

## Information Processing in the Formation of Students' Morals: Cognitive-Behavior Perspectives and Qur'anic Values

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### A B S T R A C T

Islamic boarding schools (*pesantren*) in Indonesia have long been recognized as indigenous educational institutions that play a strategic role in shaping individuals with strong moral and religious character. This study aims to analyze the mechanism of moral character formation among *pesantren* students through the integration of Information Processing Theory, the Cognitive-Behavior perspective, and Qur'anic values. The research employs a qualitative library research approach focusing on conceptual analysis and theoretical synthesis rather than field-based numerical data. Data sources consist of primary references such as the Qur'an and authoritative works in cognitive and educational psychology, supported by secondary sources including accredited journals and classical as well as contemporary Qur'anic commentaries. Data were collected through systematic documentation and analyzed using descriptive content analysis following the interactive model of Matthew B. Miles and A. Michael Huberman. The findings reveal that moral formation in *pesantren* is not an instant or mystical process, but a structured cognitive-spiritual mechanism involving attention, encoding, storage, and retrieval of moral information reinforced by repetition, modeling, and reflective practices. The Cognitive-Behavior framework underscores the significant role of the *kyai* as a living model shaping students' belief systems and behavioral schemas, while Qur'anic concepts such as *tadabbur*, *tazkiyatun nafs*, and *muraqabah* function as metacognitive and spiritual control mechanisms. Theoretically, this study contributes by proposing an integrative conceptual model that bridges modern cognitive psychology and Islamic educational thought, demonstrating that moral character formation can be systematically explained through information-processing architecture enriched by cognitive-behavioral constructs and grounded in Qur'anic epistemology. This model extends the application of Information Processing Theory beyond academic learning into the domain of moral education, recontextualizes Cognitive-Behavior principles within a faith-based institutional setting, and offers a multidisciplinary framework for understanding character education as a structured cognitive-spiritual process. The study concludes that *pesantren* education represents an integrated cognitive-spiritual ecosystem that systematically cultivates sustainable moral character.

**Keywords:** *Information Processing Theory; Cognitive-Behavior; Qur'anic Values; Moral Character Formation; Islamic Boarding School (Pesantren)*

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## INTRODUCTION

Islamic boarding schools in Indonesia have long been recognized as indigenous educational institutions that play a strategic role in forming individuals with strong character as well as religious (Dhofier, 2011; Madjid, 1997). The uniqueness of the *pesantren* lies in the total institution education system, where all student activities for twenty-four hours take place in one integrated environment full of Islamic values. The main orientation of *pesantren* not only emphasizes intellectual prowess, but also the formation of noble morals (*akhlaqul karimah*) as the foundation of personality (Azra, 2012). In daily practice, students experience a simultaneous educational process between cognitive, affective, and behavioral aspects through intensive interaction with *kiai*, administrators, and fellow students. This situation makes *pesantren* a social and psychological space that is rich in moral learning stimuli.

However, the study of moral formation in Islamic boarding schools has tended to be dominated by theological-normative and sociological approaches (Muhaimin, 2015). These studies generally emphasize the role of kiai examples, religious culture, worship habits, and collective traditions in shaping the character of students. This perspective does provide an important conceptual foundation, but it has not explicitly examined the internal mental mechanisms that occur when students receive, process, store, and reactualize moral values in real behavior. In other words, previous research has focused more on the *outcome dimension* in the form of moral behavior, without tracing the cognitive processes that work behind the formation of these behaviors.

On the other hand, in the realm of educational psychology, Information Processing Theory has been widely used to explain how individuals receive input, encode, store information in memory, and *retrieve* the information in the context of academic learning (Ormrod, 2017; Schunk, 2012). This theory places learners as *active information processors* who actively organize and integrate learning experiences (Schunk, 2012). However, the application of this theory is still limited to formal cognitive learning such as understanding learning concepts and strategies, and has not been widely applied to explain the process of internalizing moral values in the context of pesantren education.

Similarly, the *cognitive-behavior approach*, especially within the framework of the social cognitive theory of Albert Bandura, emphasizes the concept of *triadic reciprocal determinism* which explains the reciprocal interactions between personal, behavioral, and environmental factors (Bandura, 1986). This perspective also highlights the role of *core beliefs* and *automatic thoughts* in shaping emotional and behavioral responses (Beck, 2011). However, this approach is more often used in the context of behavioral therapy and individual habit modification than as a framework for the analysis of moral formation in Islamic educational institutions.

Meanwhile, the study of Islamic education generally emphasizes the normative and spiritual dimensions based on the legitimacy of religious texts, without systematically integrating information processing theory or cognitive restructuring dynamics in explaining how Qur'anic values are mentally processed by students (Al-Attas, 1999). As a result, moral formation is often understood as a process of social habituation or linear transmission of values, rather than as a mental architecture that involves attention, elaboration of meaning, formation of *core beliefs*, and metacognitive control.

Thus, there is a *research gap* in the form of the absence of integrative studies that comprehensively link: (1) information processing mechanisms (attention, *encoding*, *storage*, and *retrieval*), (2) cognitive construction dynamics in a *cognitive-behavior* perspective, and (3) Qur'anic values as a normative foundation in explaining the formation of student morals in Islamic boarding schools. This integrative void shows the need for a multidisciplinary approach that is able to bridge modern cognitive psychology with the treasures of Islamic education.

In the perspective of Islam itself, the process of thinking and processing information acquires a strong theological legitimacy. The Qur'an uses terms such as *tafakkur*, *ta'qqul*, and *tadabbur* to encourage humans to do deep reflection on reality (Al-Ghazali, 2004). The concept of *tadabbur* in QS. Muhammad:24 emphasizes the importance of critical reflection on the meaning of information, which is psychologically in line with the concept of *elaborative rehearsal* in memory theory (Ormrod, 2017). The principle of *tabayyun* in QS. Al-Hujurat: 6 reflects the mechanism of information verification that intersects with metacognitive control, while the concept of *tazkiyatun nafs* in QS. Ash-Shams: 9-10 can be understood as a process of cognitive restructuring towards a clearer moral consciousness. This integration shows that the formation of morality does not only rely on the spiritual dimension, but also involves systematic and rational mental mechanisms.

Based on this description, this study aims to explain the architecture and information processing mechanism from a *cognitive-behavior perspective*, analyze the dynamics of the cognitive process that occurs in the formation of student morals in the pesantren environment, and formulate an integrative model between cognitive psychology and Qur'anic values in building a sustainable and meaningful student character.

**METHOD**

This research uses a qualitative approach with the type of library research which is specifically in the form of conceptual analysis and theoretical synthesis. The selection of this approach is based on the characteristics of the research object that is not oriented to field numerical data, but on the exploration and integration of ideas, texts, and theoretical constructions related to information processing, cognitive-behavioral perspectives, and Qur'anic values in the formation of students' morals. Conceptual analysis is carried out to clarify and systematically define key concepts such as attention, encoding, memory, core beliefs, and internalization of moral values. Meanwhile, theoretical synthesis is used to integrate the theoretical framework of modern cognitive psychology with Qur'anic principles in one coherent conceptual model. Thus, the main focus of research lies in the construction and development of theoretical models, rather than on the collection of empirical data based on surveys or field observations.

The data sources of this study are classified into primary and secondary data sources to maintain the validity and depth of the analysis. Primary data sources include the Qur'an as the main normative reference, especially verses related to the function of the intellect, heart, thought process, and character formation, such as QS. Al-Hashr: 18 and QS. Al-Isra: 36. In addition, primary sources also include authoritative cognitive and cognitive-behavioral psychology literature, including Albert Bandura's *Social Foundations of Thought and Action*, Judith S. Beck's *Cognitive Behavior Therapy: Basics and Beyond*, as well as educational psychology textbooks from Jeanne Ellis Ormrod and Dale H. Schunk which are widely used as academic references. The secondary data sources are obtained from accredited scientific journals that discuss Islamic psychology, pesantren education, and character building, as well as tafsir books such as *Tafsir Al-Misbah* and *Tafsir Ibn Katsir* which are relevant to the discussion of cognition and morality verses.

The data collection technique is carried out through a documentation method with systematic and targeted literature search. This process begins with the identification of keywords such as information processing, cognitive behavior, Islamic character building, and pesantren education to obtain relevant sources. Furthermore, a selection of sources is carried out based on the author's authority, publisher's reputation, theoretical relevance, and year of publication to ensure the quality and up-to-date of references. The selected literature is then analyzed comparatively to identify common points, differences, and opportunities for conceptual integration. This stage is part of the theoretical synthesis process that aims to build a structured conceptual framework while minimizing interpretation bias.

The collected data was analyzed using a content analysis technique that is descriptive-analytical by adopting an interactive flow from Matthew B. Miles and A. Michael Huberman, namely data reduction, data presentation, and verification and drawing conclusions. At the data reduction stage, the researcher selects the theories, concepts, and findings of the literature that are most relevant to the focus of the study and eliminates data that are not directly related. The data presentation stage is carried out through the preparation of conceptual matrices and integrative charts that connect the stages of information processing with the worship practices, learning, and social interaction of students in Islamic boarding schools. The verification and conclusion drawing stages are carried out through reflective and integrative synthesis in order to formulate a conceptual model for the formation of morals based on the processing of information and Qur'anic values. Through this procedure, the research seeks to show that the formation of the character of students is not only a religious normative phenomenon, but can also be understood as a systematic, structured, and epistemological mental process between cognitive psychology and revelation.

## FINDINGS AND DISCUSSION

## Findings

Table 1. Mapping the Information Processing Process and the Practice of Moral Formation of Students in Islamic Boarding Schools

Information Processing Stage	Practice in Islamic Boarding Schools	Stimulus Utama	Form of Student Response	Output Akhlak
Atensi (Attention)	Ta'zim to Kyai, ringing bells, tarhim	Authority figures, regular voices	Focus on listening, being silent, ready to receive directions	Hormat, discipline
Encoding (Penyandian)	Squirrel, Squirrel, Meaning of Squirt	Text of the book, oral explanation	Writing meaning, asking, repeating	Understanding the Meaning of Morality
Storage	The Rise of Nadatomy, the Habit of Being Self-Reliant	Verbal repetition and action	Memorization, behavioral routines	Habits, malakah
Retrieval	Everyday moral dilemma situation	Social/emotional conflict	Remembering advice/verses	Self-control, honesty, trust
Observational Learning	An example of Kyai	Real behavior of exemplary figures	Imitating attitudes and gestures	Sabar, tawadhu
Cognitive Restructuring	Mauidhoh hasanah, reframing simplicity	Spiritual advice	Changing perspective	Qana'ah, gratitude
Metakognisi Spiritual	Meditation, Meditation	Divine consciousness	Self-evaluation	Sincerely, responsibility

The table shows the conceptual data from the literature synthesis regarding the relationship between the stages of information processing and the typical practices of pesantren which have implications for the formation of student morals.

## Discussion

The results of the mapping show that the formation of students' morals takes place through a systematic and layered cognitive mechanism, not just a doctrinal process. In the early stages, data shows that the attention of students is greatly influenced by the sacredization of the Kyai figure and the routine sound ritual of the Islamic boarding school. These findings are in line with information processing theory that places attention as the main gateway for information entry into working memory. A structured learning environment has been shown to improve the quality of focus and information retention as described in cognitive learning theory (Ormrod, 2017). Thus, the practice of pesantren can be understood as a form of *attention engineering* that is psychologically effective.

The *encoding* stage shows that the sorogan and bandongan methods function as a *dual coding mechanism*, namely visual and verbal integration. The activity of writing the meaning of *gandul* and listening to Kyai's explanation encourages students not only to memorize but also to understand the structure of meaning. Theoretically, this condition is in line with *the Dual Coding Theory* which asserts that information processed through more than one sensory pathway will be easier to remember (Paivio, 1986). In addition, *the concept of elaborative rehearsal* in educational psychology emphasizes that deep processing will strengthen long-term memory storage (Schunk, 2012). These findings affirm traditional education studies that say pesantren methods are effective in improving conceptual understanding, not just memorization.

At the *storage* stage, the data showed the dominance of communal repetition practices such as *nadhom* and physical manners. This signals a shift from declarative memory to procedural memory, where moral behavior is no longer purely cognitive, but becomes an automatic habit. In learning theory, meaningful repetition plays an important role in habit formation and behavioral *automaticity* (Schunk, 2012). Compared to previous research that only highlighted memorization as a characteristic of pesantren, these findings broaden the perspective that repetition in pesantren is a character consolidation strategy, not just a memorization technique. Thus, this study is affirmative while enriching previous findings.

The *retrieval* stage shows that the strength of moral memory is tested when students face real conflicts. Students who have an emotional and spiritual connection to grades are faster to exercise self-control. This is in line with *the Levels of Processing Theory* which states that deep processing produces more durable memory than superficial processing ( Craik & Lockhart, 1972). These findings are also supported by moral psychology studies that emphasize the involvement of emotions in ethical decision-making. Thus, this study affirms the previous theory, while adding a religious dimension as a moral memory enhancer that is rarely discussed in Western psychological studies.

In the *perspective of Cognitive-Behavior*, the results show the great role of *observational learning* through Kyai figures. Students learn morals mainly through observation of real behavior, not just verbal instruction. This is very consistent with Bandura's Social Cognitive Theory regarding *vicarious reinforcement*, in which individuals mimic the behavior of the respected model and obtain indirect reinforcement (Bandura, 1986). Compared to formal education research that places teachers as academic facilitators, these findings show Kyai's position as a "living curriculum" that combines cognitive, affective, and spiritual aspects. Thus, this study is affirmative of Bandura's theory but provides an expansion of the religious context.

In the aspect of *cognitive restructuring*, the data shows that *mauidhoh hasanah* functions as a psychological *reframing* technique. Students who originally had negative thoughts about simplicity experienced a change in meaning after receiving spiritual advice. These findings are parallel to the concept of cognitive restructuring in *Cognitive Behavior Therapy* which emphasizes changing mindsets to change emotions and behaviors (Beck, 2011). However, this study presents a partial antithesis to the secular CBT approach, because the restructuring process in pesantren is not only based on psychological rationality, but also theological legitimacy and worship values that strengthen intrinsic motivation.

The dimension of Qur'anic integration shows that *tadabbur*, *tazkiyatun nafs*, and *muraqabah* serve as metacognitive layers that are not found in pure cognitive psychology. God-watched consciousness creates an internal surveillance system that is active all the time. In Flavell's theory, this condition can be understood as a form of high-level metacognition, namely the ability to monitor and evaluate one's own thought processes (Flavell, 1979). However, this study shows that in the context of pesantren, metacognition does not only come from rational awareness, but also transcendental awareness. Compared to general character education research, these findings are antithesis because they suggest that the control of religious behavior does not depend solely on social regulation, but on more stable internal spiritual regulation.

Overall, the results and discussions show that the formation of student morals is an integrative process between cognitive psychology mechanisms, social learning, and Qur'anic spiritual awareness. The findings of this study largely affirm modern psychological theories regarding memory, observation, and cognitive restructuring (Bandura, 1986; Beck, 2011; Ormrod, 2017; Schunk, 2012), but at the same time offers conceptual expansion through a transcendental dimension that makes the internalization of value more profound and sustainable. Thus, pesantren can be understood not only as traditional educational institutions, but as a systematic cognition-spiritual engineering ecosystem in shaping character.

## CONCLUSIONS

Based on the overall discussion of the research, it can be concluded that the formation of morals in the pesantren environment is not a magical or instant process, but a scientific process that can be explained through an integrated psychological and spiritual approach. In the perspective of Information Processing Theory, the morals of students are formed through systematic cognitive stages, starting from attention to the moral stimulus received, then encoding values through book recitation and learning activities, followed by storage through repetitive behavioral habituation, as well as retrieval that appears in daily social interaction practices. This process shows that moral education has a structured, measurable, and

sustainable mental mechanism. Furthermore, through the Cognitive-Behavior perspective, the pesantren environment plays a role as an ecosystem that forms the cognitive scheme of students. The example (uswah) given by the kiai and the ustadz is a model of behavior that strengthens the internal beliefs of the students. Morality does not only appear as an outward action, but as a manifestation of a belief system formed through social interaction, religious experience, and the internalization of the meaning of life. Thus, the moral behavior of students is the result of integration between the thought process, strengthening the environment, and forming relatively stable beliefs. Furthermore, the integration of Qur'anic values becomes a perfecting element in the entire psychological process. The concept of tadabbur functions to ensure deep processing or a deep understanding of the values learned, tazkiyatun nafs acts as a mechanism for purifying and maintaining mental-spiritual health, while muraqabah acts as a metacognitive control that maintains behavioral consistency. The synergy between rational mechanisms, physical habituation, and spiritual awareness is what makes moral education in Islamic boarding schools have strong durability and relevance in social life. In line with these findings, this study has some more concrete practical implications. First, at the pedagogical level, educators in pesantren need to design learning strategies that consciously optimize the stages of information processing, such as providing attention-grabbing stimulus, facilitating reflective discussions to strengthen encoding, and providing consistent social practice spaces to strengthen the storage and retrieval of moral values. Second, at the curriculum level, the teaching of the yellow book and moral material can be enriched with dialogical methods, case studies, and structured reflection so that students build solid core beliefs, not just following collective habits. Third, at the institutional level, pesantren can develop mentoring programs or halaqah character development based on reflective monitoring to strengthen the function of muraqabah and student self-regulation. Fourth, at the level of educational evaluation, indicators of moral success are not only measured from compliance with external behavior, but also from the ability of students to explain meaning, moral reasons, and consistency of values in different situations. Academically, this research opens up opportunities for the development of measurement instruments that are able to operationalize information processing variables and spiritual practices in the context of pesantren education. Therefore, further research is recommended to conduct empirical studies – both quantitative and mixed-method – to test the integrative model that has been formulated, for example by measuring the relationship between the intensity of the practice of tadabbur Al-Qur'an, the formation of core beliefs, and the ability to regulate students' emotions. With this approach, the integration between cognitive psychology and Qur'anic values does not only stop at the conceptual level, but can be empirically verified and developed into a more applicative and standardized model of character education.

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