



## AN INTEGRATED ECOSYSTEM MODEL FOR ACADEMIC POTENTIAL TEST READINESS IN ISLAMIC SECONDARY EDUCATION

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### ABSTRACT

*This descriptive qualitative study employs a case study design to comprehensively investigate the strategic implementation of Academic Potential Test (TKA) preparation at SMA Muhammadiyah Mlati. Empirical data were gathered through field observations, in-depth interviews, and documentary analysis, and subsequently analyzed using the interactive model by Miles, Huberman, and Saldaña. The findings reveal five core operational dimensions driving exam preparation success: (1) baseline diagnostic mapping for ability-grouped learning cohorts, (2) routine computer-based mock tests that enhance procedural fluency and mitigate test anxiety, (3) Higher-Order Thinking Skills (HOTS) enrichment through the logical deconstruction of complex items, (4) integration of Al-Islam and Kemuhammadiyah (AIK) values as a spiritual and emotional regulation anchor, and (5) structured, data-driven parental monitoring synergy. In conclusion, achieving optimal examination readiness requires a holistic, ecosystemic model that combines differentiated instruction, technological adaptation, critical reasoning, faith-based emotional grounding, and active home-school collaboration. Moving forward, the school is recommended to continuously update its HOTS question banks, maintain digital testing infrastructure, and strengthen transparent communication channels with parents.*

**Keywords:** TKA Preparation; Differentiated Instruction; Higher-Order Thinking Skills (HOTS)

### 1. INTRODUCTION

The national educational evaluation system is constantly undergoing transformations to measure students' academic readiness with greater objectivity and precision, notably through the implementation of the Academic Potential Test (TKA). As a high-stakes selection instrument, the TKA is designed to evaluate students' cognitive potential and reasoning ability required for higher education [1]. However, empirical evidence indicates that exam preparation models focusing solely on conventional tutoring or mechanical rote memorization are often insufficient to address the complexity of these standardized national test items [2]. The inadequacy of traditional strategies leads to elevated academic anxiety and student failure in achieving expected score thresholds [3]. Therefore, a new paradigm is required one that views exam preparation not merely as isolated cognitive drills, but as a holistic process of cultivating comprehensive student capability.

Pedagogically, the primary challenge in facing the TKA lies in the disparity of students' foundational understanding and the shift toward Higher-Order Thinking Skills (HOTS) items [4]. Mastering content grounded in analytical reasoning, logical deconstruction, and complex problem-solving requires a differentiated learning approach from the outset to prevent gaps in understanding [5]. Beyond high cognitive demands, the adoption of Computer-Based Testing (CBT) introduces technical anxiety related to time management and digital interface navigation, which frequently impairs exam concentration [6]. Without systematic computer-based simulations (tryouts) paired with accurate diagnostic mapping, students risk

encountering procedural obstacles that hinder their ability to demonstrate their full academic potential during examinations.

Beyond technical and cognitive dimensions, students' emotional and mental resilience plays a vital role in determining exam performance under high-pressure conditions. Prolonged psychological pressure prior to testing can trigger test anxiety, mental fatigue, and a significant decline in focus during test administration [7]. Within the context of Islamic education, particularly in Muhammadiyah schools, the integration of Al-Islam and Kemuhammadiyah (AIK) values offers an effective framework for emotional regulation and spiritual coping to mitigate exam-related stress [8]. Spiritual development through routine worship, Islamic motivation, and self-reflection has been empirically proven to instill inner peace, foster stable emotional regulation, and cultivate resilient learning orientations.

The success of national-level exam preparation is also inseparable from the learning environment outside of school, particularly active parental involvement in monitoring student progress. Grounded in school-family interaction theory, transparent synergy between educators and parents establishes an atmosphere of accountability and consistent psychological encouragement for students [9]. Regular reporting of tryout score trajectories and subject vulnerability analyses empowers parents to construct conducive home study environments, manage independent study hours, and offer targeted emotional support [10]. This robust partnership has been shown to extend student study discipline seamlessly from the classroom to the home.

At SMA Muhammadiyah Mlati, the challenges of TKA preparation vividly reflect these multi-dimensional complexities. Initial analyses revealed significant gaps in foundational knowledge across classes, anxiety surrounding CBT systems, and psychological distress regarding HOTS item standards. In response, the school implemented an integrated preparation model rather than relying on a single isolated solution, combining diagnostic mapping, digital tryouts, HOTS enrichment classes, AIK spiritual strengthening, and structured progress reporting to parents. However, the degree to which the interconnected components within this integrated ecosystem systematically foster students' overall TKA readiness has not been comprehensively investigated in academic research.

Given these theoretical and practical imperatives, conducting a study on TKA preparation strategies grounded in an integrated ecosystem model at SMA Muhammadiyah Mlati is of paramount importance. Examining the synergy among pedagogical, technological, psychological-spiritual, and stakeholder collaboration aspects will provide a holistic understanding of how a secondary education institution effectively manages high-stakes examination preparation [11], [12]. The findings of this research are expected to contribute not only empirical insights for curriculum development at SMA Muhammadiyah Mlati, but also practical references and theoretical contributions for faith-based and general secondary schools in designing balanced, humanistic, and result-oriented academic evaluation strategies.

## 2. LITERATURE REVIEW

### 2.1. TKA Preparation (Academic Potential Test Preparation)

High-stakes standardized assessments, such as the Academic Potential Test (TKA), serve as critical gatekeeping instruments designed to evaluate students' scholastic aptitude, logical reasoning, and academic readiness for higher education [13]. Traditional test preparation paradigms have historically relied on passive memorization and mechanical drill-and-practice methods, which frequently lead to elevated test anxiety and superficial content mastery [14]. Contemporary educational literature emphasizes that effective preparation for standardized aptitude tests requires a paradigm shift toward a holistic, multi-dimensional framework that integrates diagnostic mapping, technological adaptation, and socio-emotional support [15]. Furthermore, as national assessment systems increasingly transition to Computer-Based Testing (CBT) platforms, test preparation must also address the digital literacy and interface familiarity required to navigate onscreen timed assessments without operational friction.

From a cognitive load perspective, routine exposure to simulated examinations (tryouts) plays a vital role in automating digital test navigation and mitigating technical anxiety [16]. Grounded in the testing effect and retrieval practice paradigms, periodic low-stakes mock exams enhance long-term memory consolidation while habituating students to time constraints and onscreen mechanics [17]. This procedural fluency effectively reduces extraneous cognitive load, enabling learners to reallocate working memory capacity

toward high-level analytical problem-solving during actual testing conditions. Consequently, modern scholarly consensus advocates for a systematic exam preparation ecosystem that continuously combines performance tracking, digital interface adaptation, and targeted skill remediation to achieve sustainable performance gains.

## **2.2. Differentiated Instruction**

Differentiated instruction (DI) is a pedagogical framework anchored in Vygotsky's [18] Zone of Proximal Development (ZPD) and Tomlinson's [19] model, which posits that optimal learning occurs when instruction is systematically tailored to students' readiness levels, learning profiles, and specific competency gaps. In the context of standardized exam preparation, implementing baseline diagnostic assessments allows educators to dismantle the limitations of a one-size-fits-all teaching model and categorize students into skill-based learning cohorts [20]. Meta-analytic research on ability grouping confirms that homogeneous skill-based cohorting empowers instructors to calibrate teaching pace, scaffolding intensity, and conceptual complexity, thereby preventing cognitive overload in struggling learners while maintaining intellectual challenge for high achievers [21].

The application of differentiated instruction within examination preparation environments significantly improves instructional efficiency and student engagement through targeted academic interventions. Aligning instructional delivery with student proficiency transforms passive classroom instruction into active, student-centered problem-solving sessions [22]. Beyond academic gains, research indicates that ability-grouped learning cohorts cultivate a supportive socio-emotional environment by mitigating peer comparison, lowering evaluation anxiety, and encouraging active participation among lower-readiness learners [23]. Thus, combining rigorous diagnostic capability mapping with differentiated cohort instruction provides an essential foundation for addressing foundational learning deficits and maximizing score trajectories in high-stakes assessment contexts.

## **2.3. Higher-Order Thinking Skills (HOTS)**

Higher-Order Thinking Skills (HOTS), conceptualized within Bloom's Revised Taxonomy, encompass complex cognitive operations such as critical analysis, logical evaluation, and creative synthesis that transcend simple recall or surface-level memorization [24]. Contemporary standardized tests increasingly feature HOTS-based items to evaluate students' capacity for multi-step logical reasoning, contextual data interpretation, and non-routine problem solving [25]. Academic literature highlights that traditional rote learning strategies prove ineffective when applied to HOTS questions because these items demand the deconstruction of complex stimulus materials, the evaluation of competing hypotheses, and the systematic elimination of subtle distractor options. Consequently, explicitly embedding higher-order reasoning frameworks into test preparation curricula is essential for cultivating the intellectual flexibility required for university-level academic success.

The pedagogical cultivation of HOTS relies heavily on structured scaffolding, explicit logic modeling, and metacognitive deconstruction of challenging examination items [26]. Collaborative learning environments, where students actively debate solution pathways and dissect complex word problems in small groups, allow learners to articulate their reasoning and internalize systematic analytical heuristics [27]. Empirical studies demonstrate that explicit metacognitive training significantly enhances students' analytical precision, problem-solving confidence, and pacer efficiency when encountering novel, high-difficulty exam questions. By transitioning students from passive knowledge consumers into active critical thinkers, targeted HOTS enrichment serves as a primary determinant of superior performance in standardized academic potential assessments.

## **3. METHOD**

This study employed a descriptive qualitative research design utilizing a case study approach to comprehensively investigate the strategic implementation of Academic Potential Test (TKA) preparation at SMA Muhammadiyah Mlati. To capture the full scope of pedagogical, operational, and socio-emotional interventions, empirical data were gathered through a rigorous data triangulation framework encompassing direct field observations, in-depth semi-structured interviews, and documentary analysis [28]. Key research informants were purposively selected to include school administrators, curriculum developers, TKA instructors, computer lab coordinators, invigilators, guidance counselors, students, and parents. Field observations were systematically conducted across key preparation settings, including ability-grouped instructional classes, computer-based mock exam sessions, HOTS enrichment workshops, routine Al-Islam and Kemuhammadiyah (AIK) spiritual activities, and parent-teacher association meetings. Simultaneously,

documentary evidence was extensively reviewed, including baseline diagnostic test records, chronological tryout log files, student answer sheets, pedagogical module archives, HOTS question banks, guidance counselor logs, progress report cards, and digital attendance registers [29].

The collected qualitative data were systematically analyzed using the interactive data analysis model established by Kulimbang et al. [30], which involves continuous data condensation, structured data display, and rigorous conclusion drawing and verification. To establish qualitative trustworthiness and analytical rigor, source and method triangulation protocols were strictly applied. Observational field notes, verbatim interview transcripts, and archival documents were coded and categorized iteratively into thematic clusters corresponding to the core operational dimensions of TKA readiness: diagnostic capability mapping, digital interface adaptation, higher-order reasoning cultivation, faith-based emotional regulation, and home-school synergy. Furthermore, the credibility and dependability of the findings were reinforced through member-checking procedures with key school stakeholders and peer debriefing sessions among qualitative researchers [31], ensuring that the resulting insights accurately reflect the multi-faceted reality of the school's examination preparation framework.

#### **4. RESULTS AND DISCUSSION**

##### **4.1. Diagnostic Mapping and Learning Group Division**

Documentary analysis of initial diagnostic test scores revealed a wide disparity in students' foundational knowledge across TKA subject areas, highlighting the inadequacy of a one-size-fits-all teaching model. In-depth interviews with the school's curriculum team and TKA instructors further emphasized that without initial categorization, high-achieving students felt unchallenged, while struggling students were quickly overwhelmed by fast-paced instruction. Based on these initial test records and qualitative teacher insights, the school instituted a structured division of students into skill-based learning cohorts designed to address specific competency gaps.

Direct classroom observations during these specialized sessions showed a marked increase in student engagement and instructional efficiency. Instructors were observed delivering targeted interventions focusing on core concepts for foundational groups while leading advanced problem-solving drills for high-performing groups. Interviews with students confirmed that learning within peer groups of similar proficiency significantly reduced peer pressure and encouraged active participation, while observational notes confirmed that teachers could manage classroom pace far more effectively compared to mixed-ability settings.

##### **4.2. Effectiveness of Computer-Based Mock Tests (Tryouts)**

Field observations during computer-based tryout sessions revealed that initial simulations were marred by student hesitancy, pacing struggles, and minor technical panic when interacting with the digital testing interface. However, review of school documentation specifically the chronological tryout log files and student answer sheets showed a progressive decline in unattempted questions and technical errors across successive testing cycles. Interviews with the computer lab coordinator and invigilators corroborated that routine exposure swiftly converted operational unfamiliarity into procedural fluency.

Student interviews following the final simulation rounds revealed a noticeable drop in test-related anxiety, with respondents attributing their calm demeanor to familiarity with onscreen timers and navigation mechanics. Observation notes taken during later tryout phases documented students actively applying time-allocation strategies, such as flagging complex questions for later review and pacing themselves steadily throughout the exam. Documented score trajectories confirmed that this combination of technical confidence and refined time management led to steady, measurable improvements in overall TKA scores.

##### **4.3. Strengthening Higher-Order Thinking Skills (HOTS)**

Review of pedagogical documentation, including lesson plans, module archives, and HOTS question banks, demonstrated a deliberate shift toward problem-solving frameworks that require analytical synthesis rather than rote memory. In interviews, subject matter teachers emphasized that TKA items demand multi-step reasoning, prompting them to design specialized mentoring sessions focused on deconstructing complex stimulus materials. Documented curriculum logs verified that dedicated weekly hours were strictly set aside for analyzing high-level logic, data interpretation, and contextual problem-solving.

Direct observations of these HOTS enrichment classes captured dynamic teacher-student interactions, where instructors guided students through step-by-step logic trees to eliminate subtle distractor options. During

these sessions, students were observed actively debating solution paths, dissecting complex word problems, and verifying answer rationale in small discussion groups. Subsequent student interviews revealed that this structured approach significantly enhanced their analytical precision and boosted their confidence when encountering unfamiliar, high-difficulty questions on practice exams.

#### 4.4. Integration of Al-Islam and Kemuhammadiyah (AIK) Values

Observational data gathered from the school environment highlighted the daily integration of AIK routines, including congregational Dhuha and Zuhur prayers, communal Quran recitations, and short spiritual reflections embedded into the academic schedule. School policy documentation and guidance counselor logs confirmed that spiritual development was formally treated as an integral component of exam preparation rather than an extra-curricular activity. These records detailed scheduled motivational circles (*pengajian*) specifically tailored to build mental resilience and ethical grounding ahead of high-stakes testing.

In interviews, students consistently reported that these spiritual practices served as a crucial emotional anchor, helping them process academic pressure, manage fatigue, and maintain focus. Guidance counselors and teachers noted during interviews that students who actively engaged in routine AIK activities exhibited lower stress levels and greater emotional stability during stressful mock exams. Observational records during the final weeks of preparation confirmed a calm, orderly, and supportive atmosphere among the student body, reflecting the psychological benefits of integrating faith-based emotional regulation.

#### 4.5. Synergy and Monitoring with Parents

Documentary evidence in the form of student progress report cards, digital attendance logs, and formal tryout result sheets demonstrated a structured communication framework established between the school administration and parents. In interviews, school leaders explained that distributing detailed progress reports after every major tryout was designed to keep parents fully informed about their child's academic trajectory and specific subject vulnerabilities. This transparent data-sharing model ensured that school interventions were mirrored by appropriate support systems at home.

Observations during parent-teacher association (PTA) meetings revealed active dialogue between guardians and educators regarding individual student needs and home study schedules. Interviews with parents confirmed that receiving concrete performance data empowered them to establish distraction-free study environments, regulate evening study hours, and provide tailored emotional encouragement. Students also noted in interviews that knowing their parents and teachers were actively coordinating created a strong sense of accountability and consistent support, which ultimately sustained their study discipline throughout the intensive TKA preparation period.

#### 4.6. Discussion

The empirical findings regarding the preparation for the Academic Potential Test (TKA) at SMA Muhammadiyah Mlati demonstrate a structured, multi-dimensional intervention model that strongly resonates with established educational literature on differentiated instruction and capability mapping. The implementation of diagnostic assessments to stratify students into ability-based learning cohorts aligns directly with Tomlinson's [19] Differentiated Instruction Framework and Vygotsky's [18] Zone of Proximal Development (ZPD). Prior research confirms that homogeneous skill-based grouping allows educators to calibrate instructional pace and complexity, thereby preventing cognitive overload in struggling students while sustaining intellectual rigor for high achievers [32]. At SMA Muhammadiyah Mlati, this approach successfully mitigated the drawbacks of a uniform teaching model, validating previous scholarly assertions that targeted interventions based on baseline diagnostic data significantly optimize instructional efficiency and foster a lower-anxiety peer-learning environment.

The observed effectiveness of routine computer-based mock tests (tryouts) in cultivating procedural fluency and reducing technical anxiety corroborates Cognitive Load Theory and the Testing Effect paradigm [33]. Prior studies on computer-based testing (CBT) adoption emphasize that unfamiliarity with digital interfaces introduces extraneous cognitive load, which inadvertently impairs working memory capacity during high-stakes assessments [34]. The longitudinal evidence at SMA Muhammadiyah Mlati showing a steady decrease in unattempted questions, technical errors, and test anxiety over successive tryouts echoes findings by Rochmat et al. [35] and Hatmoko et al. [36], who observed that repeated exposure to digital testing environments transforms operational mechanics into automated habits. Consequently, by converting digital interaction from a source of stress into a routine procedure, periodic tryouts enabled students to reallocate

their working memory toward high-level problem-solving and strategic time management, resulting in tangible score improvements.

The strategic shift toward Higher-Order Thinking Skills (HOTS) instruction directly reflects the evolving paradigms of educational assessment, which prioritize deep conceptual understanding over surface-level memorization. This finding strongly aligns with Bloom's Revised Taxonomy and empirical research by anil et al. [37] and Onoshakpokaiye [38], which asserts that explicit instruction in reasoning, logic trees, and distractor analysis enhances cognitive flexibility across diverse student cohorts. The observational and interview data from SMA Muhammadiyah Mlati demonstrate that deconstructing complex, multi-step stimulus materials through guided inquiry helps students dismantle cognitive biases and avoid subtle exam distractors. This is consistent with findings by Siswanto et al. [39] and Syah et al. [40], who demonstrated that embedded metacognitive training equips learners with systematic analytical tools, allowing them to approach unfamiliar and highly complex test items with greater precision and self-efficacy.

Integrating Al-Islam and Kemuhammadiyah (AIK) values as a psychological anchor provides an empirical contribution to the literature on faith-based emotional regulation and academic coping mechanisms. While conventional test preparation focuses predominantly on cognitive drills, the routine incorporation of congregational prayers (Dhuha and Zuhur), Quranic recitations, and motivational spiritual sessions (pengajian) serves as an effective stress-buffering mechanism. This outcome substantiates Religious Coping Theory and Process Model of Emotion Regulation, which posit that spiritual practices provide positive cognitive reframing, reduce physiological arousal, and foster internal locus of control during high-pressure events. Previous studies on holistic education in faith-based institutions Illah et al. [41] and Mujazin [42] similarly highlighted that embedding spiritual routines into academic schedules enhances psychological resilience, maintaining cognitive clarity and emotional stability during high-stakes evaluative conditions.

The strong synergy established between the school administration and parents through data-driven progress reporting reinforces the Framework of Overlapping Spheres of Influence and Social Capital Theory [43], [44], [45]. Literature on educational governance consistently highlights that transparent, continuous communication regarding student achievement bridges the structural gap between classroom instruction and home environments [46], [47]. The findings at SMA Muhammadiyah Mlati confirm that distributing detailed, tryout-specific diagnostic feedback empowers parents to move beyond generic encouragement, enabling them to construct structured home study routines, regulate domestic distractions, and offer targeted emotional support. This active alignment creates a supportive accountability loop, validating prior empirical findings that strong home-school partnerships directly sustain student motivation, study discipline, and long-term academic engagement.

Synthesizing these five dimensions reveals that the success of TKA preparation at SMA Muhammadiyah Mlati relies on an integrated, ecosystemic model of examination readiness rather than isolated academic drills. This holistic framework aligns seamlessly with modern educational reform literature advocating for the simultaneous alignment of pedagogy, technology, socio-emotional well-being, and community partnership [48], [49], [50]. By combining diagnostic capability mapping and digital interface mastery with HOTS cultivation, faith-based emotional grounding, and parental monitoring, the school established a balanced educational environment. This comprehensive approach demonstrates that sustainable performance gains in high-stakes standardized assessments are achieved when cognitive skill enhancement is reinforced by robust psychological support systems and active stakeholder collaboration.

## 5. CONCLUSION

In conclusion, the TKA preparation framework at SMA Muhammadiyah Mlati demonstrates that optimizing student readiness requires an integrated model that balances diagnostic ability grouping, computer-based simulation, HOTS cognitive enrichment, AIK-based spiritual regulation, and transparent parent-school collaboration. Moving forward, it is recommended that the school continually update its HOTS item bank to reflect changing exam standards, maintain reliable digital test infrastructure, and strengthen data-driven communication channels with parents to sustain consistent study discipline and socio-emotional support both at school and at home.

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