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Beyond Classroom Time: Evaluating Mastery Based Learning and Competency Achievement in Secondary Schools

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ABSTRACT

Background. Competency-Based Education (CBE) emphasizes demonstrated mastery rather than learning duration as the basis for student progress. However, the continued dominance of seat-time-oriented practices raises questions about how effectively CBE principles are being implemented in secondary schools..

Purpose. This study aims to examine the relationship between mastery-based learning, classroom learning time orientation, competency achievement, and perceptions of learning effectiveness among secondary school students.

Method. A cross-sectional quantitative survey was conducted with 310 high school students in Palembang, Indonesia, selected through random sampling. Data were collected using a structured questionnaire and analyzed using descriptive statistics, Pearson correlation, and regression analysis.

Novelty. This study offers a multidimensional assessment of CBE by positioning mastery-based learning and seat-time orientation as contrasting predictors of students' competency achievement and perceived learning effectiveness.

Results. Mastery-based learning was positively associated with perceived learning effectiveness ($r = .610$, $p < .001$) and significantly predicted competency achievement ($\beta = .454$, $p < .001$). In contrast, seat-time orientation showed a significant negative association with competency achievement ($\beta = -.157$, $p = .002$).

Conclusion. The findings support a shift toward mastery-governed learning in which demonstrated competency becomes the primary basis for academic progression, while instructional time functions as a flexible resource for achieving mastery.

KEYWORDS

Competency Achievement; Competency Based Education; Classroom Learning; Mastery Based Learning; Secondary Education;

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INTRODUCTION

Secondary education is increasingly expected to prepare students not only to acquire disciplinary knowledge but also to demonstrate transferable competencies, including critical thinking, problem solving, communication,collaboration, and the ic contexts. These expectations have intensified interest in educational models that define learning in terms of demonstrated outcomes rather than participation in a predetermined sequence of instructional activities. Competency Based Educationon as an approach that reorganizes teaching, assessment, and student progression around explicit competencie

and evidence of mastery (Huang et al., 2026).

Recent scholarship describes competency-based learning as part of a broader transition toward learner-centered education in which knowledge, skills, and dispositions are integrated and demonstrated through meaningful performance rather than inferred primarily from course completion (Barthakur et al., 2026). Within K-12 education, CBE therefore represents more than an alternative assessment technique; it involves reconsidering how learning expectations are defined, how progress is documented, and how students move through educational experiences (Alonzo & Elby, 2019; Ho & Dimmock, 2023; Mcguire, 2026).

A defining principle of CBE is that student progression should be based primarily on evidence of learning rather than the amount of time spent in a classroom. Competencies are expected to be explicit, measurable, and transferable, while assessment provides evidence of whether students have achieved the level of mastery required for further learning (Erwin & Kuswandi, 2024; Winget & Persky, 2022). Contemporary definitions of CBE further emphasize student agency, meaningful assessment, timely differentiated support, varied learning pathways and pacing, and progression based on demonstrated mastery rather than *seat time* (Gagnon, 2023; Mudinillah et al., 2024). This orientation contrasts with conventional time-based structures in which instructional schedules, semesters, course hours, and grade-level calendars often determine when students encounter new content and progress through formal schooling. The distinction is consequential because equal exposure to instructional time does not necessarily produce equal levels of understanding. Students enter classrooms with different prior knowledge, learning needs, rates of development, and capacities to master particular competencies; consequently, a fixed amount of instructional time may result in substantial variation in actual learning.

The intellectual foundation of this distinction can be traced partly to mastery learning, particularly the proposition that the time needed to achieve a learning objective may vary among students while high expectations for learning remain relatively constant (Khalishah & Iklilah, 2021). CBE, however, should not simply be equated with mastery learning. Mastery learning is primarily an instructional approach centered on clearly specified objectives, formative assessment, corrective instruction, and opportunities to reach a defined level of performance. CBE extends this principle into a broader educational architecture involving curriculum, assessment, pacing, student support, progression, grading, and organizational structures (Erwin et al., 2026; Hermansyah et al., 2025). The central issue is therefore not whether instructional time has educational value. Time remains an essential resource for learning. The more fundamental question is whether time spent in instruction should serve as the principal basis for progression or whether advancement should depend more directly on credible evidence that students have mastered the competencies required for subsequent learning.

The transition from a time-based system to a mastery-oriented system is nevertheless more complex than replacing conventional grades or allowing students to learn at different speeds. Effective CBE requires alignment among clearly articulated competencies, instructional practices, assessment evidence, feedback mechanisms, opportunities for relearning, and decisions about student progression. Evans et al. (2019), in a study involving 413 school principals, found that competency-based practices resembling existing educational routines were more commonly implemented than practices requiring greater departures from traditional structures. This finding highlights an important implementation problem: schools may adopt selected elements of CBE while retaining underlying time-based assumptions about pacing, grading, scheduling, and progression. A school may, for example, articulate competency standards while continuing to move

all students through curriculum content according to a uniform calendar, thereby producing a hybrid system rather than a fully mastery-based model.

Empirical research also suggests that the implementation and outcomes of CBE cannot be assumed to be uniformly positive. A systematic review by Evans, identified relatively consistent facilitators and barriers across K-12 implementation studies but found mixed evidence regarding academic achievement, student progress, motivation, engagement, and other outcomes (Abell et al., 2023). The review also noted that assessment a fundamental mechanism for determining whether competence has actually been demonstrated was insufficiently represented in much of the existing implementation research. More recent evidence offers promising but still cautious conclusions. Examining high schools participating in a competency-based education pilot in Illinois, found that participation in CBE was associated with higher high-school graduation rates in matched comparisons, although it was not significantly associated with college entry within 12 months (Evans et al., 2020; Ojo et al., 2025). These findings suggest that CBE may contribute to meaningful educational outcomes, but they do not justify treating competency-based reform as inherently effective regardless of how it is interpreted and implemented.

Teachers occupy a particularly important position in this transition because CBE changes how they establish learning expectations, interpret evidence of mastery, provide feedback, differentiate support, and make decisions about student progress. High-school teachers, found substantial variation in the depth of CBE implementation across school districts and demonstrated that teachers' beliefs and contextual conditions shaped classroom practices (Bingham et al., 2021; Deng et al., 2024). More advanced implementation was associated with greater perceived transformation of pedagogical practices, while administrative and structural support facilitated the integration of competency-based principles. These findings indicate that formal adoption of CBE does not necessarily guarantee consistent enactment at the classroom level. Teachers may interpret mastery, flexibility, reassessment, and competency-based progression differently, creating variations between the intended model and students' actual experiences.

Students' perspectives are equally important but have received comparatively less attention in implementation research. Students are the individuals who directly experience changes in learning expectations, assessment, pacing, feedback, grading, and opportunities to demonstrate mastery. Their perceptions can therefore reveal whether principles presented institutionally as competency-based are actually experienced as greater clarity, meaningful feedback, flexible support, and ownership of learning. Found generally positive or neutral student perceptions alongside teacher-reported benefits related to mastery tracking and differentiation, but also identified inconsistencies in assessment, grading, resources, communication, and student agency. Their study, however, focused on elementary-school contexts undergoing a transition toward CBE (Prast et al., 2023). Evidence integrating both teacher and student perspectives within general secondary-school settings remains comparatively limited, particularly research that examines whether the implementation of CBE represents a substantive shift from time-based progression or merely the addition of competency-oriented terminology to conventional school structures.

A further conceptual limitation in the literature is the tendency to frame *mastery* and *seat time* as a simple binary opposition. In practice, secondary schools rarely operate as purely time-based or purely competency-based systems. Implementation is more plausibly understood as a continuum in which traditional organizational structures coexist with varying degrees of mastery-based progression, flexible pacing, competency-aligned assessment, feedback and relearning opportunities, and student agency (Miglani et al., 2026). This distinction is important because assessing CBE solely through formal policy adoption may obscure substantial differences in how

the model functions in everyday teaching and learning. An evaluation of implementation therefore requires evidence from multiple stakeholders and across multiple dimensions rather than a single global judgment of whether a school uses CBE.

Against this background, the present study evaluates the implementation of Competency-Based Education in general secondary schools by examining the perspectives of both students and teachers. The study focuses on key dimensions of CBE, including mastery-based progression, flexible learning pace, competency-based assessment, feedback and opportunities for relearning, student agency, and the persistence of seat-time-oriented practices (Wendler, 2026). By integrating student and teacher perceptions, the study seeks to identify both convergences and potential gaps between instructional intentions and lived learning experiences.

Rather than assuming that mastery and seat time are mutually exclusive categories, the study examines the extent to which secondary-school practices have shifted from time-determined progression toward evidence-based mastery. Specifically, the study aims to evaluate the level of CBE implementation, identify its strongest and weakest dimensions, examine student and teacher perceptions of the transition from seat time to mastery-based learning, and determine whether significant differences exist between the two stakeholder groups. This approach contributes to the literature by providing a multidimensional, stakeholder-based assessment of how competency-based principles are translated into practice within secondary education. RQ1: The implementation of mastery-based learning is positively associated with students' perceived learning effectiveness in secondary schools. RQ22: Mastery-based learning is perceived as more effective than seat-time-based learning in supporting students' competency achievement in secondary schools.

RESEARCH METHODOLOGY

Research Design

This study used a cross-sectional quantitative survey design to evaluate the implementation of Competency-Based Education (CBE) in secondary schools, with a particular emphasis on the shift from seat-based learning to mastery-based progress. A cross-sectional design allows researchers to examine perceptions, characteristics, and relationships among variables within a defined population at a specific point in time, making it suitable for evaluating current educational practices across diverse respondent groups (Hinzmann et al., 2026). A survey approach was used to systematically collect quantitative data from two key stakeholder groups: students and teachers, whose perspectives provide complementary evidence regarding how competency-based principles are experienced and implemented in actual teaching and learning practices.

The evaluation focused on the differences between mastery-based learning, where progress is determined by demonstrated achievement of clearly defined competencies, and seat-based learning, where student progress is largely structured by predetermined learning periods and academic schedules. This distinction reflects the fundamental principle of CBE that learning progress should be based primarily on demonstrated mastery rather than time spent in instruction (Walden, 2020). Data were collected at a single point in time using a structured questionnaire designed to measure student and teacher perceptions of mastery-based learning, competency attainment, assessment and feedback practices, learning progress, and the ongoing impact of time-oriented classroom practices. Examining students and teachers is considered crucial because CBE implementation can vary between intended instructional practices and stakeholders' actual experiences with those practices (Aguas, 2020).

The design was descriptive and comparative-correlational. The descriptive component was used to determine the extent to which CBE principles were perceived to be implemented in

secondary schools, while the comparative component examined differences between mastery-based and time-oriented classroom practices, as well as between student and teacher perceptions. The correlational component examined the relationship between mastery-based learning and perceived learning effectiveness. Therefore, this design provides an empirical basis for testing whether mastery-based learning is positively associated with perceived learning effectiveness and whether mastery-oriented practices are perceived as more supportive of student competency achievement than conventional practices oriented toward classroom learning time. Because the data were collected cross-sectionally and based on stakeholder perceptions, the findings are interpreted as evidence of associations and perceived differences rather than causal effects (Wang & Cheng, 2020).

Research Subjects

The subjects of this study were 310 students enrolled in senior high schools in Palembang, Indonesia. Participants were selected using a random sampling technique to provide equal opportunity for participation in the study and to minimize potential selection bias. Participants represented students who had direct experience with the teaching practices, assessment processes, learning progressions, and competency-oriented learning activities implemented in their respective schools.

Inclusion criteria required participants to be actively enrolled as senior high school students in Palembang and to have sufficient experience with the learning and assessment practices implemented in their schools. Students were selected as the primary research subjects because they directly experienced mastery-oriented learning practices and conventional time-based learning structures. Therefore, their perspectives were considered important in assessing the extent to which learning practices emphasized mastery of demonstrated competencies rather than development primarily determined by learning time.

Participation in this study was voluntary. Prior to data collection, participants were informed about the purpose and procedures of the study. Confidentiality and anonymity were maintained throughout the study, and all data collected was used exclusively for academic and research purposes.

Research Instrument

The study used a structured questionnaire to assess students' perceptions of Competency-Based Education (CBE) in senior high schools. The instrument was developed based on key CBE principles, particularly mastery-based progression, competency achievement, and the distinction between demonstrated mastery and seat-time-oriented learning (Lu & Lin, 2025).

The questionnaire consisted of 20 items covering four dimensions: mastery-based learning, seat-time orientation, competency achievement, and perceived learning effectiveness. All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Instrument validity was examined through content and construct validation, while reliability was assessed using Cronbach's alpha, with a coefficient of ≥ 0.70 considered acceptable (Trabelsi et al., 2024).

Research Procedures

This study was conducted in four main stages. First, the researcher prepared and validated a questionnaire based on the conceptual framework of Competency-Based Education (CBE). Second, 310 high school students in Palembang were selected using a random sampling method and

informed of the purpose and confidentiality of the study (Purnomo, 2026). Third, a questionnaire was administered to measure students' perceptions of mastery-based learning, study time orientation, competency achievement, and perceived learning effectiveness. Finally, the collected data were filtered, coded, and statistically analyzed to test the research hypotheses. This procedure followed established cross-sectoral survey research principles of standardized data collection, voluntary participation, confidentiality, and systematic analysis (Shankar et al., 2026).

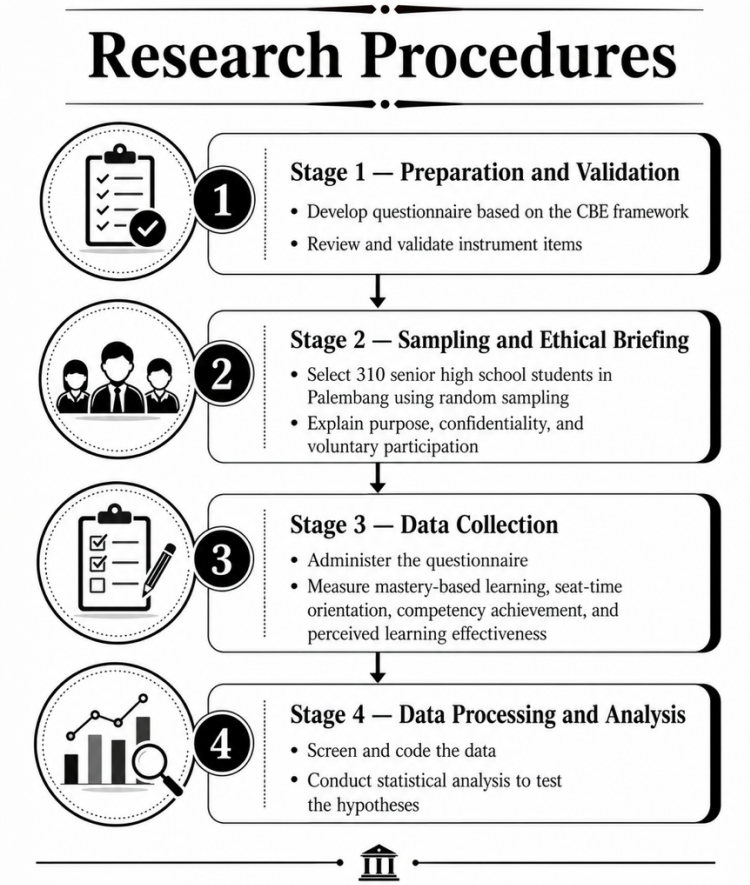

Figure 1. Research Stages

RESULT AND DISCUSSION

Data from 310 senior high school students were analyzed to examine mastery-based learning, seat-time orientation, competency achievement, and perceived learning effectiveness. These constructs reflect the central distinction in Competency-Based Education (CBE), in which student progression is oriented toward demonstrated mastery rather than being determined primarily by time spent in instruction (Gervais, 2016; Evans et al., 2020).

The descriptive analysis showed relatively high scores for mastery-based learning (M = 3.98, SD = 0.63), competency achievement (M = 3.86, SD = 0.64), and perceived learning effectiveness (M = 3.91, SD = 0.67). Seat-time orientation showed a comparatively lower score (M = 2.60, SD = 0.70).

Table 1. Descriptive Statistics and Reliability

Construct	Mean	SD	Cronbach's α
Mastery-Based Learning	3.98	0.63	0.856
Seat-Time Orientation	2.60	0.70	0.800
Competency Achievement	3.86	0.64	0.817
Perceived Learning Effectiveness	3.91	0.67	0.851

Cronbach's alpha coefficients ranged from 0.800 to 0.856**,** indicating satisfactory internal consistency across all constructs. These coefficients exceeded the commonly accepted minimum reliability criterion of approximately .70 for research instruments (Gugiu & Gugiu, 2018).

Pearson correlation analysis revealed a significant positive relationship between mastery-based learning and perceived learning effectiveness, r = **.**610**,** $p < .001$. The positive coefficient indicates that stronger mastery-based learning experiences were associated with higher levels of perceived learning effectiveness. Simple linear regression further demonstrated that mastery-based learning significantly predicted perceived learning effectiveness, $F(1, 308) = 182.68$**,** $p < .001$, with $R^2 = .372$**.** Thus, mastery-based learning accounted for approximately 37.2% of the variance in perceived learning effectiveness. The regression coefficient was positive and statistically significant ($B = 0.650$, $p < .001$).

The interpretation of the relationship was based on both the magnitude and statistical significance of the correlation coefficient, consistent with recommendations for appropriate interpretation of correlation analysis (Cassol et al., 2025; Qian et al., 2025). Therefore, the findings supported H1, demonstrating a significant positive association between mastery-based learning and perceived learning effectiveness.

Multiple regression analysis was performed to determine the relative contributions of mastery-based learning and seat-time orientation to competency achievement. The overall regression model was statistically significant, $F(2, 307) = 57.77$**,** $p < .001$, explaining 27.3% of the variance in competency achievement ($R^2 = .273$).

Table 2. Mastery-Based Learning and Seat-Time Orientation in Predicting Competency Achievement

Predictor	Standardized β	p-value
Mastery-Based Learning	0.454	< .001
Seat-Time Orientation	-0.157	.002

Mastery-based learning showed a significant positive contribution to competency achievement (β = .454, $p < .001$), whereas seat-time orientation showed a significant negative contribution (β = **-.**157, $p = .002$). The standardized regression coefficients indicated that mastery-based learning had a substantially stronger positive association with competency achievement than seat-time orientation.

This pattern is consistent with the conceptual foundation of CBE, which emphasizes demonstrated mastery and competency attainment as the basis for learning progression rather than progression determined primarily by instructional time (Yao & Lin, 2025). K-12 CBE literature similarly identifies mastery-based progression as a defining component of competency-oriented educational systems.

Therefore, H2 was supported, indicating that mastery-based learning was more positively associated with students' competency achievement, while stronger seat-time orientation was negatively associated with competency achievement.

Table 3. Summary of Hypothesis Testing

Hypothesis	Statistical Evidence	Decision
H1: Mastery-based learning is positively associated with perceived learning effectiveness.	$r = .610$; $R^2 = .372$; $p < .001$	**Supported**
H2: Mastery-based learning is more positively associated with competency achievement than seat-time orientation.	βMBL = .454; βSTO = -.157; $R^2 = .273$; $p < .01$	**Supported**

Overall, the statistical findings showed that mastery-based learning was positively associated with both perceived learning effectiveness and competency achievement. In contrast, seat-time orientation demonstrated a negative relationship with competency achievement. These results provided empirical support for both research hypotheses.

The findings indicate that mastery-based learning was positively associated with perceived learning effectiveness and competency achievement, while seat-time orientation showed a weaker and negative association with competency achievement. These results support the core principle of Competency-Based Education (CBE), which emphasizes demonstrated mastery rather than time spent in instruction as the basis for learning progression (Aschoff, 2026).

This finding is consistent with previous studies showing that mastery-oriented learning can strengthen student achievement when supported by clear competencies, formative assessment, feedback, and opportunities for relearning. However, the literature also shows that CBE does not automatically produce better outcomes, because its effectiveness depends greatly on implementation quality, teacher readiness, assessment systems, and institutional support (Rais et al., 2026). Thus, the debate should not be simplified into “mastery is good” and “seat time is bad.

Learning time remains important, but it should serve as a resource for achieving mastery, not as evidence that mastery has occurred. This perspective offers a more balanced interpretation of the results. Students may require different amounts of time to achieve the same competencies, meaning that a fixed schedule should not be the primary determinant of academic progress.These findings also suggest that future secondary education must move toward an evidence-based progression system, in which students progress based on demonstrated knowledge, skills, and competencies, rather than simply completing class hours. Such a transformation requires credible assessments, flexible support, meaningful feedback, and equitable opportunities for all students to achieve mastery. Overall, this research supports a shift from time-based schooling to mastery-driven learning. Time should remain an important learning resource, but demonstrated competency should be the primary indicator of meaningful educational progress.

CONCLUSION

This study concludes that mastery-based learning is positively related to perceived learning effectiveness and competency achievement among secondary school students. In contrast, the orientation of classroom learning time showed a weaker contribution to competency development. These findings support the principle that student progress should be based primarily on demonstrated mastery rather than time spent learning. Therefore, secondary schools should strengthen competency-based assessment, meaningful feedback, flexible learning support, and evidence-based progress to ensure that learning time serves as a pathway to mastery, not the sole indicator of educational progress.

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ETHICS STATEMENT

This study was conducted in accordance with established ethical principles for educational research. Participation was voluntary, and all participants were informed of the study's purpose and procedures prior to data collection. Confidentiality and anonymity were maintained throughout the research process. The data collected were used solely for academic purposes, and participants had the right to withdraw from the study at any time without any consequences.

GENERATIVE AI USE STATEMENT

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with language refinement, grammar correction, and organization of certain sections of the manuscript. All AI-generated output was critically reviewed, verified, and edited by the authors. The authors take full responsibility for the accuracy, integrity, and final content of this publication.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; Investigation; Methodology.
Author 3: Data curation; Investigation; Formal analysis; Visualization.

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