

Walk the Talk: When Teachers Become the Message in an Elementary School Smart Waste Management Program

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Abstract. Waste management programs in elementary schools generally rely on verbal messages from teachers, an approach that has yet to build sustained student habits. This study examines how a public elementary school in East Jakarta positions teachers as model sources of waste management messages in the Smart Waste Management (Cerdas Kelola Sampah/CKS) program, and the barriers that accompany it. A descriptive qualitative single case study was conducted using semi-structured interviews, non-participant observation, and documentation, analyzed with Miles and Huberman's interactive model and interpreted through educational communication and Bandura's social learning theory. Teachers deliver scheduled verbal messages, and Bandura's four processes are reflected in students' understanding of waste sorting and recycling. Teachers' role as exemplars emerged only after the program was underway. The barriers lie with the message actors rather than the facilities.

Keywords: educational communication; teacher behavior modeling; social learning theory; waste management; elementary school

1 Introduction

Waste problems in Indonesia have yet to shift from a handling-oriented pattern to a reduction-oriented one. Data from the National Waste Management Information System (Sistem Informasi Pengelolaan Sampah Nasional/SIPSN) for 2024 recorded national waste generation of 35.01 million tons per year, of which only 37.66 percent, or the equivalent of 13.18 million tons, could be managed [1]. This condition is also evident in dense urban areas such as East Jakarta. The government has sought to create programs aimed at raising public awareness of waste management and accustoming people to disposing of waste according to the instructions written on waste bins. One such government program is Smart Waste Management (Cerdas Kelola Sampah/CKS). The program has been socialized in schools, including an elementary school in East Jakarta. Elementary schools are important and strategic sites because they constitute the basic education unit, where students are at the foundational stage of developing awareness related to discipline in everyday life, particularly the habit of disposing of waste properly and understanding waste recycling. A number of studies have shown that waste management interventions in elementary schools can foster pro-environmental behavior, whether through composting, 3R (reduce, reuse, recycle) education and recycling-based creative activities, or plastic-free school policies. However, many schools treat environmental programs

as a series of technical activities and position teachers merely as deliverers of verbal appeals, leaving the programs short-lived and dependent on supervision. Debrah et al. [2], in their study of waste management practices in developing countries, found that students' low environmental knowledge is directly related to teachers' limited practical experience in waste management rather than to the absence of teaching materials. In the Indonesian context, collective habituation activities such as gotong royong (communal mutual cooperation) have proven to be an effective channel for instilling environmental care character in elementary schools [3].

The educational communication framework offers a different lens. Educational communication is a process of message delivery designed to achieve learning objectives and character formation; hence, its success is measured not by whether the message is delivered but by whether learners' knowledge, attitudes, and habits are formed [4]. Within this framework, teachers do not stand as neutral conduits of information. Teachers are message sources embodied in their own bodies and actions, so what teachers do can become a more powerful message than what they say.

Bandura's [5], [6] social learning theory explains this mechanism. Bandura asserts that most human behavior is learned through observing models rather than through direct experience of consequences, and that this learning unfolds through four interdependent processes: attention, retention, reproduction, and motivation. The effectiveness of modeling increases when the model possesses status, competence, and closeness to the observer. For elementary school students, teachers fulfill all three conditions simultaneously; theoretically, therefore, teachers are the most influential behavioral models in the school environment.

1.1 Research Gap

A review of prior studies reveals three interrelated gaps. Studies on waste management communication in Indonesia are dominated by institutional communicators, such as the communication strategy of the Environmental Agency in a zero waste program [7] and environmental communication strategies for household waste management [8]. Such communicators address adult audiences through time-limited campaigns. Elementary school teachers have the opposite characteristics: they are present every day in the same space as their message targets and are attached to formal authority, yet they have not been studied as communicators with these distinctive characteristics. The second gap concerns a shift in the research question, from proving influence to explaining formation. The question of whether teachers exert influence as models of children's environmental behavior has in fact been answered. Liang et al. [9] conducted a field experiment with children aged 7 to 13 years by manipulating the type of model (teacher or peer) and the valence of the demonstrated behavior, and then observed the children's subsequent waste disposal behavior. Only positive demonstrations by teachers significantly increased children's pro-environmental behavior, whereas demonstrations by peers had no effect. This finding settles the question of whether an influence exists, but simultaneously opens two unanswered questions. First, the experimental design isolated a single demonstration episode under researcher-controlled conditions; it therefore does not explain how a school repeatedly produces teacher observability in its daily operations, nor what sustains that observability when no researcher is orchestrating it. Second, the experiment assumed a uniform model, whereas in real schools teachers are a collection of individuals whose behaviors are not necessarily aligned. The question of how such uniformity is achieved remains untouched.

A similar gap appears in studies at the elementary school level, which generally report program outcomes, such as increased pro-environmental behavior among students after composting [10], 3R education and creative activities [11], or plastic-free policies [12]. These

reports show that the programs succeeded but do not dissect the pathways through which messages move from teachers to student behavior. Consequently, the findings are difficult to transfer to other schools, because what is available is a list of activities rather than an explanation of the conditions for success. Liang et al.'s [9] null finding for peer models even raises an unexamined tension with a common practice in Indonesian schools, namely appointing students as peer monitors. If peer demonstrations have no effect, the question becomes through what mechanism such practices work, and to what extent they depend on the teacher's presence behind them.

The third gap is theoretical. The framework commonly used in studies of environmental program communication is the communication planning model, which is procedural and organization-oriented. Such a framework maps the stages of program implementation well but lacks the tools to explain observational learning, that is, the process by which children acquire behavior by observing others. Conversely, social learning theory explains the mechanism of imitation but does not address how an organization designs and schedules the conditions that allow such imitation to occur. The two are rarely brought together, particularly in studies of environmental education communication in Indonesia.

1.2 Where Educational Communication Meets Behavior Modeling

Educational communication is commonly understood through a transmission logic, in which the communicator encodes ideas into symbols and channels them through media, and the receiver then interprets them [13]. Within this logic, teachers occupy the position of message encoders. Social learning theory offers a fundamental correction: messages exist not only in symbolic form but also in enactive form, that is, embedded in observable behavior [6]. Consequently, teachers are not merely encoders of the message; they are the message itself.

The two frameworks converge at three nodes. The first node is the source. Educational communication positions credibility as the determinant of message acceptance, while social learning theory positions the model's status, competence, and closeness as the determinants of the observer's attention. Both point to the same properties under different terms, and for elementary school students these properties are fully embodied in the teacher. The second node is the message. Educational communication emphasizes message clarity, whereas modeling emphasizes correspondence between the verbal message and the displayed behavior. When the two conflict, children tend to follow what the model does rather than what the model says, as demonstrated in Bryan and Walbek's [14] classic study of the gap between preaching and practice among children. The third node is the effect. Educational communication measures its success by changes in knowledge, attitudes, and behavior, while social learning theory explains the pathway leading to such behavioral change. Social learning theory therefore does not replace educational communication; rather, it fills the explanatory space between message and effect that has long been left empty.

This study aims, first, to identify the educational communication model used by teachers with students in socializing the Smart Waste Management program. Second, it seeks to identify the five stages of educational communication planning and to integrate two frameworks with an explicit division of roles, namely Cangara's [15] five stages of communication planning to explain how the program was designed and Bandura's [5] four modeling processes to explain why the message sticks.

2 Research Method

This study employed a qualitative approach with a descriptive method and a single case study design. This approach was chosen because the research objectives require an in-depth understanding of communication processes as they unfold in their natural context, rather than measuring frequencies or testing relationships between variables [16]. The research site was a public elementary school (SDN) in East Jakarta, selected purposively because it implements the Smart Waste Management (CKS) program in a structured manner with support from the school committee and the Environmental Agency. Data were collected from February to May 2026.

Informants were selected through purposive sampling, with the criterion of direct involvement in the design or implementation of the CKS program [17]. The informants consisted of the principal, the teacher in charge of CKS, the chair of the school committee, and two fifth-grade students.

3 Results and Discussion

3.1 Structured Verbal Messages

At the research stage of Cangara's [15] framework, teachers identified that the main problem was not a lack of facilities but the absence of a waste-sorting habit among students. According to the principal and the teacher in charge, before the program was designed, students continued to dispose of waste without regard to its category, even though color-coded bins were already available. The principal framed this as the failure of an approach that relied solely on theory:

"As for CKS itself, its background came from the awareness of the teachers at SDN Munjul 01. We realized that to build a habit or deliver learning, there has to be a program. And not only through theory; we also do hands-on CKS practice with the children so that they care more about the environment."

(Interview, May 14, 2026)

This statement indicates a shift in the communication assumptions underlying the program. The school no longer views behavioral change as the result of adding information but as the outcome of repeated, observable experiences; success is thus measured not by how much students know but by how consistently they act [4], [13].

At the planning stage, the school designated teachers as the main communicators, students as the primary audience, and parents as the secondary audience. The messages were designed to be simple and actionable, namely sorting waste according to color codes, bringing tumblers and lunch boxes, and turning plastic waste into valuable items, and were delivered through channels combining face-to-face interaction and digital media. The school also arranged the physical environment by involving the canteen operators, who, according to the informants, are the largest source of waste in the school. This arrangement is theoretically important because Bandura [6] asserts that behavior is formed through reciprocal determinism, that is, the reciprocal interaction among behavior, personal factors, and the environment. An environment consistent with the message removes contradictions that could weaken modeling.

3.2 Teachers as Message Sources: Bandura's Four Modeling Processes

This section dissects the mechanism of CKS message delivery using Bandura's four modeling processes. **Attention.** The modeling process can begin only when observers pay attention to the model. The public elementary school in East Jakarta creates the conditions for attention through a morning habituation routine held every day before seven o'clock on the school field. The teacher in charge explained that this forum is regularly filled with waste management material:

"At our school, every day there's a habituation routine before seven in the morning, and the routines vary, like waste management. It's held on the school field; the students are gathered and given information about waste management."

(Interview, May 6, 2026)

Two students stated that teachers remind them about waste management every day, while the school committee noted that these reminders are routinely given during the morning habituation routine and are even passed on to parents. The convergence of these three sources indicates that teachers' presence before students in the context of waste management is scheduled and institutionalized rather than incidental. It should be emphasized that what the three sources confirm is the recurrence of the activity, not teachers' behavior outside of it. Theoretically, fixed scheduling satisfies the attentional conditions proposed by Bandura, namely the regularity of the model's appearance and the prominence of the model's position in the observer's field of attention. Attention is also supported by the arrangement of the visual environment, in the form of color-coded waste bins as well as CKS-themed banners and billboards around the school, which serve as reminder cues when teachers are not near the students.

Retention. The CKS program supports retention through three instruments: first, the morning habituation routine conducted every day; second, the simplification of messages in the form of color-coded waste bins; and third, the use of flyers and social media content that package messages visually. The use of these digital channels is consistent with the finding of Permata et al. [18] that visual content on social media can persuasively reinforce environmental messages, although in this case the frequency of posts remains limited owing to teachers' workloads.

Reproduction. The school provides mandatory and collective daily opportunities for reproduction: students themselves carry their classroom waste containers to the disposal site, practice sorting, bring tumblers and lunch boxes, and turn plastic waste into products. A student representative described this series of practices as follows:

"First, we bring a tumbler and then bring our own lunch box. That cuts down on plastic waste and food waste. Then we throw trash in the right place. We recycle used bottles and make them into trash bins, or crafts like wayang puppets, pencil cases, or marker holders."

(S1, interview, May 2026)

Bandura [5] states that reproduction develops through repetition accompanied by corrective feedback. Teachers' guidance during waste sorting fulfills this feedback function; students are thus positioned as actors, and behavior that was initially imitated gradually becomes a mastered skill.

Motivation. The CKS program operates three forms of reinforcement simultaneously. Direct reinforcement occurs through daily correction by teachers. Vicarious reinforcement occurs through the Little Police (Polisi Cilik) mechanism, in which student representatives monitor proper waste disposal during recess. Self-produced reinforcement emerges from the recognition

given to recycled works put on display. The principal considered that all three have had an impact on students' attitudes:

"Now the students care more about waste, so they're more aware of it, and they also care more about cleanliness. The students take an active part in this program."

(Interview, May 14, 2026)

This assessment should be read as a claim by the program organizers rather than as a measurement of behavioral change. This study has no baseline data from before the program began; therefore, what can be stated is that a reinforcement structure is available and operating, not that behavioral change has been proven to persist.

These four processes show that teachers function as credible message sources. Teachers possess expertise because they master the sorting material, attractiveness because they are present in students' daily routines, and power because they are attached to formal authority within the school [19]. A fourth dimension that complements these three is the caring perceived by students, which McCroskey and Teven [20] identify as the component of credibility most decisive for message acceptance. The experimental findings of Liang et al. [9] reinforce this argument: among children aged 7 to 13 years, only positive demonstrations by teachers significantly increased pro-environmental behavior, whereas demonstrations by peers produced no meaningful effect. Together, these four dimensions make the teacher's presence a message that students can hardly ignore, and they explain why the same waste management message can fail when delivered through channels lacking repeated physical presence.

The research data also reveal less effective forms of communication, which are worth noting because they provide a contrast that underscores the five principles above. The principal acknowledged that the school's social media posts have not been continuous due to the workload of the supervising teachers, appearing only once a month or once a week. This channel is technically available and its message is correct, yet it lacks recurrence and therefore fails to generate stable attention. The same applies to outreach sessions by external parties, which are difficult to schedule regularly. This comparison strengthens the argument that the effectiveness of educational communication is determined not by the variety of channels used, but by the regularity of the message's presence and its alignment with the behavior displayed by its source.

A sharper contrast is offered by Mkhonto and Mnguni [21], whose student-driven, school-based recycling project did not improve learners' understanding of or attitudes toward recycling, partly because of weak motivation and inadequate guidance. This finding underscores that handing implementation over to students without the consistent presence of an adult model actually weakens the modeling process, and it also explains why the delegative mode in the CKS program functions only when it remains supported by the enactive mode and reflective conditions.

3.3 Teachers as Role Models

The finding most at odds with this study's initial assumption is that teachers had not been role models for students from the start of the CKS program. The teacher in charge revealed resistance among fellow teachers in the early phase:

"And at the beginning, our colleagues, the teachers, thought, what's the point, we must really have nothing better to do. But once it got going, everyone was on board."

(Interview with the teacher in charge of the program, May 6, 2026)

Regarding this finding, Bandura [6] asserts that the effectiveness of modeling declines sharply when observers are confronted with conflicting models. If some teachers sort waste while others ignore it, students receive two opposing messages from equally authoritative sources. Under such conditions, students tend to follow the model that demands the least effort. Uniformity of behavior among teachers is thus not merely a managerial matter but also a prerequisite for students to understand the message in the same way the teachers convey it. Following Bandura's theoretical logic, uniformity in teachers' waste-sorting behavior should have been established before the CKS program was implemented. According to the informants, the opposite occurred: the program was launched while teacher support was still uneven, and that support grew after the teachers became involved in it. Uniformity of exemplary behavior is therefore a circular process. This cycle can be broken down into three nodes. The first node is that the institutionalization of activities precedes conviction. The morning habituation schedule, the color-coded bins, and the division of daily tasks bound teachers' presence regardless of their initial attitudes, so teachers' observability to students had already begun to form before the teachers fully endorsed the program. The second node is that involvement changes the attitudes of those carrying it out. This direction is consistent with the finding of Miyasaka and Honda [22] that planning and carrying out activities to educate others increases educators' own environmental awareness. However, that finding was obtained from university student participants in an experimental design; here, therefore, it serves as a consistent explanation rather than as direct evidence for the case of in-service teachers. The third node is that changed attitudes stabilize the message. Once most teachers had come to believe in the program, what Bandura [23] calls collective efficacy was formed, and it is this shared belief that makes peer correction possible without being perceived as a reprimand.

"For CKS-focused activities, we usually coordinate with the teachers once every one or two months, but if, say, we find trash on a given day, we discuss it during the afternoon evaluation."

(KI, interview, May 14, 2026)

It is this routine evaluation practice that closes the loop. Procedurally, it fulfills the evaluation stage in Cangara's [15] framework; theoretically, it functions as a model-alignment mechanism, that is, a space in which teachers correct one another so that the behavior displayed before students remains uniform. This pattern supports Baiah and Fadiana's [24] argument that an environmentally oriented school culture is formed through continuous daily habits rather than through the mere establishment of a program. Ideally, schools need not wait for all teachers to be convinced before starting, because that conviction is partly born of involvement. What is needed is two things at once: an activity structure that binds teachers' presence from day one, and a periodic correction forum that fosters the awareness needed to carry out the program.

3.4 Peer Modeling and Reinforcement in the Family Sphere

The school extends the reach of modeling in two ways. The first is through the Little Police.

"The Little Police monitor every class during recess, watching for anyone who puts their trash in the wrong place, not in the bin of the right color."

(Interview, May 6, 2026)

Bandura [5] noted that similarity between model and observer increases the likelihood of imitation. However, the experimental findings of Liang et al. [9] show a different pattern in the context of school waste: demonstrations by peers had no significant effect on children's behavior, while demonstrations by teachers had a strong effect. This discrepancy calls for a

more careful interpretation of the Little Police's role. One possible interpretation is that the effectiveness of the Little Police in the CKS program stems not from a modeling function but from monitoring and reinforcement functions, namely extending the presence of correction into spaces and times beyond teachers' reach. This interpretation cannot yet be tested with the available data because the study was not designed to distinguish between the two mechanisms; it should therefore be treated as a conjecture awaiting further testing. The second way is by involving parents, as parties outside the school, in carrying out the same waste sorting. The school holds regular meetings with parents and positions them as actors, following a tiered pattern in which parents are trained first before passing the practice on to their children. This pattern aligns with the overlapping spheres of influence model in the dimensions of communicating, volunteering, and learning at home [25], and supports the findings of Sihvonen et al. [26] on parental involvement in sustainability education. From Bandura's perspective, this overlap prevents students from facing conflicting models at school and at home, and its impact is visible in the one-tumbler, one-lunch-box policy that reduces the circulation of plastic bottles at school. Communication with parents is supported by a WhatsApp group that speeds up the dissemination of information [27], although participation remains uneven, a challenge typical of post-pandemic school–family communication [28].

3.5 Barriers in the Modeling Process

Barriers to instructional communication can be divided into internal and external factors [29]. The barriers found in the CKS program are largely related directly to the conditions for successful modeling, particularly the regularity and uniformity of the behavior of the adults who serve as reference points. First, student awareness remains uneven. Some students still dispose of waste without regard to its category, even though socialization is carried out routinely. Within Bandura's framework, this condition indicates that the processes of attention and retention have taken place, but motivation is not yet strong enough to make the behavior persist without supervision. The principal explicitly framed the program's goal as independence that does not rely on teacher supervision, which means that the motivation stage is acknowledged as not yet fully achieved.

"Our hope, of course, is that every one of our students has a global awareness, not only being aware at school but aware wherever they are, because school hours only run from seven to twelve; the rest of the time, they spend most of their activities in the community or at home."

(Interview, May 14, 2026)

Second, diverse family conditions make reinforcement at home uneven. Some parents already understand the importance of bringing tumblers and lunch boxes, while others are constrained by busy schedules, and the school committee noted that attendance tends to be concentrated among the same individuals.

4 Conclusion

This study shows that what drives changes in waste management behavior in the Smart Waste Management program is not the message delivered by teachers, but the way the school arranges teachers' presence so that students can observe them repeatedly in the same space and time. The message is shifted from verbal explanation to a series of scheduled activities, and it

is this shift that fulfills all four conditions of modeling in Bandura's framework. School management should require teachers to be present before students every day in roles consistent with their message. Meanwhile, the barriers identified lie almost entirely on the side of the message actors rather than on the side of resources. Sorting facilities are available and institutional support is in place; what holds the program back is the awareness of some students that has not yet become established without supervision, uneven family support, initial resistance from fellow teachers, and the limited continuity of digital channels and external resource persons. This pattern reinforces the first conclusion: the main constraint on environmental programs in elementary schools lies in the regularity and uniformity of the behavior of the adults who serve as reference points, not in the completeness of facilities.

The theoretical contribution of this study lies in bringing together two frameworks that have so far operated separately: communication planning, which explains how a program is designed, and social learning theory, which explains why its message sticks. Its empirical contribution lies in the finding that uniformity of teachers' exemplary behavior is not a starting asset but an outcome that grows circularly as the program runs, so schools need not wait for all teachers to be convinced before starting. Practically, schools intending to design similar programs are advised to start with two things: an activity structure that binds teachers' presence from the outset, and a periodic evaluation forum that keeps teachers' behaviors from contradicting one another in front of students.

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