Management of Learning Transformation from Asynchronous to Synchronous Modes and Its Impact on Learning Effectiveness

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ABSTRACT

This study aims to analyze the management of learning transformation from asynchronous to synchronous modes and its impact on learning effectiveness at SMP Negeri 7 Senayang. A mixed-method approach with an exploratory sequential design was employed, beginning with qualitative exploration followed by quantitative measurement to strengthen the findings. The novelty of this study lies in examining learning management in an archipelagic area with limited technological infrastructure and internet connectivity. The research subjects included the principal, teachers, and educational staff. Data were collected through in-depth interviews, questionnaires, and document analysis, then analyzed using data reduction, data display, descriptive statistical analysis, and source triangulation to ensure validity. Based on the 2024 School Quality Report, learning quality had declined due to the dominance of asynchronous instruction characterized by low interaction and student engagement. This condition prompted the school to implement a management strategy by shifting to synchronous learning. The findings indicate that synchronous learning significantly improved teacher–student interaction, active participation, engagement, and overall learning effectiveness, while also fostering instructional innovation. These results highlight that successful learning transformation depends not only on technology use but also on adaptive management strategies aligned with local conditions. The study underscores the importance of strengthening synchronous learning management to improve educational quality, particularly in remote and island regions.

Keywords: management, learning transformation, asynchronous learning, synchronous learning

INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed educational systems worldwide, particularly in the adoption of online learning modalities. In recent years, schools have increasingly relied on digital platforms to maintain instructional continuity, leading to the widespread implementation of both asynchronous and synchronous learning. Asynchronous learning offers flexibility by allowing students to access materials at their own pace, while synchronous learning enables real-time interaction between teachers and students [1], [2], [3]. Although asynchronous approaches are often preferred in contexts with limited technological resources, prolonged dependence on this mode may reduce instructional quality due to minimal interaction, delayed feedback, and low student engagement [4], [5].

These challenges are especially evident in remote and archipelagic regions, where geographical isolation, unstable internet connectivity, and limited technological infrastructure constrain the implementation of interactive learning. At SMP Negeri 7 Senayang, an island-based school, asynchronous learning became the dominant instructional model due to such constraints

[6], [7]. However, the 2024 School Quality Report indicates a decline in learning effectiveness, reflected in reduced student participation, limited teacher–student interaction, and minimal instructional innovation. This situation highlights the urgent need for strategic interventions to improve the quality of learning in resource-constrained environments.

Previous research has examined the effectiveness of synchronous and asynchronous learning from various perspectives. Zeng and Luo [8] reported that synchronous learning generally leads to higher engagement and better learning outcomes than purely asynchronous instruction. Sain and Serban [9] emphasized the importance of integrating both modes within blended learning frameworks to support educational transformation. Ghilay [10] highlighted the necessity of faculty readiness and training in managing rapid transitions to online learning environments. Experimental findings by Ai and Guo [11] demonstrated that synchronous interaction significantly improves academic performance, while Ariyanto, Bachri, and Mariono [12] found notable differences in effectiveness between the two learning modes in higher education. Furthermore, Serdyukov [13] described a persistent gap

between asynchronous and synchronous learning implementation, emphasizing that successful adoption requires more than technological availability.

Despite these contributions, most existing studies focus on technological effectiveness or comparative outcomes, primarily in higher education and urban settings with adequate infrastructure. Limited research addresses how school management strategies facilitate the transformation from asynchronous to synchronous learning in geographically isolated areas. Moreover, few studies employ mixed-method approaches to examine both the managerial processes of transformation and their measurable impact on learning effectiveness. This gap underscores the need for context-sensitive research that integrates leadership, infrastructure management, teacher readiness, and pedagogical adaptation within a single analytical framework.

To address these challenges, synchronous learning is increasingly viewed as a viable solution because it supports real-time communication, immediate feedback, collaborative learning, and stronger social presence. However, implementing synchronous learning in remote regions requires adaptive management strategies to overcome technological limitations and ensure sustainable practice. Therefore, the transformation from asynchronous to synchronous learning should be understood as a comprehensive organizational process rather than a simple technical adjustment [14], [15].

This study aims to analyze the management of learning transformation from asynchronous to synchronous modes and its impact on learning effectiveness at SMP Negeri 7 Senayang. By employing a mixed-method approach, the research seeks to provide a holistic understanding of how management strategies can facilitate effective learning transformation in resource-constrained contexts. The findings are expected to contribute to the development of practical and contextually relevant strategies for improving educational quality, particularly in remote and island regions where digital inequality remains a significant challenge.

RESEARCH METHODS

This study employed a mixed-method research design using an exploratory sequential approach, in which qualitative findings were used to inform subsequent quantitative measurement. This design was selected to obtain a comprehensive understanding of both the management process of learning transformation and its measurable impact on learning effectiveness [16], [17].

1. Research Design

This study adopted an exploratory sequential mixed-method design to obtain a comprehensive understanding of both the process and the outcomes of learning transformation. In this design, qualitative exploration is conducted first to uncover contextual realities, management practices, and challenges faced by the school in shifting from asynchronous to synchronous learning [18], [19]. The insights generated from the qualitative phase are then used to develop quantitative instruments that measure the effectiveness of the implemented transformation. This sequential approach ensures that the quantitative phase is grounded in real field conditions, thereby enhancing the relevance and validity of the findings, particularly in a unique context such as an archipelagic school with limited technological infrastructure [20], [21].
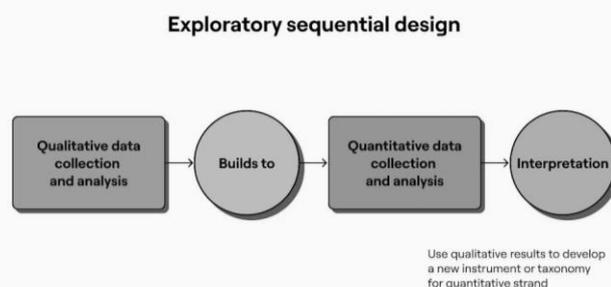

Figure 1. Exploratory Sequential Mixed-Method Research Design

Figure 1 illustrates the exploratory sequential design applied in this study. The research began with a qualitative phase aimed at exploring the management strategies used in transforming learning from asynchronous to synchronous modes. Data were collected through interviews and document analysis to identify key themes, challenges, and implementation processes. The findings from this phase were then used to develop quantitative instruments, particularly a questionnaire measuring learning effectiveness. Subsequently, the quantitative phase was conducted to assess the impact of synchronous learning implementation on student engagement, participation, interaction, and overall effectiveness.

Finally, the results from both phases were integrated to produce a comprehensive interpretation of the transformation process and its outcomes.

The research proceeded in two main phases: Qualitative Phase (Exploration). This phase explored how the transformation from asynchronous to synchronous learning was planned and implemented by school management. Quantitative Phase (Measurement). Based on qualitative findings, instruments were developed to measure the impact of synchronous learning on learning effectiveness [21].

2. Research Setting and Participants

The study was conducted at SMP Negeri 7 Senayang, a junior secondary school situated in an

archipelagic region characterized by limited technological infrastructure and unstable internet connectivity. These geographical and technological constraints significantly influence the implementation of digital learning and provide a unique context for examining the transformation from asynchronous to synchronous instruction. The research participants consisted of key stakeholders involved in the educational process, including the principal as the representative of school leadership responsible for policy and strategic management, teachers as the primary implementers of instructional activities, and educational staff who support administrative and technical aspects of school operations. In addition, students participated in the quantitative phase of the study by responding to a survey designed to measure learning effectiveness, engagement, and participation following the implementation of synchronous learning. Together, these participants provided comprehensive perspectives on both the managerial process and the instructional outcomes of the learning transformation [22].

3. Data Collection Techniques

Multiple data collection methods were used to ensure triangulation and validity [23], [24].

Table 1. Data Collection Techniques

Method	Purpose	Participants	Instruments
In-depth interviews	Explore management strategies and challenges	Principal, teachers, staff	Interview guide
Questionnaires	Measure learning effectiveness and engagement	Students	Likert-scale survey
Documentation study	Support contextual understanding	School records	Quality reports, policies
Observation (limited)	Validate implementation of synchronous learning	Classroom settings	Observation notes

Table 1 presents the data collection techniques employed in this study to obtain comprehensive and reliable information from multiple sources. In-depth interviews were conducted with the principal, teachers, and educational staff to explore management strategies, decision-making processes, and challenges encountered during the transformation from asynchronous to synchronous learning. Questionnaires were distributed to students to quantitatively measure learning effectiveness, engagement, and participation using a Likert-scale instrument. Documentation study was carried out to provide contextual evidence by examining official school records, quality reports, and institutional policies related to learning implementation. In addition, limited classroom observations were conducted to validate the actual implementation of synchronous learning practices and to corroborate findings obtained from interviews and surveys. The use of multiple methods enabled data triangulation, thereby enhancing the credibility and validity of the research findings.

4. Qualitative Phase Procedures

Based on the findings obtained from the qualitative phase, a structured questionnaire was developed to quantitatively measure learning effectiveness following the implementation of synchronous learning. The instrument was designed to capture key dimensions that emerged as critical factors during the transformation process, including student engagement, the quality of teacher–student interaction, the level of active participation, learning satisfaction, and overall perceived effectiveness of the learning experience [25]. These indicators were selected to provide a comprehensive assessment of both behavioral and perceptual aspects of learning outcomes in a synchronous environment. Responses to the questionnaire were collected using a five-point Likert scale ranging from strongly disagree to strongly agree, enabling the researcher to quantify participants' perceptions and analyze patterns of effectiveness across the student population.

5. Quantitative Phase Procedures

Drawing upon the results of the qualitative phase, a structured questionnaire was subsequently developed to assess the level of learning effectiveness following the implementation of synchronous learning. The construction of this instrument was grounded in key themes identified during interviews and document analysis, ensuring that the quantitative measurement reflected the actual conditions and experiences within the school [26], [27]. The questionnaire encompassed several core indicators of effective learning, including student engagement, the intensity and quality of teacher–student interaction, the degree of active participation in learning activities, students' satisfaction with the learning process, and their overall perceived effectiveness of synchronous instruction [28]. Together, these indicators were intended to capture both the interactive and outcome-oriented dimensions of learning in a real-time instructional setting. Responses were collected using a five-point Likert scale ranging from strongly disagree to strongly agree, allowing for systematic quantification of students' perceptions and facilitating statistical analysis of the effectiveness of the learning transformation [29].

6. Data Analysis

Before conducting the interpretation of research findings, the collected data were analyzed according to their respective types to ensure methodological rigor and coherence with the mixed-method design. Because this study employed an exploratory sequential approach, qualitative and

quantitative data required different analytical procedures, followed by an integration stage to produce comprehensive conclusions. Qualitative data were analyzed to uncover patterns, themes, and management strategies underlying the transformation process, while quantitative data were analyzed to determine the level of learning effectiveness after the implementation of synchronous learning. The final stage involved integrating both sets of findings to provide a holistic understanding of the phenomenon under investigation [30], [31].

Table 2. Data Analysis Techniques

Data Type	Analysis Technique	Objective
Qualitative	Thematic analysis	Identify management strategies
Quantitative	Descriptive statistics	Measure effectiveness
Integration	Mixed-method interpretation	Combine findings

Table 2 summarizes the analytical procedures applied to each type of data in this study. Qualitative data obtained from interviews, observations, and documentation were analyzed using thematic analysis to identify key patterns, categories, and management strategies involved in the transformation from asynchronous to synchronous learning. Quantitative data collected through student questionnaires were analyzed using descriptive statistical techniques to determine the level of learning effectiveness, including measures of engagement, participation, and satisfaction. Finally, an integrative mixed-method interpretation was conducted to merge the qualitative insights with quantitative results, enabling a comprehensive explanation of how management practices influenced learning effectiveness. This integration strengthened the validity of the conclusions by ensuring that statistical findings were supported by contextual evidence from the qualitative phase.

7. Validity and Reliability

To ensure the rigor and trustworthiness of the research findings, several strategies were employed addressing both qualitative and quantitative components of the mixed-method design. For the qualitative phase, credibility was strengthened through source triangulation, whereby data obtained from different participants—such as the principal, teachers, and educational staff—were compared and cross-verified to identify consistent patterns and reduce potential bias [32], [33].

In addition, member checking was conducted by confirming key interpretations and summaries with selected participants to ensure that the findings accurately reflected their perspectives and experiences. The study also provided a detailed contextual description of the research setting, including the geographical, technological, and institutional conditions of the school, enabling readers to assess the transferability of the findings to similar contexts [34].

For the quantitative phase, the reliability of the questionnaire was evaluated using Cronbach's Alpha to determine the internal consistency of the measurement instrument. This statistical test ensured that the items used to assess learning effectiveness measured the same underlying constructs in a stable and coherent manner. By combining qualitative trustworthiness procedures with quantitative reliability testing, the study maintained methodological rigor and produced findings that are both credible and dependable [35].

8. Ethical Considerations

Participation in this study was entirely voluntary, and informed consent was obtained from all respondents prior to data collection. Participants were clearly informed about the purpose of the research, the procedures involved, their right to decline or withdraw at any time without penalty, and how the data would be used for academic purposes only. To protect participants' privacy, confidentiality and anonymity were strictly maintained throughout the study by removing any personally identifiable information from transcripts, questionnaires, and reports [36].

Codes or pseudonyms were used in place of real names to ensure that individual responses could not be traced back to specific participants. All collected data were securely stored and accessed only by the researcher, thereby minimizing the risk of misuse or unauthorized disclosure. These ethical measures were implemented to uphold professional research standards and to ensure that the rights, dignity, and well-being of all participants were fully respected [37].

RESULT AND DISCUSSION

1. Initial Conditions: Dominance of Asynchronous Learning

Prior to the transformation, learning activities at SMP Negeri 7 Senayang were predominantly conducted using asynchronous methods due to limited technological infrastructure and unstable internet connectivity in the archipelagic region. Instruction mainly relied on assignments distributed through messaging platforms, recorded materials, and self-paced tasks. This approach resulted in minimal real-time interaction, delayed feedback, low participation, and declining student motivation. The 2024 School Quality Report also indicated a decrease in instructional quality, particularly in aspects related to engagement and learning innovation. From a pedagogical perspective, the absence of direct communication reduced social presence and weakened students' sense of accountability, leading to passive learning behaviors.

These findings challenge the assumption within flexible learning theory that asynchronous

modes inherently promote autonomy and self-regulated learning. While asynchronous learning can support independence in well-resourced contexts, the present results indicate that in environments with limited guidance and weak digital literacy, it may instead produce disengagement and isolation. This supports social constructivist perspectives emphasizing that meaningful learning emerges through interaction and shared meaning-making rather than solitary task completion. Thus, the effectiveness of asynchronous learning appears highly context-dependent, particularly influenced by infrastructure, supervision, and learner readiness [38].

2. **Management Strategies for Transforming to Synchronous Learning**

The transformation toward synchronous learning did not occur spontaneously but was driven by deliberate management strategies implemented by school leadership. These included structured planning, teacher coordination, capacity building, adaptive scheduling, and the selection of low-bandwidth communication platforms accessible to students. The principal played a central role in policy direction, while teachers collaborated to redesign lesson plans suitable for real-time delivery. This coordinated effort demonstrates that organizational leadership is a decisive factor in educational change, particularly in resource-constrained environments.

Qualitative findings reveal that synchronous sessions were scheduled flexibly to accommodate connectivity limitations, and teachers were encouraged to use interactive methods such as live explanations, question–answer sessions, and collaborative tasks, creating a more dynamic learning environment than the previous asynchronous approach [6].

This finding reinforces educational management theories that position leadership as a key driver of school improvement and innovation. However, it also nuances technology-centered models of digital transformation, which often emphasize tools rather than governance. The success observed here suggests that pedagogical change is primarily a managerial and organizational process rather than a purely technological one. In line with distributed leadership theory, collaborative planning among teachers enabled collective ownership of the transformation, increasing implementation fidelity. Therefore, effective leadership can compensate for infrastructural limitations by optimizing human and organizational resources.

3. **Improvement in Learning Effectiveness**

Quantitative data collected from student questionnaires show a substantial increase in key indicators of learning effectiveness after the implementation of synchronous learning. Students reported higher levels of engagement, more active participation, stronger teacher–student interaction, greater learning satisfaction, and improved perceived effectiveness. These improvements can be explained by the immediate feedback and real-time communication inherent in synchronous environments, which support cognitive processing and motivation .

Table 3. Students' Perceptions of Learning Effectiveness After Synchronous Implementation

Indicator	Mean Score (1–5)	Interpretation
Student engagement	4.21	High
Teacher–student interaction	4.35	Very High
Participation level	4.18	High
Learning satisfaction	4.27	High
Perceived effectiveness	4.30	Very High

Table 3 demonstrates that all measured indicators fall within the high to very high categories, indicating a positive student response to synchronous learning. The highest score was observed in teacher–student interaction, suggesting that real-time communication significantly enhanced instructional clarity and responsiveness.

These results align with interactionist learning theories, which argue that dialogue, feedback, and social presence are central to effective instruction. They also support the Community of Inquiry framework, where teaching presence and social presence jointly foster cognitive presence. However, the high effectiveness scores contrast with some studies suggesting that synchronous learning may increase cognitive load or technological fatigue. The discrepancy may be explained by the limited prior interaction in the asynchronous phase—making synchronous sessions feel novel, supportive, and motivating rather than overwhelming. Thus, effectiveness is influenced not only by modality but also by learners' prior experience and expectations [39].

4. **Qualitative Evidence Supporting Quantitative Findings**

Interview and observation data reinforce the statistical results by providing contextual explanations. Teachers reported that synchronous sessions enabled them to monitor student understanding directly, identify misconceptions, and adjust teaching strategies immediately. Students also became more accountable because their presence and participation were visible during live sessions. Observations revealed increased peer interaction, collaborative discussion, and spontaneous questioning—behaviors rarely observed during asynchronous learning. This convergence between qualitative and quantitative evidence indicates genuine changes in classroom dynamics rather than superficial perceptual shifts.

From a theoretical standpoint, these findings support formative assessment theory, which

emphasizes the importance of immediate feedback for learning improvement. Real-time monitoring enables teachers to scaffold instruction within students' zones of proximal development, as proposed by Vygotskian theory [40]. At the same time, the results challenge behaviorist models that rely heavily on task completion as evidence of learning. In this context, observable interaction and dialogue proved to be more meaningful indicators of understanding than merely submitting assignments, highlighting the limitations of purely outcome-based evaluation in asynchronous settings [41], [42], [43], [44], [45].

5. Integration of Findings and Implications

The integrated analysis confirms that the management-driven transition to synchronous learning significantly improved instructional effectiveness at SMP Negeri 7 Senayang. The findings support the research hypothesis that systematic implementation of synchronous learning enhances engagement, participation, and satisfaction. Nevertheless, the study also reveals that asynchronous learning remains valuable as a complementary mode for flexibility and independent study, particularly in contexts with connectivity constraints. Compared with studies conducted in technologically advanced settings, this research demonstrates that successful digital transformation depends more on adaptive leadership and strategic coordination than on sophisticated infrastructure alone.

This integrated outcome supports blended learning theory, which posits that combining synchronous and asynchronous approaches yields optimal results by balancing structure and flexibility. However, the present study suggests that the sequence of implementation also matters: in contexts where interaction has been minimal, introducing synchronous learning can serve as a catalyst for re-engagement before establishing a balanced model [46], [47], [48]. This finding extends existing theory by highlighting contextual sequencing as a critical factor in instructional design. Ultimately, effective learning transformation appears to emerge from the alignment of pedagogy, management, technology, and local conditions rather than from any single component alone [49].

CONCLUSION

This study concludes that the management-driven transformation of learning from asynchronous to synchronous modes at SMP Negeri 7 Senayang significantly improved overall learning effectiveness in a resource-constrained archipelagic context. Prior to the intervention, the dominance of asynchronous learning resulted in low interaction, delayed feedback, limited participation, and declining instructional quality. Through systematic management strategies—including structured planning, leadership coordination, teacher collaboration, adaptive scheduling, and the use of accessible communication platforms—the school

successfully implemented synchronous learning despite technological limitations.

Empirical evidence from both qualitative and quantitative data demonstrates substantial improvements in student engagement, participation, teacher–student interaction, learning satisfaction, and perceived effectiveness. These findings confirm the research hypothesis that synchronous learning, when supported by effective management, enhances instructional quality by fostering real-time communication, immediate feedback, and stronger social presence. At the same time, the study reveals that asynchronous learning remains important as a complementary mode to provide flexibility and accommodate connectivity constraints.

Theoretically, this research underscores that the effectiveness of learning modalities is highly context-dependent and strongly influenced by leadership and organizational capacity rather than technology alone. Practically, the findings offer valuable implications for policymakers, school leaders, and educators in remote or disadvantaged regions seeking sustainable strategies for educational improvement. Future research is recommended to examine long-term learning outcomes, scalability across different educational levels, and the development of optimized blended learning models that integrate synchronous and asynchronous approaches in a balanced manner.

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