + 1.402 \times \text{Non-verbal Behavior (Body Movements)} + \\ & 1.187 \times \text{Lesson Organization} + 1.134 \times \text{Verbal Expression} + \\ & 1.074 \times \text{Teaching Methods} + 0.818 \times \text{Lesson Delivery} \end{aligned} \quad (1)$$

4.2 Self-Reported Classroom Analysis

To evaluate self-reported classroom analysis outcomes among 22 H University faculty members, repeated measures ANOVA was utilized at four time intervals: prior to consultation, 6 months after consultation (1st semester), 1 year after consultation (2nd semester), and 2 years after consultation (4th semester).

Mauchly's test of sphericity was conducted before the repeated measures ANOVA. The analysis showed a violation of the sphericity assumption ($\chi^2(5) = 41.686$, $p < .001$). As a result, repeated measures ANOVA results were interpreted with adjusted degrees of freedom and significance levels using Greenhouse–Geisser ($\varepsilon = .506$) and Huynh–Feldt ($\varepsilon = .537$) corrections.

Table 6. Mauchly's Test of Sphericity for Self-Reported Classroom Analysis

Category	Mauchly <i>W</i>	Approximate <i>Chi-Square</i>	<i>df</i>	<i>p</i>	Greenhouse-Geisser	Huynh-Feldt
Time Point	0.121	41.686	5	0.000	0.506	0.537

According to the self-reported classroom analysis of 22 H University faculty members at four intervals—before consultation, 6 months after consultation (after one semester), 1 year after consultation (after two semesters), and 2 years after consultation (after four semesters)—results of the repeated measures ANOVA showed that average differences across the time points were statistically significant ($F = 66.055$, $p < .001$).

Table 7. Results of Repeated Measures ANOVA on Self-Reported Classroom Evaluation Scores at Different Time Points

Category	I	II	III	IV	<i>F</i>	<i>p</i>	Bonferroni Adjustment
<i>M</i>	95.86	117.73	131.82	140.55	66.055	.000	I < II < III < IV
<i>SD</i>	5.265	4.308	2.429	1.719			
I . Self-Reported Classroom Analysis Outcomes Before Consultation							
II. Self-Reported Classroom Analysis Outcomes 6 Months After Consultation (After One Semester)							
III. Self-Reported Classroom Analysis Outcomes 1 Year After Consultation (After Two Semesters)							
IV. Self-Reported Classroom Analysis Outcomes 2 Years After Consultation (After Four Semesters)							

Repeated measures ANOVA not only revealed statistically significant differences across the time intervals but also indicated a large effect size (e.g., partial $\eta^2 \geq .75$). This result implies that classroom analysis consultation had a considerable and meaningful effect on instructional perceptions and practices among faculty members.

Bonferroni post-hoc comparisons additionally showed that the mean score rose from 95.86 prior to consultation to 140.55 after two years, reflecting an improvement of about 46%. Furthermore, the standard deviation dropped from 5.265 to 1.719, suggesting a reduction in the variability of teaching competence among faculty members over time.

Collectively, these findings indicate that, beyond statistical significance, classroom analysis consultation promoted enduring and cumulative instructional benefits, as faculty members participated in ongoing self-reflection and pedagogical development.

Table 8. Results of Bonferroni Post Hoc Test on Self-Reported Classroom Analysis Scores

Time Point		Mean Difference (I-J)	<i>SD</i>	<i>p</i>
6 Months Post-Consultation (I)	Pre-Consultation (J)	21.864	2.554	0.000
1 Year Post-Consultation (I)	Pre-Consultation (J)	35.955	3.694	0.000
2 Years Post-Consultation (I)	Pre-Consultation (J)	44.682	4.848	0.000

4.2.1 Self-Reported Classroom Analysis Before Consultation

The mean self-reported classroom analysis score among 22 faculty members at H University prior to consultation was 95.86. The sub-dimensions with the highest means were verbal expression ($M = 17.59$), lesson delivery ($M = 16.50$), and non-verbal behavior ($M = 16.09$). By contrast, interaction received a lower mean of 15.14 when compared to the other measured categories.

Table 9. Results of Self-Reported Classroom Analysis before Consulting (N=22)

Category	Lesson Organization	Lesson Delivery	Teaching Methods	Verbal Expression	Non-verbal Behavior (Body Movements)	Interaction	Total
<i>M</i>	15.86	16.50	14.68	17.59	16.09	15.14	95.86
<i>SD</i>	4.683	4.993	3.400	5.077	4.770	3.758	24.697

A multiple regression analysis was conducted using the sub-factors of self-reported classroom analysis before consultation—lesson organization, lesson delivery, teaching methods, verbal expression, non-verbal behavior, and interaction—as independent variables. The analysis revealed that these independent variables collectively accounted for approximately 99.7% of the variance in the dependent variable, self-reported classroom analysis before consultation ($R^2 = 0.997$), and that the regression model reached statistical significance ($F = 1107.678$, $p < 0.000$).

Within the set of predictors, verbal expression, teaching methods, lesson organization, non-verbal behavior, and lesson delivery each demonstrated statistically significant effects at the $p < .001$ level, whereas interaction was not a significant predictor. In particular, higher levels for non-verbal behavior and teaching methods corresponded to stronger positive effects on the dependent variable. Of the significant predictors, non-verbal behavior ($t = 8.807$) had the largest impact, followed by teaching methods ($t = 8.565$).

Table 10. Regression Model of Self-Reported Classroom Analysis before Consulting

	Unstandardized Coefficient		<i>t</i>	<i>p</i>	<i>VIF</i>
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Independent Variable	<i>B</i>	<i>Standard Error</i>	Standardized Coefficient β			
(Constant)	0.226	1.486		0.152	0.881	
Verbal Expression	1.099	0.195	0.226	5.649	0.000	8.880
Teaching Methods	1.750	0.204	0.241	8.565	0.000	4.394
Lesson Organization	0.951	0.189	0.180	5.044	0.000	7.098
Non-verbal Behavior (Body Movements)	1.177	0.132	0.227	8.897	0.000	3.627
Lesson Delivery	1.006	0.205	0.203	4.896	0.000	9.579
$R^2=0.997$, $Adj.R^2=0.996$, $F=1107.678$, $p=0.000$						

Drawing on the estimated regression coefficients, the following model was constructed to predict classroom analysis scores before consultation.

$$\begin{aligned}
 \text{Consultation Score} = & 0.226 + 1.777 \times \text{Non-verbal Behavior (Body Movements)} + \\
 & 1.750 \times \text{Teaching Methods} + 1.099 \times \text{Verbal Expression} + \\
 & 0.951 \times \text{Lesson Organization} + 1.006 \times \text{Lesson Delivery} \quad (2)
 \end{aligned}$$

4.2.2 Self-Reported Classroom Analysis Six Months After Consultation

The mean self-reported classroom analysis score among the 22 faculty members at H University six months post-consultation was 117.73. Within the sub-dimensions, the highest average scores were identified in verbal expression ($M = 20.45$), lesson delivery ($M = 19.95$), and non-verbal behavior ($M = 19.73$). By comparison, teaching methods displayed a comparatively lower mean score of 18.82 relative to the other domains.

Table 11. Results of Self-Reported Classroom Analysis Six Months after Consulting (N=22)

Category	Lesson Organization	Lesson Delivery	Teaching Methods	Verbal Expression	Non-verbal Behavior (Body Movements)	Interaction	Total
<i>M</i>	19.41	19.95	18.82	20.45	19.73	19.36	117.73
<i>SD</i>	4.090	3.498	3.246	3.851	3.990	3.430	20.204

A multiple regression analysis was performed utilizing the sub-factors of self-reported classroom analysis six months after consultation—lesson organization, lesson delivery, teaching methods, verbal expression, non-verbal behavior, and interaction—as independent variables. The analysis revealed that these independent variables accounted for approximately 99.1% of the variance in the dependent variable, self-reported classroom analysis score six months after consultation ($R^2 = 0.991$), with the regression model achieving statistical significance ($F = 649.159$, $p < 0.000$).

Table 12. Regression Model of Self-Reported Classroom Analysis Six Months after Consulting

Independent Variable	Unstandardized Coefficient		Standardized Coefficient β	t	p	VIF
	B	Standard Error				
(Constant)	4.817	2.909		1.656	0.115	
Lesson Organization	1.638	0.332	0.332	4.932	0.000	8.883
Interaction	2.393	0.243	0.406	9.853	0.000	3.342
Verbal Expression	1.701	0.283	0.324	6.011	0.000	5.716
$R^2=0.991$, $Adj.R^2=0.989$, $F=649.159$, $p=0.000$						

Of the predictors examined, lesson organization, interaction, and verbal expression exerted statistically significant effects at the $p < .001$ threshold, while lesson delivery, teaching methods, and non-verbal behavior did not significantly impact the outcome. It is important to note that higher levels of interaction and verbal expression corresponded to more substantial positive effects on the dependent variable. Among the significant predictors, interaction ($t = 9.853$) had the strongest effect, followed by verbal expression ($t = 6.011$).

Drawing from the estimated regression coefficients, the following regression model was established to predict self-reported classroom analysis scores six months post-consultation.

$$\text{Consultation 6 Month Analysis Score} = 4.817 + 1.638 \times \text{Lesson Organization} + 2.393 \times \text{Interaction} + 1.702 \times \text{Verbal Expression} \quad (3)$$

4.2.3 Self-Reported Classroom Analysis One Year After Consultation

The mean self-reported classroom analysis score among the 22 faculty members at H University one year after consultation was 131.82. In terms of sub-dimensions, the highest average scores appeared in lesson delivery ($M = 22.27$), non-verbal behavior ($M = 22.09$), and verbal expression ($M = 20.36$). By contrast, teaching methods registered a comparatively lower mean score of 21.32 compared to the other categories.

Table 13. Results of Self-Reported Classroom Analysis One Year after Consulting (N=22)

Category	Lesson Organization	Lesson Delivery	Teaching Methods	Verbal Expression	Non-verbal Behavior (Body Movements)	Interaction	Total
M	21.86	22.27	21.32	22.36	22.09	21.91	131.82
SD	2.376	2.453	2.009	2.341	2.328	1.875	11.392

A multiple regression analysis was performed using the sub-factors of self-reported classroom analysis one year after consultation—lesson organization, lesson delivery, teaching methods, verbal expression, non-verbal behavior, and interaction—as independent variables. The analysis revealed that the independent variables accounted for approximately 99.0% of the variance in the dependent variable, self-reported classroom analysis one year after consultation ($R^2 = 0.990$), and that the overall regression model was statistically significant ($F = 306.285$, $p < 0.000$).

Among the independent variables, non-verbal behavior, lesson delivery, interaction, lesson organization, and teaching methods demonstrated statistically significant effects at the $p < .001$ level, whereas verbal expression did not have a significant impact on the dependent variable.

Importantly, higher scores in lesson delivery and non-verbal behavior were linked to more pronounced positive effects on the outcome variable. Of the significant predictors, lesson delivery ($t = 7.783$) yielded the strongest effect, followed by non-verbal behavior ($t = 6.239$).

Table 14. Regression Model of Self-Reported Classroom Analysis One Year after Consulting

Independent Variable	Unstandardized Coefficient		Standardized Coefficient β	t	p	VIF
	B	Standard Error				
(Constant)	1.805	3.580		0.504	0.621	
Non-verbal Behavior (Body Movements)	1.346	0.216	0.275	6.239	0.000	3.008
Lesson Delivery	1.547	0.199	0.333	7.783	0.000	2.836
Interaction	1.451	0.244	0.239	5.956	0.000	2.489
Lesson Organization	0.932	0.223	0.194	4.174	0.001	3.354
Teaching Methods	0.640	0.219	0.113	2.919	0.010	2.317
$R^2=0.990$, $Adj.R^2=0.986$, $F=306.285$, $p=0.000$						

Using the estimated regression coefficients, the following equation was formulated to forecast self-reported classroom analysis scores one year following consultation.

$$\begin{aligned}
 \text{Consultation 1 Year Analysis Score} = & 1.805 + 1.346 \times \\
 & \text{Non-verbal Behavior (Body Movements)} + \\
 & 1.547 \times \text{Lesson Delivery} + 1.451 \times \text{Interaction} + \\
 & 0.932 \times \text{Lesson Organization} + 0.640 \times \\
 & \text{Teaching Methods} \quad (4)
 \end{aligned}$$

4.2.4 Self-Reported Classroom Analysis Two Years After Consultation

The mean self-reported classroom analysis score for the 22 faculty members at H University two years after consultation was 140.55. Regarding the sub-dimensions, the highest mean values were seen in verbal expression ($M = 23.64$), lesson organization ($M = 23.55$), and both non-verbal behavior and interaction ($M = 23.41$ each). In contrast, teaching methods had a comparatively lower mean score of 23.23 relative to the other variables.

Table 15. Results of Self-Reported Classroom Analysis Two Years after Consulting (N=22)

Category	Lesson Organization	Lesson Delivery	Teaching Methods	Verbal Expression	Non-verbal Behavior (Body Movements)	Interaction	Total
M	23.55	23.32	23.23	23.64	23.41	23.41	140.55
SD	1.819	1.783	1.572	1.916	1.869	1.709	8.064

A multiple regression analysis was conducted with the sub-factors of self-reported classroom analysis two years after consultation—lesson organization, lesson delivery, teaching methods, verbal expression, non-verbal behavior, and interaction—entered as independent variables. The analysis showed that the independent variables collectively accounted for approximately 99.3% of the variance in the dependent variable, self-reported classroom analysis two years after consultation ($R^2 = 0.993$), and that the regression model was statistically significant ($F = 423.767$, $p < 0.000$).

Among the predictors, lesson delivery, teaching methods, verbal expression, lesson organization, and interaction demonstrated statistically significant effects at the $p < .001$ level, whereas non-verbal behavior did not produce a significant impact on the dependent variable. Notably, higher levels of verbal expression and teaching methods corresponded with stronger positive influences on the dependent variable. Within the significant predictors, verbal expression ($t = 12.550$) was found to be the most influential, followed by teaching methods ($t = 7.094$).

Table 16. Regression Model of Self-Reported Classroom Analysis Two Years after Consulting

Independent Variable	Unstandardized Coefficient		Standardized Coefficient β	t	p	VIF
	B	Standard Error				
(Constant)	2.891	3.220		0.898	0.383	
Lesson Delivery	1.279	0.184	0.283	6.964	0.000	3.521
Teaching Methods	1.115	0.157	0.217	7.094	0.000	2.005
Verbal Expression	1.785	0.142	0.424	12.550	0.000	2.438
Lesson Organization	0.930	0.142	0.210	6.534	0.000	2.202
Interaction	0.762	0.142	0.161	5.361	0.000	1.936
$R^2=0.993$, $Adj.R^2=0.986$, $F=423.767$, $p=0.000$						

Drawing from the calculated regression coefficients, the following model was established to estimate self-reported classroom analysis scores two years subsequent to consultation.

$$\begin{aligned} \text{Consultation 2 Year Analysis Score} = & 2.891 + 1.279 \times \text{Lesson Delivery} + \\ & 1.115 \times \text{Teaching Methods} + 1.785 \times \text{Verbal Expression} + \\ & 0.930 \times \text{Lesson Organization} + 0.762 \times \text{Interaction} \end{aligned} \quad (5)$$

4.3 Course Evaluation

To analyze course evaluation outcomes among 22 faculty members at H University, repeated measures ANOVA was employed at four intervals: before consultation, 6 months after consultation (1 semester), 1 year after consultation (2 semesters), and 2 years after consultation (4 semesters).

Prior to conducting repeated measures ANOVA, Mauchly's test of sphericity was carried out. The results showed a violation of the sphericity assumption ($\chi^2(5) = 23.901$, $p < .001$). Interpretation of the repeated measures ANOVA therefore relied on adjusted degrees of freedom and significance levels using the Greenhouse–Geisser ($\epsilon = .594$) and Huynh–Feldt ($\epsilon = .645$) corrections.

Table 17. Mauchly's Test of Sphericity for Self-Reported Classroom Analysis

Category	Mauchly W	Approximate <i>Chi-Square</i>	df	p	Greenhouse-Geisser	Huynh-Feldt
Time Point	0.298	23.901	5	0.000	0.594	0.645

Based on the course evaluations of 22 faculty members at H University, conducted at four intervals—before consultation, 6 months after consultation (after one semester), 1 year after consultation (after two semesters), and 2 years after consultation (after four semesters)—the

repeated measures ANOVA revealed that mean differences across the intervals reached statistical significance ($F = 5.902$, $p < .05$).

Table 18. Repeated-Measures ANOVA Results for Classroom Evaluation Scores across Time Points

Category	I	II	III	IV	F	p	Bonferroni
M	4.555	4.667	4.678	4.726	5.902	.008	I < II < III < IV
SD	0.056	0.042	0.043	0.032			
I . Course Evaluation Results Prior to Consultation							
II. Course Evaluation Results 6 Months After Consultation (Following One Semester)							
III. Course Evaluation Results 1 Year Following Consultation (Following Two Semesters)							
IV. Course Evaluation Results 2 Years Following Consultation (Following Four Semesters)							

The results of the repeated measures ANOVA indicated that differences in course evaluation scores across time points were statistically significant and exhibited a substantial effect size (partial $\eta^2 = .21$). According to Cohen's (1988) guidelines, this corresponds to a medium-to-large effect, implying that classroom analysis consultation produced a notable and meaningful shift in students' learning experiences and perceptions [24]. In particular, the mean scores rose from 4.555 before consultation to 4.726 after two years, corresponding to an increase of approximately 3.8%. Additionally, the steady decline in standard deviation ($0.056 \rightarrow 0.032$) suggests that students' evaluations became more uniform and reflected greater consensus about improved perceptions. These results underscore that classroom analysis consultation holds practical significance in education, enhancing both faculty members' self-reflection and students' learning experiences.

Table 18. Results of Bonferroni Post Hoc Test on Classroom Evaluation Scores at Different Time Points

Time Point		Mean Difference (I-J)	SD	p
6 Months Post-Consultation (I)	Pre-Consultation (J)	0.112	0.041	0.076
1 Year Post-Consultation (I)	Pre-Consultation (J)	0.123	0.041	0.038
2 Years Post-Consultation (I)	Pre-Consultation (J)	0.171	0.062	0.068

5. Conclusion and Recommendations

This study investigated the long-term impacts of classroom analysis consultation by performing repeated measures ANOVA on self-reported classroom analysis data and student course evaluations across four intervals—before consultation, 6 months after consultation (1 semester), 1 year after consultation (2 semesters), and 2 years after consultation (4 semesters)—involving 22 faculty members from H University. The principal findings are outlined below.

First, self-reported classroom analysis data verified the effectiveness of classroom analysis consultation. Mean scores increased both progressively and cumulatively, rising from 95.86 before consultation to 117.73 at 6 months, 131.82 at 1 year, and 140.55 at 2 years. The Bonferroni post-hoc tests revealed statistically significant improvements at each stage in comparison to pre-consultation scores ($p < .001$), demonstrating the sequence $I < II < III < IV$. Furthermore, the standard deviation consistently declined from 5.265 (before consultation) to 4.308 (6 months), 2.429 (1 year), and 1.719 (2 years), reflecting increased consistency and homogeneity in faculty members' self-reports. These outcomes indicate that the influence of classroom analysis consultation was both immediate and sustained over a two-year period, with

the reduced variability pointing to a stabilization of teaching competence. Faculty members progressively developed more positive perceptions of their teaching abilities, aligning with Armstrong et al. (2003), who concluded that faculty development initiatives promoted learner-centered pedagogies, and Knight et al. (2005), who observed that rising self-evaluation scores were associated with diversified instructional methods and improved student engagement.

Second, the analysis of student course evaluations further demonstrated positive impacts resulting from classroom analysis consultation. The average scores of course evaluations increased incrementally over time (0.112 → 0.123 → 0.171). The largest impact was noted one year following the consultation ($p = .038$), with the effects persisting, though at a lower level of statistical significance, after two years. These results suggest that consultation generates distinct short-term advantages and maintains at least partial effectiveness in the long run.

Third, faculty members' self-reports identified a change in instructional priorities after consultation. While prior to consultation there was a focus on direct teaching behaviors and methods, there was a gradual shift towards greater value being placed on communication-oriented aspects, notably interaction and verbal expression. Over the long term, verbal expression and instructional methods became increasingly prominent, highlighting the ongoing need for faculty to refine their communicative skills and vary their teaching approaches. Interaction played a more substantial role shortly after consultation, but its relative importance lessened over time in comparison to verbal expression and instructional methods. Consequently, faculty perspectives evolved from an emphasis on expression and techniques → student engagement → classroom management → more nuanced communicative and methodological skills.

Fourth, increases in faculty members' self-reported scores post-consultation were found to correspond closely with improvements in student course evaluation scores. Both indicators demonstrated steady growth over time, with student evaluations exhibiting statistically significant gains after one year. This pattern indicates that there is a lag for enhancements in faculty self-perceptions and teaching practices to be translated into student evaluations. As consultation strengthened elements such as verbal expression, interaction, and lesson organization, students' assessments of instructional quality also rose, leading to elevated evaluation scores.

This study is subject to several limitations. The research sample comprised only 22 faculty members from a single university, constraining the extent to which the findings can be generalized. Participant distribution was uneven, as males constituted 68.2% of the sample and faculty from natural sciences and engineering also made up 68.2%, while only 31.8% represented the humanities and social sciences. In addition, the research was carried out within the particular educational context of H University, so factors such as institutional size, educational culture, and faculty development programs may have affected the outcomes.

Despite these limitations, this study is important because it offers empirical evidence regarding the long-term impacts and sustainability of classroom analysis consultation. Future research should broaden the sample to include faculty from a wider range of institutions and disciplines, aiming for more equitable representation with respect to gender and academic field.

Drawing from these findings, the following recommendations are offered:

First, as the link between classroom analysis consultation and course evaluations has been established, it is advisable to implement a student feedback-based collaborative consultation

program. This initiative would embed student feedback in the consultation process, enabling faculty to utilize student comments as a basis for course enhancement.

Second, to preserve long-term benefits, consultation efforts should progress beyond individualized feedback to facilitate the creation of faculty learning communities. In these communities, consultation outcomes can be collaboratively shared and discussed, fostering enhancement of the teaching culture not only at an individual level, but also departmentally and across varied disciplines.

Third, adopting digital technologies should be explored by connecting consultation with AI-based automated classroom analysis tools. For example, AI can systematically analyze patterns such as the frequency of verbal expressions, speech tempo, and frequency of classroom interactions, integrating these data with consultant feedback for more accurate and ongoing faculty development support.

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