



## Enhancing Motivation and English Learning Outcomes through the SANTREE Model in a Pesantren-Based Senior High School

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### ABSTRACT

Integrating religious values with 21st-century learning remains a significant challenge in Islamic boarding schools (pesantren), especially in English instruction, where low motivation and achievement persist. Addressing this gap, this study aims to examine the effectiveness of the SANTREE instructional model, an innovative learning design grounded in motivation theory, digital pedagogy, and collaborative learning, in enhancing students' motivation and English learning outcomes. A quantitative approach with a one-group pretest–posttest design was employed. The participants were 128 tenth-grade students from a pesantren-integrated private senior high school in East Java, Indonesia. Data collection involved a Likert-type motivation questionnaire based on the ARCS model and a cognitive test on narrative texts. Instruments were validated through expert judgment and statistical testing. Data were analysed using descriptive statistics, paired sample t-tests, simple linear regression, and effect size calculations. The results indicated substantial improvements in students' learning motivation and English achievement after the implementation of the SANTREE model. Furthermore, learning motivation emerged as a significant predictor of students' English learning outcomes, underscoring its central role in supporting academic performance. These findings confirm the pedagogical value of SANTREE in fostering student-centred, contextualised, and effective language instruction. The study offers practical implications for curriculum innovation in pesantren and similar educational contexts.

### KEYWORDS

Instructional model; Language learning; Motivation; Narrative text; Pesantren; SANTREE.

## INTRODUCTION

Education is crucial for human resource development in the digital age. According to Society 5.0, educational institutions must create adaptable methods and creative learning ecosystems to achieve global competitiveness and sustainability (Mahlomaholo et al., 2023; Ramírez-Montoya et al., 2025). Islamic boarding schools (*pesantren*), a unique educational institution in Indonesia, are gradually integrating modern technology in response to these demands. This involves digital literacy curriculum development and teacher training (Pamungkas et al., 2025; Zainuddin et al., 2024). This includes teaching 21st-century skills, including critical thinking, cooperation, and media fluency (Maharani, 2025; Nugroho & Astutik, 2024). *Pesantren* still struggle with poor digital infrastructure, inconsistent digital readiness among teaching staff, and the difficult task of reconciling technological advances with their long-standing moral and spiritual principles.

Therefore, the evolution of *pesantren* is indicative of a dynamic educational transformation that integrates an Islamic worldview, scientific reasoning, and contemporary tools to enhance the relevance of education and student outcomes (Budiharso et al., 2023; Ismail et al., 2025; Mar, 2024). Nevertheless, obstacles persist. In schools such as the Senior High School of Trensains Tebu Ireng Jombang, students' low motivation and weak performance in reading narrative texts are evident in classroom observations and teacher interviews, as curriculum rigidity, inadequate foreign language exposure, and lack of technological access continue to impede optimal learning, particularly in subjects such as English, contributing to Indonesia's persistently low performance in national assessments (Lundeto et al., 2021). Students are reportedly experiencing difficulty comprehending the structural components of narrative texts, such as orientation, complication, and resolution. This issue is further exacerbated by the ongoing reliance on conventional lecture-based instruction, which discourages learner autonomy and restricts active engagement. These circumstances indicate a pressing necessity for a pedagogical transition to more contextually grounded and responsive models.

Innovative, technology-supported, and collaborative instructional models are increasingly recognised as essential to advancing sustainable, student-centred learning. Improvements in both cognitive and affective learning outcomes have been associated with methodologies that prioritise critical thinking, interaction, and collaboration (Hendarwati et al., 2021; Khahro & Javed, 2022; Sibanda, 2023). Also, collaborative learning designs promote a sense of shared responsibility and community, which are particularly beneficial in religious educational environments (Pérez-Navío et al., 2023). Su and Zou (2020) have demonstrated that integrating technology into collaborative strategies in language acquisition can improve learner motivation, reading comprehension, and vocabulary. According Newton et al., (2020), collaborative learning environments supported by ongoing formative feedback and mastery-oriented assessment practices can strengthen student engagement and promote deeper learning, as students are encouraged to participate actively in reflective and iterative learning

processes. These models also facilitate contextual and authentic learning, as demonstrated by experience-based design methodologies in architectural education (Antonini et al., 2021). In the same vein, flipped and integrated learning environments are effective in enhancing conceptual understanding and promoting student engagement (Yangari & Inga, 2021). These models serve as the conceptual foundation for developing integrative, adaptive, and transformative learning models, such as SANTREE, tailored to the contextual requirements of contemporary *pesantren* education. Islamic boarding schools have many obstacles, from low learner motivation and academic performance to obsolete pedagogical techniques. Contextual and revolutionary instructional models are needed. The SANTREE model (Set Goals and Objectives, Assess Prior Knowledge, Navigate Technology, Teach Language Skills, Reinforce Learning, Engage Collaboratively, Evaluate Progress) is an innovative and adaptive learning system that meets these needs. *Pesantrens* must reconcile religious values and academic performance, making this concept particularly relevant. SANTREE boosts motivation and academic performance by encouraging digital literacy, learner autonomy, and meaningful interaction, preparing students for a fast-changing global community.

Middle schoolers focus on plot development and struggle with lexical understanding, cultural nuances, and implicit meanings, suggesting limited exposure to more complex narrative traits (Johansson, 2022). Narrative texts generally prompt lower-order thinking inquiries in high school students, indicating a lack of cognitive involvement (Aslan Altan, 2022). Text processing and interpretation are influenced by structural factors such as discourse, characterisation, and narrative arrangement, which impede narrative understanding (Tekercioğlu, 2024). Student understanding is sensitive to unfamiliar content and differs across literal, inferential, and evaluative levels (Krokou, 2022). Explicit narrative text structure training helps children with learning disabilities grasp and remember narrative content (Butler et al., 2021). As reading fluency develops in secondary education, prosodic reading becomes vital for comprehension (Álvarez-Cañizo et al., 2020). Theory of mind and mental state talk are more crucial for narrative interpretation than informational texts, highlighting literary reading's cognitive demands (Kim et al., 2021).

The lack of contextually adapted learning models for the 21st century, especially in modern Islamic boarding schools (*pesantren*) that integrate religious values, science, and technology, led to this research. Motive and learning outcomes are rarely studied together in a quantitative experimental design (Schunk, 2019). English narrative texts, particularly hidden meanings and narrative frameworks, remain problematic for Islamic boarding school pupils (Johansson, 2022). The unique SANTREE learning approach (Set Goals and Objectives, Assess Prior Knowledge, Navigate Technology, Teach Language Skills, Reinforce Learning, Engage Collaboratively, Evaluate Progress) was designed and tested in this study to fill this gap. This methodology boosts motivation and learning and fits modern Islamic boarding school education. This study builds on instructional design and motivation theories such as ARCS and

SDT (Chang, 2021) and presents a practical learning model for Islamic boarding school English teachers.

The objective of this study is to evaluate the efficacy of the SANTREE learning model in enhancing the process and outcomes of English learning in a contemporary Islamic boarding school setting, taking into account the aforementioned background and research gaps. In particular, the objectives of this study are as follows: (1) to investigate the extent to which the SANTREE model enhances students' English learning motivation; (2) to evaluate the extent to which the model enhances students' English learning outcomes; and (3) to ascertain whether learning motivation significantly predicts students' English learning outcomes post-intervention. The empirical evaluation of the SANTREE model's contribution to integrating adaptive, contextual, and technology-based instructional approaches to enhance learning quality in Islamic boarding institutions is predicated on these three objectives.

## LITERATURE REVIEW

### **Design Foundations of SANTREE in 21st-Century Learning Contexts**

To address the evolving requirements of 21st-century education, which prioritise contextual comprehension, collaboration, and critical thinking, it is imperative to implement innovative learning models. These models abandon conventional teacher-centred methodologies in favour of collaborative and problem-based methodologies that actively involve students in real-world challenges (Endrawan & Aliriad, 2023; Muawiyah, 2024). The need to equip learners with essential skills in an increasingly interconnected, technology-driven society is the driving force behind the urgency of these innovative models. According to Qurratu'ain et al. (2024) and Hanida et al. (2023), collaborative learning environments, such as those found in project-based learning contexts, have been shown to significantly enhance student engagement and learning outcomes by fostering peer interaction and teamwork (Suryanti et al., 2023). These changes emphasise the urgent need for educational institutions, such as Islamic boarding schools, to incorporate these methodologies to bridge the gap with traditional models that often fail to equip students with critical 21st-century skills.

The characteristics that define 21st-century learning models are a particular focus within modern educational practices. These models are inherently collaborative, rely heavily on digital tools, and emphasise contextual relevance (Mei et al., 2023; Wulandari, 2021). For example, research has shown that project-based learning methods significantly improve students' communication and collaboration skills, thereby enabling them to apply their knowledge to real-world scenarios (Aznia et al., 2022; Septiarini & Prasetyo, 2024). The discrepancy between conventional and innovative practices is particularly evident in settings such as Islamic boarding schools, where the development of these critical competencies may be hindered by outdated teaching methods (Sinensis et al., 2022). Recent research supports the notion that the successful implementation of innovative learning models can improve student engagement and enhance academic performance. This is because these models foster active learning environments that

are responsive to contemporary societal needs (Antonini et al., 2021; Suharti et al., 2024). Consequently, incorporating innovative learning models is essential to align educational practices with the competencies necessary for success in the 21st century.

Building on these principles, the SANTREE model was designed to operationalise 21st-century learning through a structured yet flexible instructional framework. While the model follows a systematic design logic to ensure instructional coherence, each stage is deliberately infused with collaborative and learner-centred activities grounded in social interaction and peer engagement, as emphasised in collaborative learning environments (Qurratu'ain et al. 2024). Digital tools are integrated not merely as delivery media, but as facilitators of interaction, reflection, and contextual engagement, aligning with the characteristics of 21st-century learning models that emphasise collaboration, technology integration, and contextual relevance (Mei et al., 2023; Wulandari, 2021). Furthermore, motivational and engagement-oriented strategies are embedded across all phases to foster active learning environments and enhance academic performance (Antonini et al., 2021). In this way, SANTREE reconciles structured instructional design with open-ended collaborative learning, translating theoretical foundations into a practical model tailored to the pedagogical realities of *pesantren*-based education.

### **Motivation and Learning Outcomes in Language Learning**

Learning motivation plays a central role in language education and is strongly supported by theoretical frameworks such as the ARCS model and Self-Determination Theory (SDT). The ARCS model promotes motivation through four key components: attention, relevance, confidence, and satisfaction, while SDT emphasises autonomy, competence, and relatedness as drivers of intrinsic motivation (Elliott et al., 2022; Mertasari et al., 2023). Intrinsic motivation, which stems from personal interest and enjoyment of learning, is consistently associated with higher engagement and long-term academic success compared to extrinsic motivation, which tends to yield short-term outcomes (Haftador et al., 2021; Peng & Fu, 2021). Empirical studies have shown that intrinsically motivated learners report greater self-rated proficiency and emotional satisfaction (Dong et al., 2022), while extrinsically motivated learners often depend on context-specific reinforcements, making their engagement less sustainable (Liu, 2021).

This relationship is particularly pertinent in the context of English learning within *pesantren* education, as language achievement is substantially predicted by motivation. Research suggests that intrinsic motivation has a more significant impact on learning outcomes, including comprehension, skill proficiency, and test performance, than extrinsic drivers (Amriza et al., 2023; Mamun et al., 2024). In integrated or collaborative environments, such as SANTREE, motivation also influences emotional factors, including anxiety and confidence, which, in turn, directly influence the academic performance of learners (Peng & Fu, 2021). Additionally, motivation is associated with learners' capacity to self-regulate, monitor, and manage their learning skills, which is essential in technology-integrated environments (Ortega-Torres et al., 2020; Tamimi, 2024; Zhu & Doo, 2021). This emphasises the significance of incorporating motivational strategies into instructional designs such as SANTREE, particularly in *pesantren*

settings that strive to integrate religion, science, and technology into meaningful and effective English language education (Rafique et al., 2021).

Rather than treating ARCS and SDT as separate motivational frameworks, this study integrates both perspectives within the SANTREE model by combining structured motivational scaffolding with opportunities for autonomy, collaboration, and competence development. While ARCS informs instructional strategies to sustain learners' attention, relevance, confidence, and satisfaction, SDT guides the creation of learning environments that support students' psychological needs, particularly autonomy and relatedness (Elliott et al., 2022). This integration is essential in technology-supported and collaborative settings, where motivation is closely linked to learners' emotional engagement, self-regulation, and academic performance (Peng & Fu, 2021). Consequently, SANTREE positions motivation not merely as an outcome variable, but as an embedded instructional mechanism that mediates students' engagement and English learning achievement in pesantren contexts.

### **Conceptual Foundation of the SANTREE Model**

The integration of numerous pertinent and complementary educational theories serves as the foundation for this investigation. Initially, Vygotsky's Social Constructivism Theory underscores that learning is most effectively achieved through social interaction, collaboration, and scaffolding within the zone of proximal development. This approach is consistent with the SANTREE model, which enables technology-based collaborative learning that encourages active student engagement. Secondly, Keller's ARCS Model is the foundation for developing learning strategies and motivational tools within SANTREE. Shekhar et al. (2020) and Baah et al. (2023) have demonstrated that this model is effective in enhancing student learning motivation across a variety of educational contexts, such as language and technology, by implementing four primary components: Attention, Relevance, Confidence, and Satisfaction. Third, the ADDIE Instructional Design Model (Branch) serves as the framework for developing SANTREE, from requirements analysis through implementation and evaluation. This process guarantees that learning is structured, contextualised, and focused on 21st-century outcomes (Spatioti et al., 2023). Lastly, Bandura's Social Cognitive Learning Theory emphasises the significance of individual interactions with the environment and technology in the development of learning behaviour. The digital collaboration-based approach advocated by SANTREE is relevant to the concepts of self-efficacy, observational learning, and social influence (Zahra et al., 2023; Kim et al., 2021). These four theories provide a robust foundation for the SANTREE model, which aims to enhance motivation and English learning outcomes through a collaborative, contextual, and technology-based approach. SANTREE is pertinent to addressing the challenges of 21st-century learning in modern Islamic boarding schools, as it incorporates these theories without compromising religious values.

The theoretical framework of this research was established by incorporating innovative learning design (SANTREE), motivational theories (ARCS, SDT), and social-cognitive theory. The relationships were logically designed: the implementation of SANTREE as an independent

variable was expected to increase learning motivation (an intervening variable), which in turn would positively impact English learning outcomes, particularly narrative text comprehension (a dependent variable). This framework is consistent with the discovery that intrinsic motivation has a substantial impact on learning outcomes and engagement (Mertasari et al., 2023; Peng & Fu, 2021). Narratively, this research framework progresses from the issue of low motivation and learning outcomes in Islamic residential schools to interventions that are based on the SANTREE model, and subsequently to the measured cognitive and motivational effects.

## METHOD

### **Research Design**

Utilising a one–group pretest–posttest design, this investigation implemented a quantitative research methodology (Smith, 2023). This design was selected due to practical and administrative constraints within the *pesantren*-based school context, where random assignment and the establishment of parallel control groups were not feasible. The intact-class approach also ensured instructional continuity and ethical equity by allowing all students to participate in the intervention. By measuring outcomes within the same group before and after implementation, this design enabled the identification of learning changes attributable to the treatment, making it suitable for preliminary model evaluation in authentic educational settings (Coburn, 2015).

### **Research Participants**

During the 2024/2025 academic year, the survey population consisted of Grade X students at a private senior high school integrated with a *pesantren* in the Jombang area. Through purposive sampling, a total of 128 students were chosen based on their compatibility with the experimental schedule and the availability of classes (Bostley & Peters, 2023). The participants were typically aged 15-16 and included both male and female students. Most students lived in the boarding school environment and followed a structured daily routine that combined religious and academic activities. The school serves students from predominantly middle- to lower-middle socio-economic backgrounds in a semi-rural area, with limited prior exposure to technology-enhanced English learning. In general, students demonstrated moderate to low initial English proficiency and had minimal experience with collaborative digital learning approaches prior to the intervention.

This sampling approach was adopted to facilitate the initial implementation and contextual validation of the SANTREE model in an authentic educational setting. The intervention was implemented over six instructional sessions on English narrative texts. Although this timeframe allowed for the observation of immediate learning gains, it may be insufficient to determine long-term effects. Accordingly, the results reflect short-term impacts, highlighting the need for future studies with extended durations and larger samples.

### **Data Collection Tools**

To gather quantitative data pertinent to the research objectives, this investigation used both test and non-test instruments (Bostley & Peters, 2023). The test-based instrument was used to evaluate students' English learning outcomes through pre- and posttests, while the non-test instrument was a learning motivation questionnaire. To ascertain students' perspectives on various motivational dimensions, the motivation questionnaire used a Likert-type scale (Okello, 2022). Two primary instruments were devised and implemented to guarantee the validity of the research findings: (1) a Learning Motivation Questionnaire and (2) an English Learning Outcome Test that concentrates on narrative texts. The following tables, 1 and 2, contain the specifics of each instrument. The motivation questionnaire was developed in accordance with Keller's ARCS motivation model, which encompasses four dimensions: Attention, Relevance, Confidence, and Satisfaction (Chang, 2021; Mirzaei et al., 2022). The instrument consisted of 20 items that were arranged on a 5-point Likert scale, with a range of 1 (strongly disagree) to 5 (strongly agree).

**Table 1.**

#### Learning Motivation Questionnaire Grid

Dimension	Indicator	Item Number
Attention	Curiosity, interest, variation	1, 2, 3, 4, 5
Relevance	Goal orientation, usefulness	6, 7, 8, 9, 10
Confidence	Self-efficacy, control of learning	11, 12, 13, 14, 15
Satisfaction	Sense of achievement, reward, enjoyment	16, 17, 18, 19, 20

The cognitive test was designed according to Bloom's revised taxonomy, focusing on cognitive levels C3 to C5. It consisted of 20 multiple-choice questions (four options each), assessing students' ability to apply, analyse, and evaluate information related to narrative texts (Aslan Altan, 2022; Zahra et al., 2023).

**Table 2.**

#### English – Narrative Text Grid

Cognitive Level	Indicator	Item Number
C3 (Apply)	Identify the function of narrative elements	1–7
C4 (Analyse)	Analyse sequence, cause-and-effect	8–14
C5 (Evaluate)	Justify interpretations or answers	15–20

In order to guarantee the quality of measurement instruments, both reliability and validity were meticulously evaluated (Kaplan, 2023). Two experts in educational research and English language teaching evaluated the content validity of both instruments, confirming that all items were relevant to the research constructs. Construct validity was examined using Exploratory Factor Analysis (EFA), yielding a Kaiser–Meyer–Olkin (KMO) value of 0.821 and a significant Bartlett's Test of Sphericity ( $p < 0.001$ ), indicating adequate sampling suitability. Four motivational factors were extracted as expected, with all item loadings exceeding 0.50. A pilot study involving 30 students was conducted to assess instrument reliability. The learning

motivation questionnaire demonstrated high internal consistency (Cronbach's Alpha = 0.89), while the English learning outcome test showed satisfactory reliability (KR-20 = 0.84). As data collection relied exclusively on objective cognitive tests and self-report questionnaires, no observational or rater-based assessments were employed; therefore, inter-rater reliability was not applicable in this study. Table 3 provides a concise summary of these findings.

**Table 3.**

Summary of Instrument Validity and Reliability

Instrument	Type of Test	Sample Size (N)	Reliability Coefficient	Interpretation
Motivation Questionnaire	Cronbach's Alpha	30	0.89	High Reliability
Learning Outcome Test	KR-20	30	0.84	Acceptable Reliability

### **Data Analysis Technique**

A structured sequence of statistical procedures was implemented to analyse the quantitative data (Okello, 2022). The initial screening involved descriptive statistics and Shapiro–Wilk tests to identify outliers, missing data, and data normality. To evaluate the influence of the SANTREE model, a paired-samples t-test was conducted, along with assumption checks for independence, interval-scaled difference scores, and normality of the difference scores. When parametric assumptions were not met, the Wilcoxon Signed-Rank Test was applied as a nonparametric alternative. The predictive relationship between students' English learning motivation and English learning outcomes was examined using simple linear regression, preceded by tests of linearity, normality of residuals, homoscedasticity, and residual independence (Durbin–Watson). The results of these regression assumption tests are summarised in Table 9 to confirm the model's suitability before hypothesis testing. The magnitude of treatment effects was interpreted using Cohen's *d*, as presented in Table 4.

**Table 4.**

Interpretation for Cohen's *d*

Cohen's <i>d</i>	Effect Size Category
$0.20 \leq d < 0.50$	Small
$0.50 \leq d < 0.80$	Medium
$d \geq 0.80$	Large

### **Ethical Considerations**

Ethical permission for this study was obtained from the school administration (Research Permit No. B/74732/UN38.1/PP.11.01/2024). Written informed consent was secured from students and their parents or guardians after they were informed about the study objectives and procedures. Participation was voluntary, data were anonymised, and findings were reported in aggregate without affecting students' academic evaluations.

## RESULT

The preliminary analysis involved examining data from 128 Grade X students who participated in the SANTREE model intervention. Table 5 presents the descriptive statistics for all variables measured in this study.

**Table 5.**

Descriptive Statistics of All Variables

Variable	N	Mean	SD	Min	Max	Skewness	Kurtosis
Learning Motivation							
Pretest	128	67.42	8.15	48	85	-0.312	0.441
Posttest	128	78.86	7.23	62	95	-0.198	-0.165
English Learning Outcomes							
Pretest	128	58.28	9.67	35	80	0.089	-0.287
Posttest	128	71.45	8.94	50	90	-0.156	0.112

The descriptive analysis shows that the intervention improved learning motivation and English learning results from pretest to posttest. The posttest mean learning motivation score was 78.86 (SD = 7.23), up 11.44 points from 67.42 (SD = 8.15). This increasing trend indicates increased student participation and passion throughout the study. The mean score for English learning outcomes increased 13.17 points from 58.28 (SD = 9.67) to 71.45 (SD = 8.94). This significant improvement implies participants' English ability and mastery. Furthermore, the skewness and kurtosis values for all variables were within acceptable limits ( $\pm 2$ ), indicating generally normal distributions suitable for statistical analysis. For sample sizes up to 2,000, the Shapiro-Wilk test is ideal for assessing normality and detecting deviations. The test findings in Table 6 supported normal distributions, confirming improvements in motivation and learning outcomes.

**Table 6.**

Normality Test Results (Shapiro-Wilk)

Variable	Statistic	df	Sig.	Interpretation
Learning Motivation				
Pretest	0.988	128	0.312	Normal
Posttest	0.991	128	0.598	Normal
English Learning Outcomes				
Pretest	0.985	128	0.189	Normal
Posttest	0.989	128	0.425	Normal
Difference Scores				
Motivation Difference	0.987	128	0.267	Normal
Learning Outcomes Difference	0.983	128	0.134	Normal

The Shapiro-Wilk test shows that all variables, including pretest-posttest scores, follow normal distributions ( $p > 0.05$ ). This crucial finding supports the use of parametric statistical tests in future research, ensuring robust and reliable results. Data screening verifies that the

dataset meets the assumptions of statistical methods, such as paired-sample t-tests, thereby ensuring its integrity. These assessments will enable a precise pretest-posttest comparison, revealing the statistical significance of changes in learning motivation and English learning outcomes. With normally distributed data and the assumptions met, the analysis can confidently and clearly assess the intervention's impact.

### Impact of SANTREE on Students' Motivation and Learning Outcomes

To examine the effectiveness of the SANTREE instructional model, paired-samples t-tests were conducted to compare pretest and posttest scores for both learning motivation and English learning outcomes, as shown in Table 7.

**Table 7.**

Paired Sample t-test Results for Learning Motivation and English Learning Outcomes

Variable	Measure	Mean	SD	Mean Difference	SD Difference	t	df	Sig. (2-tailed)	95% CI
Learning Motivation	Pretest	67.42	8.15	-11.44	6.89	-	127	< 0.001	[-12.65, -10.23]
	Posttest	78.86	7.23						
English Learning Outcomes	Pretest	58.28	9.67	-13.17	7.82	-	127	< 0.001	[-14.54, -11.80]
	Posttest	71.45	8.94						

The SANTREE intervention significantly enhanced learning motivation and English learning outcomes, as demonstrated by paired sample t-tests ( $p < 0.001$  for both). Motivation rose from a pretest mean of 67.42 to 78.86, and English outcomes improved from 58.28 to 71.45, with reliable gains confirmed by 95% confidence intervals. Large effect sizes (Cohen's  $d$ : 1.66 for motivation, 1.68 for outcomes) highlight the intervention's substantial impact. Normality of data, verified by the Shapiro-Wilk test ( $p > 0.05$ ), and fulfilment of statistical assumptions ensure robust findings. These results underscore SANTREE's effectiveness and suggest potential for broader educational application, warranting further investigation into its key components. Cohen's  $d$  was calculated to assess the practical significance of the observed improvements, following Cohen's (1988) guidelines for interpreting effect size, as shown in Table 8.

Both variables demonstrated enormous effect sizes ( $d > 1.30$ ), indicating substantial short-term improvements following the SANTREE intervention. However, these effect sizes should be interpreted within the context of a single-group design and a limited intervention duration. The observed gains reflect immediate instructional impacts in a specific pesantren setting rather than sustained or generalized effects. Accordingly, while the findings suggest

promising practical implications for English learning motivation and outcomes, further studies employing control groups and more extended implementation periods are needed to confirm the stability and transferability of these results.

**Table 8.**

Effect Size Analysis (Cohen's d)

Variable	Cohen's d	Effect Size Category	Interpretation
Learning Motivation	1.66	Very Large	The SANTREE model had a significant practical impact on student motivation.
English Learning Outcomes	1.68	Very Large	The SANTREE model had a significant practical impact on learning outcomes.

### Predictive Role of Motivation on English Learning Outcomes

To examine the third research objective regarding the predictive relationship between learning motivation and English learning outcomes, a simple linear regression was conducted with posttest motivation scores as the predictor and posttest English learning outcomes as the criterion, as shown in Table 9.

**Table 9.**

Regression Assumption Testing

Assumption	Test/Method	Result	Interpretation
Linearity	Scatterplot examination	Linear pattern observed	Assumption met
Normality of residuals	Shapiro-Wilk test	W = 0.988, p = 0.341	Normal residuals
Homoscedasticity	Breusch-Pagan test	$\chi^2 = 2.14$ , p = 0.144	Equal variances
Independence	Durbin-Watson test	DW = 1.987	No autocorrelation

**Table 10.**

Simple Linear Regression Results

Variable	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
(Constant)	12.48	—	—	—	—
Motivation	0.748	—	0.742	12.44	< .001

*Dependent Variable: English Learning Outcomes*

$R = 0.742$ ;  $R^2 = 0.551$ ;  $Adjusted R^2 = 0.547$ ;  $F(1,126) = 154.68$ ;  $p < .001$

Before analysis, all regression assumptions were met. Scatterplots confirmed linearity between predictor and criterion variables. The Shapiro-Wilk test (W = 0.988, p = 0.341) showed regularly distributed residuals. Homoscedasticity was confirmed by the Breusch-Pagan test ( $\chi^2$

= 2.14,  $p = 0.144$ ), indicating equal variances in anticipated values. A Durbin-Watson score of 1.987, within the allowed range (1.5-2.5), proved residual independence and no autocorrelation as shown in Table 10.

Simple linear regression analysis revealed that students' English learning motivation significantly predicted English learning outcomes ( $\beta = 0.742$ ,  $p < .001$ ). The regression model accounted for 55.1% of the variance in English learning outcomes ( $R^2 = 0.551$ ),  $F(1,126) = 154.68$ ,  $p < .001$ , indicating a strong positive association between motivation and academic performance. The unstandardized regression coefficient showed that for every one-unit increase in motivation, English learning outcomes increased by 0.748 points ( $B = 0.748$ ). These results reflect short-term instructional effects within the specific pesantren context of this study.

## DISCUSSION

The results indicate a notable increase in students' learning motivation following the application of the SANTREE model, with a mean increase of 11.44 points from pretest to posttest (pretest = 65.30; posttest = 76.74;  $p < 0.001$ ). The effect size, quantified by Cohen's  $d = 1.66$ , signifies a substantial and practically significant impact. This motivational enhancement can be attributed to the organised phases of the SANTREE model, which closely correspond to the ARCS framework: Attention, Relevance, Confidence, and Satisfaction. These components are meticulously crafted to incite curiosity, align information with learners' objectives, enhance self-efficacy, and foster a sense of achievement, all of which were evident in the students' heightened engagement. The current literature on collaborative technology-enhanced learning and ARCS-based motivational techniques further substantiates this outcome. Instruction using ICT and digital collaboration has demonstrated improvements in excitement, engagement, and access to learning resources (Zen et al., 2022; Gopinathan et al., 2022). Likewise, interactive and mobile learning designs correlate positively with student engagement and satisfaction (Mivehchi & Rajabion, 2020).

Simultaneously, empirical evidence substantiates the efficacy of the ARCS model across various educational contexts, encompassing project-based learning. (Shekhar et al., 2024), music education, digital media design (Chang, 2021), flipped learning, and electronics instruction activities (Dutta et al., 2020). This research consistently illustrates that ARCS-based solutions enhance student engagement, performance, and happiness (Bakar et al., 2020; Yang & Junsuwan, 2025), particularly when integrated with digital innovation or gamification (Baah et al., 2023). Collectively, these data indicate that the motivational efficacy of SANTREE arises from both its digital and collaborative attributes, as well as its robust theoretical foundation in the ARCS model. This renders it a highly adaptable and influential pedagogical innovation for 21st-century learners.

The application of the SANTREE approach resulted in a notable improvement in students' English learning outcomes, with a mean improvement of 13.17 points from pretest to posttest

(pretest = 61.22; posttest = 74.39;  $p < 0.001$ ). The impact size ( $d = 1.68$ ) signifies a substantial and practically significant enhancement. This outcome underscores the pedagogical efficacy of the SANTREE model in improving students' understanding of narrative texts through organised, interactive learning experiences. These findings correspond with recent research highlighting the efficacy of technology-based collaborative learning (TBCL), experiential learning, and inquiry-driven instruction in enhancing academic performance (Asad & Qureshi, 2025; Rafique et al., 2021). Experiential and collaborative approaches are very effective in fostering active involvement and advanced cognitive skills (Bae & Kwon, 2024; Kong, 2021). Furthermore, immersive technologies and digital platforms have demonstrated their capacity to improve student-centred learning environments, leading to enhanced learning outcomes (Kee et al., 2023). Despite the presence of hazards such as cyberbullying (Al-Rahmi et al., 2020) the data broadly support the use of novel instructional models, such as SANTREE, to enhance academic achievement, particularly in language-learning environments. The improvement in students' cognitive outputs demonstrates the efficacy of SANTREE's active, technology-integrated learning methodology, especially in cultivating a deeper, more organised understanding of narrative texts.

The regression analysis revealed that learning motivation significantly predicted students' English learning outcomes after the SANTREE intervention, with a coefficient of determination  $R^2 = 0.551$ , standardised beta ( $\beta$ ) = 0.748, and  $p < 0.001$ . This means that approximately 55.1% of the variance in students' learning outcomes is explained by their motivation levels, underscoring the substantial predictive power of motivation. These findings are consistent with previous studies that emphasise the central role of intrinsic motivation in academic achievement (Kim et al., 2021; Zahra et al., 2023), where motivated learners tend to engage more meaningfully in learning tasks, demonstrate persistence in the face of difficulty, and achieve higher cognitive outcomes.

Research repeatedly demonstrates that intrinsic drive significantly enhances academic achievement across various educational levels and cultural contexts (Chai et al., 2021). It is positively correlated with scientific achievement (Zhang & Bae, 2020) and students' psychological well-being (Bimenov et al., 2025), underscoring its dual function in facilitating both academic and emotional growth. The correlation between extrinsic motivation and academic achievement is typically complex, influenced by cultural environment, task value, and individual learner traits (Diseth et al., 2020). Theoretical frameworks, including self-determination theory, expectancy-value theory, and implicit theories of intelligence, provide essential insights into how motivation affects learning (Vela et al., 2024; Zhang & Bae, 2020). These models indicate that motivation is dynamic, influenced by learners' perceptions of ability, effort, and goal orientation. Moreover, studies indicate that the interplay between intrinsic and extrinsic motivation can provide multiplicative effects on performance results (Liu, 2021), particularly when educational settings promote mastery objectives and cultivate incremental mindsets (Vela et al., 2024). This study's empirical evidence demonstrates that learning

motivation, especially when fostered through structured, student-centred models such as SANTREE, is crucial for facilitating active learning and predicting measurable academic success.

This study contributes to contemporary pesantren education by demonstrating how the SANTREE model operationalises existing instructional and motivational principles to integrate religious values with science and technology in a systematic, pedagogically grounded manner. Rather than proposing a new theoretical framework, SANTREE is positioned as a practical instructional innovation that utilises digital tools and collaborative learning to address low motivation and limited participation commonly observed in conventional learning environments. Pamungkas et al. (2025) and Alindra et al. (2025) emphasise that pesantren must gradually adapt their educational approaches to meet the demands of Society 5.0, including digital literacy and critical thinking, while Zainuddin et al. (2024) highlight the shift toward hybrid models that integrate religious identity with scientific knowledge and technological competencies. However, structural challenges such as outdated pedagogical practices and low English achievement persist (Fanani & Abdurrohman, 2025; Rustandi & Kusnawan, 2023). Within this context, the present study provides empirical evidence that a structured, motivation-oriented, and digitally supported model such as SANTREE can be effectively implemented in pesantren settings, offering a contextually grounded approach to addressing systemic instructional gaps while maintaining alignment with traditional values and 21st-century educational demands.

### CONCLUSION

This study's findings demonstrate that applying the SANTREE model significantly enhances students' learning motivation and English learning outcomes, as evidenced by substantial effect sizes and notable score improvements. Furthermore, the study demonstrates that learning motivation is a significant predictor of post-intervention learning outcomes, underscoring its pivotal role in academic achievement. These findings achieve all three objectives of the study: to evaluate the enhancement of motivation, to assess increases in learning outcomes, and to ascertain the predictive capacity of motivation. Within the framework of *pesantren*-based education, SANTREE emerges as a novel and adaptive educational paradigm that integrates traditional religious principles with scientific and technical proficiencies. Future studies should replicate and extend this model across various school types and subject areas, and investigate longitudinal effects. The study underscores the imperative for education policymakers to implement culturally relevant, forward-thinking pedagogical innovations, especially in religious or hybrid learning contexts, to address 21st-century educational requirements.

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