

Strategic Learning for High School Mathematics

PEIMS Code: N1110030

Abbreviation: STLNHSM

Grade Level(s): 9–10

Award of Credit: 1.0

State Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to TAC §74.13 for guidance on endorsements.

Course Description:

This course is intended to create strategic mathematical learners from underprepared mathematics students. The basic understandings will stimulate students to think about their approach to mathematical learning. These basic understandings will include identifying errors in the teaching and learning process, input errors, physiological concerns, and key cognitive skills. The essential knowledge and skills will foster a deeper understanding of the task of learning mathematical concepts. Use of personal data and statistical analysis will establish relevance and aid in creation of individualized learning plans (I.L.P.'s).

Essential Knowledge and Skills:

(a) Introduction.

- (1) Fundamental concept of student errors in the learning process. With particular attention given to behaviors, attitudes, and beliefs that relate to successful learning and that can be altered through educational interventions, students will be exposed to common reasons students do not gain the mathematical knowledge and skills necessary to perform satisfactorily in their mathematics courses.
- (2) The teaching process. Students will understand that certain errors correlate with missing steps in the teaching process, including but not limited to direct instruction, guided practice, independent practice, assessment, and debriefing of assessments. Students will further explore how missing steps in the teaching process negatively impacts the learning process.
- (3) Input errors. When students are given the opportunity to receive content they may not receive the content, receive only a portion of the content, or misinterpret the content. Errors related to receiving content include inappropriate socialization, failure to produce reinforcing materials (notes), failure to participate in reinforcing actions (discussion), misinterpretation of content, study issues, and unfamiliar vocabulary.
- (4) Output errors. When students are asked to demonstrate knowledge they may produce incorrect or inappropriate responses and these output errors may, or may not, be related to previous

input errors. These output errors can include concept errors, formula errors, algorithmic errors, not answering the question, careless errors, and errors related to personal effort.

- (5) Physiological concerns. Students should understand that there are various physical and chemical factors that affect the learning process. Physiological influences include learning disabilities, nutrition, sleep deprivation, anxiety, and work ethic. Certain factors are genetic, some are environmentally influenced, and some are the result of behaviors.
- (6) Key cognitive skills. Disruptions in the learning process are often caused by multiple interconnected factors including connections between input errors and output errors, connections between physiological factors and input errors, and connections between physiological factors and output errors. To address errors that are the result of multiple, complicated, and interrelated errors and circumstances, students will use key cognitive skills to make informed decisions to improve their personal performance in high school mathematics. Intellectual curiosity can be developed through conscious direction.

(b) Knowledge and Skills.

- (1) Input errors. The student understands there are errors related to receiving
 - (A) content and relates these errors to disruptions in the teaching and learning processes. The student is expected to:
 - (B) identify, describe, analyze and evaluate input errors;
 - (C) analyze and evaluate strategies to mitigate input errors;
 - (D) formulate personal strategies to mitigate input errors;
 - (E) predict effects of synthesized strategies;
 - (F) study the student's errors and evaluate the seriousness of the errors based on patterns and departure from patterns in his/her data;
 - (G) create an individualized learning plan to address his/her errors;
 - (H) analyze the results of the plan by creation of appropriate visual representations of the data collected;
 - (I) read and interpret graphical displays created by others; and
 - (J) draw conclusions about input errors from analyzing the data
- (2) Output errors. Students will understand that certain behaviors exacerbate output errors, and that output errors can be related to input errors. The student is expected to:
 - (A) recognize output errors in his/her own work;
 - (B) recognize output errors in the work of others;
 - (C) classify errors, in terms of severity, for a variety of situations;
 - (D) analyze and evaluate strategies to mitigate output errors;
 - (E) formulate new personal strategies to mitigate output errors;
 - (F) predict effects of all strategies;
 - (G) analyze the results of strategies to reduce output errors using appropriate visual representations;

- (H) read and interpret graphical displays created by others; and
 - (I) draw conclusions about output errors from analyzing the data.
- (3) Physiological Concerns. The student knows that there are certain physiological
- (A) influences affect the learning process. The student is expected to:
 - (B) investigate and describe physiological factors that influence mathematical learning;
 - (C) classify physiological concerns, in terms of severity, for a variety of situations such as homework, quizzes, and tests;
 - (D) evaluate the impact of strategies designed to minimize negative physiological factors;
 - (E) formulate new strategies to reduce negative physiological effects on learning;
 - (F) predict the effectiveness of his/her own strategies and the strategies of others; and
 - (G) implement a personal plan to minimize his/her own negative physiological concerns.
- (4) Connections among types of errors and physiological factors. The student understands that disruptions in the learning process are often caused by multiple interconnected factors. The student is expected to:
- (A) recognize the connections between different types of errors and physiological concerns;
 - (B) analyze the work of others, and predict what circumstances contributed to the quality of that students work, both positively and negatively; and
 - (C) analyze their own past and present work using critical-thinking to determine what circumstances contributed to the quality of their work.
- (5) Intellectual curiosity. The student further develops intellectual curiosity through conscious direction. The student is expected to accept constructive criticism and revise personal views when valid evidence warrants.
- (6) Reasoning. The student demonstrates the ability to think critically. The student is expected to:
- (A) consider arguments and conclusions of self and others;
 - (B) construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions;
 - (C) gather evidence to support arguments, findings, or lines of reasoning; and
 - (D) support or refine claims based on the results of an inquiry.
- (7) Problem Solving. The student applies a systemic approach to problem solving. The student is expected to:
- (A) analyze the situation to identify the problem to be solved;
 - (B) develop and apply multiple strategies to solve problems; and
 - (C) systematically collect evidence and data directly related to solving the problem.
- (8) Academic Behaviors. The student implements academic behaviors that foster academic success. The student is expected to:
- (A) self-monitor learning needs and seek assistance when needed;
 - (B) use study habits necessary to manage academic pursuits and requirements;
 - (C) strive for accuracy and precision; and
 - (D) persevere to complete and master tasks.
- (9) Work Habits. The student implements work habits that foster academic success. The student is expected to:
- (A) work independently; and

(B) work collaboratively.

Recommended Resources and Materials:

L.A.S.S.I. – “The LASSI is a 10-scale, 80-item assessment of students' awareness about and use of learning and study strategies related to skill, will and self-regulation components of strategic learning. The focus is on both covert and overt thoughts, behaviors, attitudes and beliefs that relate to successful learning and that can be altered through educational interventions. Research has repeatedly demonstrated that these factors contribute significantly to success in college and that they can be learned or enhanced through educational interventions such as learning and study skills courses.” – H&H Publishing

The Orleans-Hanna Algebra Prognosis Test

Test correction templates designed to further engage students in the strategic learning process while correcting assessments

Teacher created notes, group activities, individual activities, and assessments designed to aid students in acquiring strategic learning essential knowledge and skills

Recommended Course Activities:

- Students will be required to complete specialized assessment analysis templates after each math assessment or strategic learning assessment they complete. These analysis templates will aid students in identifying errors and the circumstances that lead to those errors.
- An Individualized Learning Plan (I.L.P.) will be written by each student upon discovery of personal factors that have negatively impacted performance on an assessment to mitigate future errors. These I.L.P.'s will be reviewed after each subsequent assessment, and revisions will be made accordingly.
- Students will be required to engage in periodic, teacher supervised visits to other classrooms on their campus. Students will use “Strategic Learning Logs” to document behaviors that positively and negatively impact learning. Analysis of the logs will follow in order to relate observed behaviors to personal behaviors. Groups of students will create several small units of instruction to present to their classmates. These units will include student-made lesson plans, activities and assessments. These units will better acquaint students with the teaching and learning process through participating in the process from the teacher’s point of view.
- All of the items produced will be kept in a strategic learning notebook to document and support progress in this course and the student’s mathematics course. Students will be required to complete specialized assessment analysis templates after each math assessment or strategic learning assessment they complete. These analysis templates will aid students in identifying errors and the circumstances that lead to those errors.
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Suggested methods for evaluating student outcomes:

Students will be evaluated based on the completion of required activities listed.

Teacher qualifications:

Teachers holding a Texas Teaching Certificate for the high school level will teach the course. Teachers holding a secondary mathematics certification are preferred. At a minimum, teachers for the course must have a strong mathematics background. Campus administrators will select teachers based on their ability to develop positive relationships with students and their commitment to work with students to enhance their academic and personal success. Campus and central office administrators will provide both the implementation and ongoing training for teachers. Teachers who have created, piloted, and taught the curriculum will also be available to train and mentor teachers new to the course content.

Additional information: