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Visual Communication Patterns to Enhance Conceptual Understanding Among Students on the Autism Spectrum at SLB Autisma Yogasmara Semarang

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Abstract

This study examines visual communication patterns used by teachers to support conceptual understanding among students on the autism spectrum at SLB Autisma Yogasmara Semarang. A descriptive qualitative approach was employed, with data collected through classroom observations, in-depth interviews with the principal and teachers, and documentation. Informants were selected purposively based on their involvement in instructional activities. Data were analyzed using the interactive qualitative framework of data condensation, organization, display, and conclusion drawing and verification, with credibility supported through triangulation and information verification. The findings reveal that teachers employ picture cards, symbols, tangible objects, television, and other instructional resources within the Individualized Learning Program (PPI). Visual communication follows a reciprocal process involving message presentation, student responses, feedback interpretation, and instructional adjustment. Visual representations support students' recognition of symbols, understanding of instructions, and participation in learning activities. Communication challenges, including tantrums, wandering behavior, and differences between home and school routines, require flexible instructional strategies. The study concludes that visual communication functions as an interpersonal, instructional, and adaptive process supporting situated meaning-making and conceptual understanding, although causal improvements in learning outcomes cannot be established.

Keywords: *Autism Spectrum Disorder, Conceptual Understanding, Individualized Learning, Symbolic Interaction, Visual Communication.*

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INTRODUCTION

The increasing emphasis on equitable and individualized education has brought renewed attention to the communication conditions that shape learning opportunities for students on the autism spectrum. Contemporary special education research recognizes that instructional accessibility cannot be achieved solely through curriculum adaptation, because students may experience substantial differences in interpreting spoken instructions, processing symbolic information, maintaining attention, and connecting abstract concepts with observable experiences. Visual communication has consequently become a significant component of educational practice, particularly where conventional verbal instruction does not adequately accommodate heterogeneous communication profiles. Recent developments in augmentative and alternative communication (AAC), picture-based learning, digital activity schedules, and multimodal instructional systems demonstrate an expanding range of approaches for presenting information through accessible symbolic representations (Almurashi et al., 2022; Hammond et al., 2025). Evidence concerning visual supports in physical activities further suggests that their educational relevance extends beyond academic instruction to participation in structured activities, where visual cues can clarify expectations and sequences of actions (Forbes & Yun, 2023). Research on picture-based representations and communication technologies also indicates increasing scholarly interest in the relationship between symbolic accessibility, communication participation, and learning processes among autistic children (Holyfield et al., 2024; Pope & Light, 2026). Indonesian special education research reflects related concerns, particularly the development of alternative communication systems and instructional strategies

responsive to autistic learners' individual characteristics (Erlani et al., 2022; Normawati et al., 2025). These developments raise a broader scientific question concerning how visual information acquires instructional meaning through interactions between teachers and students, rather than merely whether visual materials are available during lessons. This question is particularly relevant to specialized educational institutions such as SLB Autisma Yogasmara Semarang, where individualized learning arrangements provide an institutional setting for examining how teachers combine visual representations, verbal explanations, demonstrations, and students' responses during instructional communication. The educational significance of this phenomenon lies in the need to understand visual communication as a potentially adaptive process through which instructional messages become recognizable, interpretable, and applicable to students' learning activities.

Recent scholarship on visual communication and autism education can be organized into three interconnected research directions: structured visual instruction, symbolic communication development, and technologically mediated learning support. The first direction concerns visual schedules, picture prompts, and representations that organize instructional activities and facilitate student participation. Research examining visual schedules and instructional engagement indicates that visual supports are frequently integrated with other teaching procedures, including peer-mediated instruction, rather than operating as independent educational mechanisms (Mahoney & Davis, 2024). Comparative investigations of picture prompting and video prompting have similarly extended scholarly attention to the different representational formats through which learners receive procedural information and develop functional skills (Benson et al., 2024). The second direction examines AAC and the social construction of communicative meaning through symbols. Studies investigating aided enhanced milieu teaching, AAC intervention packages, and visual scene displays approach symbolic representations as components of communicative exchanges in which the interpretation of messages depends on interaction between communication partners (Logan et al., 2024; Edgar et al., 2024; Patenaude et al., 2025). This literature suggests that visual materials should not be evaluated exclusively according to their graphical characteristics, because their communicative functions are also shaped by instructional arrangements, opportunities for response, and the accessibility of symbolic content. The third direction addresses representation design and technological adaptation, including digital activity schedules, pictorial communication systems, and differences between text-based and picture-based representations (Hammond et al., 2025; Pope & Light, 2026). Research synthesizing pictorial and graphic representations in reading comprehension interventions further extends this discussion toward the relationship between external representations and students' interpretation of learning content (Lee et al., 2025). Investigations comparing different pictogram systems highlight the relevance of representation selection for individuals with complex communication needs (Zurita Díaz et al., 2026). Across these research directions, visual communication emerges as a multidimensional educational practice involving the organization of information, symbolic representation, communicative participation, and individualized instructional support, although these dimensions have not always been examined through the same analytical framework.

Despite these advances, the literature reveals a distinction between establishing the educational utility of visual supports and explaining the interactional processes through which those supports contribute to conceptual understanding. Research on activity schedules and prompting systems has primarily organized its analytical attention around identifiable instructional procedures and their relationships with engagement, independence, or functional performance (Benson et al., 2024; Mahoney & Davis, 2024). Such approaches provide valuable evidence concerning the application of visual materials, but their emphasis does not necessarily explain how teachers interpret learners' responses, negotiate the meaning of instructional symbols, or modify messages when initial communication is unsuccessful. Studies of AAC and symbolic communication address communicative interaction more directly, although their intervention-oriented designs frequently concentrate on particular communication systems, specified communication behaviors, or defined populations rather than the broader organization of everyday instructional exchanges (Edgar et al., 2024; Logan et al., 2024). Research synthesizing digital schedules, visual scene displays, and pictorial representations likewise contributes knowledge about instructional accessibility, but its intervention-specific focus leaves room for a complementary examination of how different visual resources operate together within a school-based communication process (Hammond et al., 2025; Patenaude et al.,

2025; Lee et al., 2025). A systematic review of caregiver-implemented visual supports demonstrates the additional relevance of implementation settings and communication partners, suggesting that the characteristics of those providing visual support deserve analytical consideration alongside the materials themselves (Avery et al., 2025). The resulting research gap is therefore not an absence of evidence concerning visual supports for autistic learners, but a more specific limitation in the integration of instructional representation, reciprocal teacher–student interaction, interpretation of behavioral responses, and adaptive message adjustment within a single qualitative account of conceptual understanding. A related contextual gap concerns the need for situated descriptions of how these processes operate in Indonesian special education institutions, where instructional practices may involve individualized programs, multiple communication modalities, and differing student responses. These gaps justify an investigation that examines the communicative mechanisms connecting visual media with students' observable interpretation of instructional concepts without presuming that the presence of visual materials independently establishes learning effectiveness.

The consequences of insufficiently examining these interactional mechanisms extend to both the conceptual foundations of visual communication research and the practical organization of special education instruction. Scientifically, treating visual supports primarily as instructional instruments risks obscuring the distinction between the presentation of information and the communicative process through which learners develop an understanding of its meaning. A visually accessible instruction does not necessarily establish that the intended concept has been understood, since interpretation may depend on prior experiences, the consistency of symbolic associations, opportunities for clarification, and teachers' recognition of individual responses. Research comparing different prompting formats demonstrates the relevance of instructional representation, while studies of AAC interactions emphasize the communication conditions surrounding the use of symbols (Benson et al., 2024; Holyfield et al., 2024). An integrated interpretation is needed to determine how these dimensions can be examined within ordinary educational practice without reducing conceptual understanding to the immediate completion of an assigned task. Practically, insufficient knowledge of adaptive communication processes may limit teachers' ability to distinguish difficulties arising from unfamiliar visual representations, unclear instructional messages, inconsistent routines, or temporary disruptions in attention and participation. Frameworks for applying visual schedules demonstrate the significance of systematic implementation, although instructional consistency must also be considered alongside students' changing communication and learning needs (Liang, 2025). Research on caregiver-implemented supports raises a related concern about the continuity of visual communication across instructional and noninstructional environments (Avery et al., 2025). Indonesian investigations of alternative communication development and effective learning strategies reinforce the practical relevance of adapting instructional resources to students' communicative characteristics rather than applying uniform methods indiscriminately (Erlani et al., 2022; Normawati et al., 2025). For SLB Autisma Yogasmara Semarang, these considerations establish the need to examine how visual materials are incorporated into individualized educational activities, how teachers recognize communicative difficulties, and how instructional messages are clarified or modified. Addressing these issues can support a more analytically grounded understanding of accessible instruction while providing practical knowledge relevant to teachers, school administrators, and professionals involved in supporting autistic students' learning.

The present study is positioned at the intersection of visual instructional communication, symbolic meaning-making, and individualized special education practice, with an analytical emphasis distinct from studies primarily concerned with evaluating specific visual interventions. Existing research has examined picture and video prompting, visual activity schedules, digital representations, pictorial reading supports, and AAC technologies as identifiable educational approaches (Forbes & Yun, 2023; Hammond et al., 2025; Lee et al., 2025). Research on communication interventions and visual scene displays has also emphasized the importance of interactive symbolic systems, while comparative investigations of pictogram formats and text-based representations demonstrate that the characteristics of visual symbols constitute a relevant dimension of communication accessibility (Patenaude et al., 2025; Pope & Light, 2026; Zurita Díaz et al., 2026). These contributions establish a substantial foundation for examining instructional representations, but they do not by themselves constitute a context-specific account of how teachers coordinate multiple visual materials with verbal instructions, demonstrations, student feedback, and subsequent message adjustments in an Indonesian

special education classroom. The proposed contribution of this study is to examine these elements as an interconnected pattern of instructional communication rather than as separate media categories or isolated teaching techniques. Its conceptual orientation treats pictures, symbols, and tangible objects as representations whose instructional significance develops through repeated association with activities, responses, and teacher-mediated interpretation. Its contextual contribution lies in examining SLB Autisma Yogasmara Semarang, where instruction is organized through the Individualized Learning Program, known locally as Program Pembelajaran Individu (PPI), and where communication may require adjustment to individual learning characteristics and variations in classroom participation. Its methodological contribution lies in using qualitative evidence from classroom observation, interviews, and documentation to reconstruct the relationship between message delivery, visual representation, student response, feedback interpretation, and instructional modification. This approach does not claim to introduce a previously unknown visual intervention or establish causal effectiveness. Its novelty instead consists of integrating communication processes and instructional adaptation into a situated analytical account of how conceptual understanding is supported, thereby extending intervention-centered discussions toward the mechanisms of meaning-making within everyday teacher–student interaction.

This study aims to describe and critically analyze the patterns of visual communication employed by teachers to support conceptual understanding among students on the autism spectrum at SLB Autisma Yogasmara Semarang. Specifically, the investigation seeks to identify the forms and instructional functions of visual media used in classroom activities, examine how teachers combine visual representations with verbal instructions and demonstrations, analyze how students' responses are interpreted as communicative feedback, and explain how teachers adjust their messages and instructional strategies according to individual learning needs and classroom conditions. Conceptual understanding is examined through observable indicators within instructional interaction, including students' recognition of visual symbols, responses to directions, associations between representations and learning activities, and performance of tasks corresponding to communicated instructions. The study adopts a descriptive qualitative orientation to examine these processes in their institutional setting without assuming uniform learning outcomes or attributing causal effects to particular instructional materials. Its principal theoretical contribution is the development of an integrated understanding of visual communication as a reciprocal process involving symbolic representation, message interpretation, feedback, and adaptive instruction, rather than a one-directional transfer of information through teaching media. Its methodological contribution is a context-sensitive analytical approach that connects teachers' reported practices with observed instructional interactions and documentary evidence. Its practical contribution is to provide an empirically grounded basis for reflecting on visual media selection, instructional consistency, teacher responsiveness, and individualized communication strategies in special education. The study thereby seeks to clarify how visual communication operates as an instructional and interpersonal process through which students on the autism spectrum can engage with and interpret concepts presented during classroom learning.

RESEARCH METHODS

This study employed a descriptive qualitative research design to examine visual communication patterns used by teachers to support conceptual understanding among students on the autism spectrum at SLB Autisma Yogasmara Semarang, Indonesia. The investigation focused on instructional communication processes, particularly the presentation of visual messages, teacher–student interactions, students' responses, and the adaptation of communication strategies to individual learning needs. The principal units of analysis were instructional interactions involving teachers, students, and visual communication media within classroom learning activities. Research informants comprised the school principal and teachers, who were selected purposively based on their direct involvement in instructional activities, educational management, and communication with autistic students. Data were collected through classroom observation, in-depth interviews, and documentation. Classroom observations examined how teachers incorporated picture cards, symbols, tangible objects, television, and other available instructional resources into communication activities, with particular attention to message delivery, demonstrations, student responses, and instructional adjustments. Interviews with the principal and teachers addressed the school's instructional system, teacher responsibilities, visual media utilization, communication barriers, and approaches to evaluating

students' learning progress. Documentary materials provided supplementary information concerning the institutional profile, instructional arrangements, available facilities, and implementation of the Individualized Learning Program (Program Pembelajaran Individu, PPI). These complementary sources enabled the investigation to consider both the reported organization of instructional communication and its observable implementation in classroom activities.

The qualitative data were analyzed using the interactive analytical framework of Miles, Huberman, and Saldaña (2014), encompassing data collection, data condensation and organization, data display, and conclusion drawing and verification. Information obtained through observations, interviews, and documentation was examined according to its relevance to the research objectives, particularly the forms of visual communication, the instructional functions of visual symbols, patterns of teacher–student interaction, and the adjustment of instructional messages in response to students' communicative and behavioral characteristics. Data condensation involved organizing relevant information into analytical categories concerning visual message presentation, student recognition and interpretation of instructional cues, communicative feedback, and teacher responses to communication difficulties. The organized information was subsequently examined across data sources to identify recurring interaction patterns, relationships between visual representations and instructional activities, and variations in communication strategies associated with individual learning needs. Conceptual understanding was examined qualitatively through observable instructional indicators, including students' recognition of symbols, responses to directions, engagement with learning materials, and performance of activities corresponding to communicated instructions, without treating these observations as standardized measurements of cognitive development. Conclusions were developed through interpretation of the relationships among instructional communication practices, student responses, and adjustments made during learning activities. The credibility of the findings was addressed through comparison of information obtained from different sources, triangulation of observation, interview, and documentation data, and verification of relevant information with authorized parties. This analytical procedure provided a basis for examining visual communication as an interpersonal, instructional, and adaptive process while maintaining the distinction between observed communication practices and claims of causal instructional effectiveness.

RESULTS AND DISCUSSION

Visual Communication Patterns in Teacher–Student Instructional Interactions

Visual communication at SLB Autisma Yogasmara Semarang was characterized by reciprocal instructional interactions in which teachers combined verbal messages with concrete visual representations to support students' interpretation of learning activities. Classroom observations and interviews indicated that teachers employed picture cards, symbols, tangible objects, and television to communicate instructions according to students' individual learning characteristics. The instructional process involved message presentation, observation of student responses, interpretation of feedback, and modification of communication strategies when the intended message was not adequately understood. This interactional structure is consistent with the understanding of communication as a reciprocal process in which meaning develops through exchanges between communicators rather than through message transmission alone (Littlejohn et al., 2017).

The instructional organization of the school provided a relevant institutional basis for understanding how visual communication was implemented. Interview data identified nine teachers and 21 students, with instructional activities organized through the Individualized Learning Program (Program Pembelajaran Individu, PPI) and teachers assigned on a rotating basis. The PPI established an individualized instructional arrangement, although the available evidence did not document standardized differences in communication outcomes between students or instructional programs. The significance of this arrangement corresponds to research emphasizing that visual instructional supports require adaptation to learners' individual characteristics and the conditions under which learning activities occur (Hume et al., 2021).

A prominent communication pattern involved teachers presenting verbal instructions alongside visual symbols or demonstrations and subsequently observing students' actions to determine whether further clarification was required. Students' responses included attention to instructional materials, verbal or behavioral reactions, and participation in activities corresponding to teachers' directions. These responses served as observable feedback rather than standardized measures of conceptual

development, making their interpretation dependent on the instructional situation and the expectations associated with each activity. Research on symbol-based communication similarly emphasizes that instructional representations acquire communicative functions through their association with meaningful actions and opportunities for response (Logan et al., 2024).

The interaction between visual message delivery and student feedback can be organized into analytically distinct stages based on the instructional procedures described in the observational and interview findings. Teachers did not rely exclusively on the initial presentation of a visual representation, since unsuccessful or unclear responses could prompt repetition, further explanation, demonstration, or adjustment of the instructional medium. Table 1 presents an analytical synthesis of these documented communication activities without assigning numerical frequencies or assuming that every sequence occurred identically across students. This interpretation is compatible with the broader emphasis on responsive communication partners in AAC interventions involving autistic learners (Edgar et al., 2024).

Table 1. Observed Patterns of Visual Instructional Communication at SLB Autisma Yogasmara Semarang

Communication Component	Empirical Evidence	Instructional Interpretation
Message presentation	Verbal instructions accompanied by pictures, cards, symbols, or objects	Instructional messages are represented in observable forms
Visual demonstration	Teachers demonstrate activities or provide examples	Instructions are linked to concrete actions
Student response	Attention, answers, actions, or behavioral reactions	Responses provide feedback about students' interpretation of instructions
Feedback interpretation	Teachers observe and evaluate students' responses	Communication difficulties can be identified during interaction
Message adjustment	Repetition, explanation, demonstrations, or changes in media	Instructional communication is adapted to students' immediate needs
Individualized instruction	Implementation of the PPI	Communication practices are adjusted to individual learning characteristics

Source: Analytical synthesis of classroom observations and interviews.

The communication components presented in Table 1 indicate that instructional meaning was developed through successive exchanges rather than through isolated exposure to visual materials. The distinction between message presentation and feedback interpretation is particularly significant because student attention or task completion cannot automatically be equated with comprehensive conceptual understanding. Teachers' subsequent explanations and demonstrations formed part of the instructional process through which potential discrepancies between intended messages and observable responses could be addressed. This interpretation is consistent with the conceptual foundations of symbolic interactionism, which emphasize the formation and modification of meaning through social interaction (Blumer, 1969; Mead, 1934).

The use of multiple visual media also indicates that instructional communication was not organized around a single standardized representation system. Picture cards and symbols provided simplified representations of instructional information, while tangible objects allowed teachers to associate messages with observable materials or activities. Television and other available equipment expanded the range of resources used during instruction, although the available observations did not establish that these resources constituted a formal digital communication intervention. Research comparing picture and video prompting supports the analytical distinction between different representational formats, while also demonstrating the need to examine their instructional functions rather than assume equivalent applications (Benson et al., 2024).

Communication disruptions constituted another characteristic of the instructional environment, particularly when students exhibited tantrums, wandering behavior, or difficulties associated with differences between routines at home and at school. Interview and observation data indicated that teachers responded by adjusting communication strategies and the duration of activities according to

students' immediate circumstances. These observations should not be interpreted as evidence that visual communication independently reduced behavioral difficulties, since the research did not employ behavioral frequency measurements or a comparative intervention design. The relevance of predictable and adaptable visual communication is nevertheless supported by research examining visual supports across educational, home, and community settings (Rutherford et al., 2020; Avery et al., 2025).

The role of teachers as interpreters of student responses distinguishes the observed communication practices from a purely technical application of visual instructional materials. A symbol or picture could function as an instructional message only when its intended association with an activity was communicated and interpreted through interaction. Teachers' repetition of instructions and modification of representations illustrated the importance of communicative responsiveness in maintaining the relationship between instructional objectives and students' observable engagement. Research on visual schedules likewise identifies structured presentation and consistent instructional procedures as relevant considerations in supporting autistic learners' participation (Knight et al., 2015; Liang, 2025).

The findings identify three interrelated characteristics of visual communication at SLB Autisma Yogasmara Semarang: interpersonal reciprocity, instructional structuring, and adaptation to individual learning needs. Interpersonal reciprocity was reflected in the relationship between teacher messages and student responses, instructional structuring appeared through the combination of visual representations and demonstrations, and adaptation occurred when teachers modified communication following unclear responses or classroom disruptions. These characteristics provide a qualitative explanation of how communication was organized, although they do not establish the comparative effectiveness of particular visual media or measurable gains in conceptual understanding. The analytical emphasis on responsive and structured communication is consistent with contemporary research on visual supports and communication interventions, which recognizes the relevance of both instructional representation and opportunities for communicative participation (Mahoney & Davis, 2024; Holyfield et al., 2024).

Visual Media as Symbolic Representations in the Construction of Conceptual Understanding

Visual media at SLB Autisma Yogasmara Semarang functioned as instructional representations through which teachers connected verbal messages with concrete objects, recognizable images, and observable activities. Classroom observations identified the use of picture cards, symbols, blocks, tangible objects, and television as resources for presenting information according to students' individual learning characteristics. These materials were incorporated into instructional interactions rather than treated as independent communication systems, since teachers accompanied their use with explanations, demonstrations, and responses to students' behavior. This relationship corresponds to the principle of symbolic interactionism, which regards meaning as something developed and interpreted through social interaction rather than as an inherent property of objects or symbols (Blumer, 1969; Mead, 1934).

The instructional significance of pictures and symbols was associated with their capacity to represent information in forms that students could observe during learning activities. Teachers used visual materials to clarify instructions and establish connections between instructional messages and the actions students were expected to perform. The available findings indicate that the meaning of these representations depended on their association with repeated instructions and classroom experiences, rather than on visual presentation alone. Research on pictorial and graphic representations in reading comprehension interventions similarly identifies visual representation as an important dimension of instructional accessibility, although the cognitive processes associated with comprehension require more specific examination than the mere presence of pictures (Lee et al., 2025).

The use of tangible objects introduced a further dimension of symbolic communication by linking instructional messages with materials that students could directly observe or manipulate. Blocks and other physical resources provided concrete references during activities, enabling teachers to demonstrate the relationship between instructions and expected actions. These practices are analytically relevant because conceptual understanding involves more than identifying a visual sign; students must also associate that representation with the activity or meaning communicated through

instruction. Research on visual scene displays and symbol-based AAC supports the relevance of examining relationships among representations, communicative opportunities, and the interpretation of meaning (Patenaude et al., 2025; Logan et al., 2024).

The diversity of instructional media identified in the school indicates that visual representations were selected within an individualized teaching arrangement rather than through a single uniform format. Picture cards, symbols, television, and tangible objects served different instructional functions, although the research did not establish a standardized classification of their effectiveness or comparative learning outcomes. Table 2 organizes the documented instructional resources according to their observable roles and the conceptual processes they may support, while distinguishing empirical evidence from analytical interpretation. This distinction is relevant to contemporary investigations comparing pictorial communication formats, which demonstrate that representational characteristics constitute an important consideration when designing accessible communication systems (Pope & Light, 2026; Zurita Díaz et al., 2026).

Table 2. Visual Instructional Media and Their Symbolic Functions at SLB Autisma Yogasmara Semarang

Visual Media	Documented Instructional Use	Symbolic and Conceptual Function
Picture cards	Supporting verbal instructions and learning activities	Representing instructional information through recognizable images
Visual symbols	Communicating instructions and activity-related information	Associating symbolic representations with intended meanings
Blocks and tangible objects	Providing concrete materials during instruction	Connecting instructional messages with observable objects and actions
Television	Serving as an available visual instructional resource	Presenting information through a screen-based visual medium
Gym balls and trampolines	Supporting school learning and activity arrangements	Providing physical activity resources within the instructional environment
Occupational therapy equipment	Supporting individualized school activities	Providing specialized materials associated with students' developmental needs

Source: Analytical synthesis of classroom observations, interviews, and institutional documentation.

The classification presented in Table 2 illustrates that visual communication at SLB Autisma Yogasmara Semarang involved resources with different representational and instructional characteristics. Picture cards and symbols conveyed information through graphic representations, while tangible objects provided physical references that could be associated with teachers' instructions and demonstrations. Gym balls, trampolines, and occupational therapy equipment were identified as available resources, but the findings do not establish that they functioned as formal AAC devices or that their use independently improved conceptual understanding. This distinction corresponds to research examining visual supports in physical activities, where the instructional functions of visual information must be differentiated from the physical activities and equipment with which that information is associated (Forbes & Yun, 2023).

The interpretation of visual representations was closely related to the consistency of communication between teachers and students. When students did not respond as expected, teachers repeated instructional messages, provided examples, or adjusted the media used to communicate the intended activity. These adjustments indicate that the communicative significance of a picture or symbol could be reinforced through repeated associations between the representation, the instruction, and the student's response. Research on picture-based communication systems similarly emphasizes the relevance of structured symbolic associations, although evidence concerning formal AAC interventions should not be directly equated with the informal or individualized visual practices documented in this school (Flippin et al., 2010; Huang et al., 2026).

Individual differences among autistic students constituted an important consideration in the selection and interpretation of visual materials. Teachers adapted instructional resources through the Individualized Learning Program, recognizing that students could differ in their responses to

instructions, preferred activities, and ability to participate in classroom routines. The findings suggest that visual communication was organized around students' observable learning needs, although the research did not include standardized assessments of visual processing, symbolic recognition, or cognitive functioning. Contemporary research on AAC interventions and automated augmented input similarly emphasizes the importance of communication accessibility and the characteristics of individual learners, rather than assuming that a single representation format will be equally appropriate for every student (Holyfield et al., 2024; Edgar et al., 2024).

The relationship between visual representation and conceptual understanding was most directly observable through students' responses to instructional messages. Teachers interpreted students' ability to recognize signs, follow directions, respond to learning materials, and perform corresponding activities as indications that instructional information had been understood. These behavioral indicators provided a practical basis for evaluating immediate instructional communication, but they did not establish the durability, transferability, or independent application of conceptual knowledge beyond the observed learning situations. This distinction is consistent with research on structured visual instruction, which recognizes the educational relevance of visual schedules while requiring attention to the instructional procedures and specific learning outcomes associated with their implementation (Knight et al., 2015; Mahoney & Davis, 2024).

The use of television alongside conventional picture cards and tangible objects illustrates the coexistence of screen-based and physical visual media within the school's instructional environment. The available data did not specify particular software, digital activity schedules, multimedia programs, or technological interventions, making it inappropriate to classify the observed activities as technology-based experimental instruction. The relevant finding is instead that teachers had access to different forms of visual presentation that could be incorporated into individualized communication practices. Reviews of digital activity schedules and emerging visual communication technologies provide a comparative foundation for understanding this diversity, while emphasizing that technological sophistication and instructional effectiveness are analytically separate considerations (Almurashi et al., 2022; Hammond et al., 2025).

The findings establish visual media as components of a communicative process in which instructional meanings were presented, interpreted, and clarified through teacher–student interaction. Their significance was associated not only with the availability of pictures, symbols, and objects but also with teachers' capacity to connect representations with instructional activities and adjust messages according to students' responses. This interpretation extends the discussion beyond visual media as passive teaching aids toward an understanding of symbolic communication as an adaptive process involving representation, interaction, and situated meaning-making. Research concerning individualized learning strategies and structured visual supports provides a relevant foundation for this interpretation, particularly where communication practices must accommodate differences in students' abilities and instructional participation (Erlani et al., 2022; Normawati et al., 2025; Liang, 2025).

Adaptive Visual Communication and Its Implications for Students' Conceptual Understanding

The implementation of visual communication at SLB Autisma Yogasmara Semarang demonstrated that instructional adaptation was closely associated with teachers' interpretation of students' responses and individual learning characteristics. Classroom observations and interviews indicated that teachers modified instructions, repeated explanations, provided demonstrations, and adjusted learning materials when students did not respond as expected. These practices reflected an instructional process in which communication strategies were reconsidered according to observable participation rather than maintained as fixed procedures throughout learning activities. Research on evidence-based educational practices for autistic students similarly recognizes the relevance of individualized instructional arrangements and systematic adaptation to learners' communication and educational needs (Hume et al., 2021; Wong et al., 2015).

The Individualized Learning Program (Program Pembelajaran Individu, PPI) constituted an important organizational component of adaptive communication at the school. Interview findings established that instructional activities were arranged according to students' individual needs, with teachers assigned on a rotating basis and learning methods adjusted to students' interests and abilities. The available evidence suggests that instructional flexibility was incorporated into school practices,

although it does not establish the degree to which individual communication strategies remained consistent across different teachers. Research concerning effective instructional strategies and visual activity schedules indicates that individualized teaching requires attention to both learner characteristics and the systematic organization of instructional activities (Normawati et al., 2025; Liang, 2025).

Students' conceptual understanding was examined through observable responses to the visual and verbal messages presented during instruction. These responses included recognizing instructional signs, following directions, responding to learning materials, and performing activities associated with teachers' explanations or demonstrations. Such indicators provided evidence of students' immediate interpretation of instructional information, but they did not independently establish long-term conceptual retention or transfer of learning to unfamiliar situations. Research on pictorial representations in reading comprehension interventions supports the importance of distinguishing the accessibility of instructional representations from the specific dimensions of comprehension that educational activities are intended to develop (Lee et al., 2025).

Communication barriers emerged when students experienced tantrums, wandered during learning activities, or encountered differences between routines practiced at home and at school. Teachers responded to these situations through adjustments in instructional communication and the duration of learning activities, reflecting the need to accommodate variations in students' immediate readiness to participate. Table 3 synthesizes the documented instructional challenges, adaptive responses, and their implications for the interpretation of conceptual understanding without introducing unrecorded frequencies or intervention outcomes. Research on visual supports in educational and everyday environments provides a relevant basis for examining how instructional predictability and communication consistency relate to participation across different settings (Rutherford et al., 2020; Avery et al., 2025).

Table 3. Instructional Communication Challenges and Adaptive Responses at SLB Autisma Yogasmara Semarang

Documented Challenge or Condition	Teacher Response Identified in the Study	Implication for Instructional Communication
Unclear or inappropriate responses to instructions	Repetition, further explanation, or demonstration	Provides opportunities to clarify intended instructional meanings
Differences in individual learning needs	Adjustment of materials and instructional methods through the PPI	Supports communication aligned with students' observable abilities
Tantrums during instructional activities	Modification of communication strategies and activity duration	Allows instruction to respond to temporary participation difficulties
Wandering behavior	Adjustment of instructional interaction and learning activities	Requires flexibility in maintaining students' participation
Differences between home and school routines	Adaptation of instructional communication to students' circumstances	Highlights the relevance of routine consistency across environments
Variation in responses to learning materials	Observation and interpretation of students' actions and behavior	Provides qualitative feedback concerning immediate message comprehension

Source: Analytical synthesis of classroom observations, interviews, and institutional documentation.

The patterns presented in Table 3 indicate that instructional difficulties were addressed through changes in communicative procedures rather than through the substitution of visual media alone. The relationship between a documented challenge and a teacher's response was not necessarily uniform, because students' individual characteristics influenced how instructional activities were organized. Repetition, demonstrations, and material adjustments therefore represented adaptive responses that could support the clarification of instructional messages, although the available data did not permit comparisons of their relative effectiveness. This interpretation corresponds to research on visual prompting and instructional supports, which emphasizes the relationship between communication

procedures, learning tasks, and students' individual instructional requirements (Benson et al., 2024; Forbes & Yun, 2023).

The findings also indicate that communication adaptation involved an interpersonal dimension extending beyond the technical characteristics of visual instructional materials. Teachers observed students' actions and behavioral responses to determine whether instructions required clarification, making the interpretation of feedback an integral component of instructional decision-making. From the standpoint of symbolic interactionism, this process can be understood as the continuing negotiation of meaning through communicative exchanges in which symbols acquire significance through their association with shared activities and experiences (Mead, 1934; Blumer, 1969). The observed practices suggest that instructional responsiveness helped maintain communication when students' immediate interpretations did not correspond to teachers' intended messages.

The relationship between visual communication and conceptual understanding requires careful interpretation because the study employed a descriptive qualitative design rather than an experimental evaluation of learning effectiveness. The findings demonstrate how teachers used visual materials and communicative feedback to support students' recognition of instructional meanings, but they do not establish the magnitude of improvements in cognitive performance or communication proficiency. Research on AAC interventions and picture-based communication systems provides evidence that structured communication approaches can support particular communicative outcomes, although these intervention findings cannot be directly generalized to the instructional practices observed at SLB Autisma Yogasmara Semarang (Flippin et al., 2010; Huang et al., 2026; Logan et al., 2024). The contribution of the present investigation consequently concerns the organization and interpretation of classroom communication processes rather than the measurement of intervention effects.

The coexistence of visual instructional resources and individualized communication practices also raises questions concerning how communication accessibility may be maintained across different instructional situations. The school used picture cards, symbols, tangible materials, television, and activity-related equipment, but the observations did not identify a standardized procedure for comparing these resources or documenting students' responses across repeated instructional conditions. Studies concerning digital activity schedules, visual scene displays, and different AAC representations demonstrate the diversity of approaches available for supporting communication, while suggesting that the suitability of particular formats should be examined in relation to specific instructional objectives and learner characteristics (Hammond et al., 2025; Patenaude et al., 2025; Pope & Light, 2026). The absence of comparative measurements in the present study limits conclusions about media effectiveness but does not diminish the relevance of describing how teachers select and adapt available resources during classroom interaction.

An additional implication concerns the continuity of instructional communication between school-based learning and students' experiences outside the classroom. Interview findings identified differences between home and school routines as one of the conditions affecting students' learning activities, although the research did not directly examine communication practices within family environments. This finding suggests that differences in routine may influence the predictability of instructional expectations, but the available evidence does not establish their specific effects on conceptual understanding or behavioral regulation. Research on caregiver-implemented visual supports and social communication interventions provides a relevant comparative foundation for considering communication consistency across interaction partners, without assuming that the same procedures were implemented in the students' homes (Avery et al., 2025; Edgar et al., 2024).

The empirical contribution of this study lies in identifying adaptive visual communication as a reciprocal instructional process connecting message presentation, symbolic interpretation, student feedback, and teacher adjustment within an individualized educational setting. Teachers' communication practices demonstrated that observable understanding was interpreted through students' recognition of instructional representations and their responses to associated activities, while communication difficulties prompted clarification or modification of instructional messages. These findings extend the analytical focus of visual communication research from the selection of instructional media toward the interactional conditions through which visual representations support meaning-making, without claiming causal improvements that were not measured. The interpretation is consistent with scholarship concerning structured teaching, visual communication technologies, and educational interventions for autistic learners, while emphasizing the distinctive contribution of

situated qualitative evidence from SLB Autisma Yogasmara Semarang (Virues-Ortega et al., 2013; Almurashi et al., 2022; Hume et al., 2021).

CONCLUSION

This study concludes that visual communication patterns at SLB Autisma Yogasmara Semarang are characterized by reciprocal, instructional, and adaptive interactions between teachers and students on the autism spectrum. Teachers employ picture cards, visual symbols, tangible objects, television, and other instructional resources to present messages in concrete and observable forms, while the Individualized Learning Program (PPI) provides an organizational basis for adapting communication strategies to students' individual needs. The instructional communication process involves presenting visual messages, observing students' responses, interpreting communicative feedback, and modifying instructions through repetition, explanation, or demonstration when difficulties arise. Visual representations function not merely as teaching aids but also as symbolic resources through which students associate instructional messages with objects, actions, and learning activities. Students' recognition of symbols, responses to directions, and performance of instructed activities provide observable indications of immediate conceptual understanding. Communication challenges, including tantrums, wandering behavior, and differences between home and school routines, require teachers to maintain flexibility in instructional delivery. These findings demonstrate how conceptual understanding is supported through the interaction between visual representation, teacher responsiveness, and individualized instructional practices, although the descriptive qualitative design does not establish causal improvements in learning outcomes.

The principal scientific contribution of this study is its characterization of visual communication as an integrated process of symbolic representation, reciprocal feedback, and instructional adaptation rather than the isolated application of visual teaching materials. Its practical implications emphasize the relevance of selecting visual representations according to students' learning characteristics, maintaining consistency between symbols and instructional messages, and interpreting students' responses before adjusting communication strategies. The findings also provide a basis for schools and teachers to strengthen individualized instructional practices through systematic observation of communicative responses and appropriate adaptation of available learning resources. The study is limited to qualitative evidence obtained from observations, interviews, and documentation at one special education institution, without standardized measurements of conceptual understanding or comparisons of instructional effectiveness. Further research may examine how specific visual communication patterns relate to measurable conceptual learning, knowledge retention, and the transfer of understanding across instructional settings.

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