Math Center partners (2016, April). Bridging Research and Practice: Findings from the National Center on Cognition and Mathematics Instruction. Structured poster session presented at the AERA 2016 Annual meeting in Washington D.C.

Bridging Research and Practice: Findings from the National Center on Cognition and Mathematics Instruction

Session Abstract

The Institute of Education Science's (IES) National Center on Cognition and Mathematics Instruction aims to (1) apply research-based cognitive principles to revise an existing middle school mathematics curriculum and (2) to evaluate the effectiveness of the revised materials. This structured poster session will share findings from both the large-scale, nationwide study as well as findings from supplementary studies that seek to understand how to translate basic research on cognition into principled instructional design strategies. The posters discuss findings that refine existing theories of cognition and offer practical suggestions to improve overall student outcomes and meet the needs of individual learners.

Session Summary

Objectives of the session

Despite several decades of research in the cognitive and learning sciences that have advanced our understanding of how people think and learn, this substantial knowledge base has had only a limited influence in shaping the design of many K-12 curricular materials and instructional practices. The Institute of Education Science's (IES) National Center on Cognition and Mathematics Instruction aims to (1) apply research-based cognitive principles to revise an existing middle school mathematics curriculum and (2) to evaluate the effectiveness of the revised materials. The **objective of the session** is to share findings from both the large-scale, nationwide study as well as findings from supplementary studies that seek to understand how to translate basic research on cognition into principled instructional design strategies.

Overview of the presentation

The session will include presentations of research findings related to cognition and mathematics learning and instruction. The papers are organized around four cognitive principles of learning from the *IES Practice Guide: Organizing Instruction and Study to Improve Student Learning* (Pashler, 2007): (1) integrating visual and verbal information, (2) interleaving worked examples and self-explanation with problem solving (3) spacing practice, and (4) using formative assessment. The papers discuss findings that refine existing theories of cognition and offer practical suggestions for applying instructional strategies that improve overall student outcomes and meet the needs of individual learners.

Scholarly or scientific significance

As our session integrates research on cognition and student learning with teaching and instruction in authentic settings, the session provides **scholarly and scientific contributions** that inform both learning theory and educational practice. The translational research of the center will address questions such as: What are the implications for the integration of design principles and how do they work together? How can the principles of spaced assessment and formative assessment be effectively applied to practice? What types of examples should students see to improve their understanding of particular algebraic concepts? How can visual information be presented to encourage deeper processing? And, What are the implications of our collective work for efficient and effective instructional redesign?

Structure of the session

This structured poster session will be designed to facilitate discussion between presenters and attendees. The chair will introduce the session with a brief overview of the National Center on Cognition and Mathematics Instruction and findings from the full year 7th grade efficacy study. Next, attendees will have the opportunity to discuss posters with the presenters. At the end of the session, the chair will provide concluding comments on how lessons learned from the center may be applied to future research and instructional design initiatives.

Measuring the Efficacy of Research-based Revisions to a Middle School Mathematics Curricula

Jodi L. Davenport, Yvonne Kao, Bryan Matlen, Perman Gochyyev, & Steven Schneider

WestEd

Research on student learning has yielded cognitive principles that have the potential to inform the design of materials and instructional practice. The Institute for Education Sciences summarized some of the most promising research findings and formed recommendations in the *IES Practice Guide: Organizing Instruction and Study to Improve Student Learning* (Pashler, 2007). To establish whether applying these recommendations to classrooms would improve student outcomes the National Center on Cognition and Instruction brought together expertise in cognition, instruction, assessment, research design and measurement, mathematics education, and teacher professional development to redesign components of a widely-used middle school mathematics curriculum, the Connected Mathematics Project (CMP). The entire year of seventh grade CMP materials were revised by applying four cognitive principles of learning from the *IES Practice Guide*: (1) integrating visual and verbal information, (2) interleaving worked examples and self-explanation with problem solving (3) spacing practice, and (4) using formative assessment.

We report findings from 108 seventh grade teachers at 73 schools. Teachers were randomly assigned at the school level to either teach using the existing CMP2 curricula or to teach using the revised CMP2 materials. Over an entire school year, we collected data including demographic information, student performance on the Mathematics Diagnostic Testing Project (MDTP), unit posttest results, and teacher scores on the Mathematical Knowledge for Teaching (MKT) measure.

To determine whether the revised materials were associated with improved student outcomes, we conducted separate linear mixed effects ANCOVA models with additional random effect terms to account for the nesting of subjects within teachers and schools on the MDTP and seven unit posttests. These models included fixed effect covariate interactions with the treatment status at the student (e.g., MDTP pre-test, ELL status), teacher (e.g., MKT score, fidelity of implementation) and school levels (e.g., proportion FRL status at the school, proportion students proficient on the state mathematics exam). Results indicated that estimates for the treatment status were in the predicted direction for all 8 models (higher overall performance in the treatment condition relative to the control; Hedge's g ranged from 0.18 - 0.34). There was a significant effect of treatment status at alpha < .10 for two of the models and a significant effect of treatment status at alpha < .05 for one of the models. In addition, several covariates consistently moderated the effect of treatment status. In four of the models the effect of the treatment was enhanced for students with teachers who had lower scores on MKT and fidelity measures ($p < .05$; however, all models showed this same trend). The effect of the treatment was also enhanced in students with lower pre-test scores for 4 of the models at the alpha = .10 level (but all models showed the trend). Overall, these results suggest that incorporating cognitive principles with classroom instruction and practice can support students' mathematics learning and may help to close achievement gaps in student subpopulations.

Mapping Skills and Knowledge in the Connected Mathematics Project 2 (CMP2) Curriculum

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This poster describes an analysis of the distribution of mathematical knowledge and skill within a widely implemented middle school mathematics program, *Connected Mathematics Project 2* (CMP2). The goal was to map out in detail the concepts and skills targeted in the CMP curriculum to determine how knowledge and skills are distributed within units, across units, and across grades. Knowledge components consisted of four elements: skills, context, procedures, and responses. This mapping was applied to all Connected Mathematics Project (CMP) homework and assessment problems in the entire sixth and seventh grade and selected eighth grade units. Through this analysis we were able to ascertain where certain mathematical content is introduced, the practice frequency of specific skills, and the relationship between practice and test items. This analysis was important for the redesigned curriculum materials as well as in determining the types of mathematical problem sets to include in empirical studies. For example, from the curriculum mapping information, we modified teacher materials to include more elaborated information about the skills expected to already be mastered before the start of the particular unit, including all homework items in the upcoming unit where those previously mastered skills appear, in what prior unit the skill was expected to be mastered (according to CMP), a prototypical example of how each skill appeared in the mastered unit, and practice problems for each skill from the *Additional Practice and Skills Workbook*. Additionally, a tool for assessment of these prior skills, drawn from selected problems in the *Additional Practice and Skills Workbook*, was included.

The curriculum analysis supports the need for empirical studies to determine optimal patterns of the practice and assessment of specific skills, including whether skills varying in complexity and difficulty require differential practice and assessment plans to maximize student mastery and retention. However, implementing spaced practice over time for a variety of skills across a large number of students and providing an appropriate level of formative assessment is a complex task. In order to redesign the learning environment to better incorporate spaced practice and formative assessment, we utilized a web-based technology capable of tracing individual student performance across skills and time. ASSISTments (Feng, Heffernan, Koedinger, 2009). is a domain-general web-based system that allowed us to create individual practice and assessment assignments, composed of questions with associated hints and solutions. The combination of ASSISTments with our mapping of skills across the CMP curriculum enables individualized practice on specific skills based on student performance and allows improvement of students' mathematical performance using the principles of spacing and formative assessment. Practical and theoretical implications, such as how such analyses can be applied to other curricula, will be discussed.

Improving Mathematical Learning Outcomes Through Applying Principles of Spaced Practice and Assessment with Feedback

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This poster reviews two studies that investigate how applying the cognitive principles of spaced practice and assessment with feedback can improve mathematical learning outcomes. The first study investigates whether an online system that automatically reassesses student knowledge and provides relearning opportunities improves long-term retention for individual students and across specific mathematical skills. Over a single school year, 97 8^{th}-grade students were pretested on a set of mathematical knowledge and skills that were previously learned and then subsequently practiced them until evidence of mastery was exhibited on each of the skills. After mastery, students received automatic online reassessment and relearning opportunities for half the skills, while the other half were not further assessed. End-of-year post-test results revealed better performance on the problem sets that were periodically reassessed and relearned if needed. Furthermore, reassessment and relearning was especially beneficial for students with low pre-test performance (poor retention of prior knowledge) and for more difficult skills.

The second study investigates whether the practice and reacquisition of mastery of relevant prior skills aid in the acquisition of new mathematical content. In redesigning the *CMP* curriculum, our work has largely focused on preparing students to learn new material in upcoming units by engaging in spaced practice with feedback on relevant concepts mastered in earlier units and grades. The determination of "relevant" previously mastered concepts was based upon our extensive mapping of *CMP* concepts from grade 6 to grade 8. The mapping identified the *CMP* concepts practiced or assessed in the context of the overall set of homework and assessment items found in the curriculum. We hypothesized that students who are provided opportunities to re-master relevant prior skills would be better prepared to learn new mathematical content and, therefore, would demonstrate higher levels of proficiency on these new skills compared to students who did not receive opportunities for re-mastery of relevant prior skills. Although the results differed depending on the mathematical content taught in each unit and the level of skill re-mastery before learning the new unit, there was evidence of a positive impact of prerequisite skill re-mastery on the acquisition of the new lesson content.

The educational implications of both studies will be discussed with respect to the role of distributed practice and reassessment of prior learning in the design of curriculum and instruction and the potential for positive impacts on student learning and retention of critical mathematical knowledge within and across academic years.

Evaluating the Differences in Students' Performance and Retention for Mathematics Skills Given Various Forms of Feedback

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Previous feedback studies have established that immediate, formative feedback is beneficial for learning and retaining mathematics skills. Less is indicated in the literature about what specific types of feedback provide greater benefit, and for which students learning which kinds of mathematical concepts and skills. This poster reviews a study that examines differential benefits provided by four different modes of feedback during skills practice among middle grades students. Using the online *ASSISTments* platform, a program of spaced practice was developed for four categories of mathematics skills that students had ostensibly mastered in previous grades. Students followed a practice scheme that employed one of four different modes of feedback/support for each skill category: 1) correctness only, 2) voluntary access to conceptual and procedural hints, 3) a text-based worked example of a similar problem provided after an incorrect response, and 4) a video-based worked example of a similar problem provided after an incorrect response. A mixed design was used where students were randomly assigned into one of four groups, each of which practiced the four skill categories in a configuration that matched skill categories to feedback condition uniquely for each group. Each student then followed a practice scheme (3 total iterations, spaced 28 days apart) for each skill category, in which they attempted problems until they attained "mastery" by answering three items correctly in a row. For each skill category, a pretest was administered prior to the first practice session, and a posttest was administered approximately 10 weeks after the last practice session.

The analysis of performance consists of analyzing primary effects and interactions among Skill Category, Feedback Condition, and Test variables to determine the relative effects of spacing schemes on retention of previously mastered skills. Thus far, significant main effects of Test (Pre, Post) have been obtained for all skill categories and feedback conditions, indicating that practice schemes and feedback across all of these forms are beneficial for students as they practice previously encountered skills. Further analyses are focusing on deeper investigation of the overall benefits of feedback, including for which students (in terms of levels of initial mastery) the benefit of feedback is greatest. Analysis will also investigate any differential benefits among the four feedback conditions, including how benefits of particular types of feedback may vary depending on initial skill difficulty and the stability of students' previous level of mastery in a particular skill category. As *ASSISTments* also provides detailed data on *how* students engaged with the skills during practice and feedback (e.g., time on task, amount of feedback encountered, number of tries to correctness), we will explore these data as a way to further analyze main effects and interactions found in the primary analysis.

Improving Student Learning in Math through Web-based Homework Review

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Most middle school students complete mathematics homework every night, but students typically do not receive feedback on performance until the next day in class. Given the rise in the numbers of homes with Internet access, it is now possible to allow students to receive immediate feedback as they complete their homework. While lab studies have shown immediate feedback to be beneficial, it is important to investigate the benefits of immediate feedback in real-world learning environments. We have conducted a randomized controlled experiment to examine the effects of immediate computer automated feedback on knowledge retention. Immediate feedback consisted of a student receiving automated correct/incorrect feedback after submitting their answers to each question. In this study, 63 thirteen and fourteen year olds were randomly assigned to either a traditional homework condition involving practice without feedback or a web-based homework condition that added correctness feedback and ability to try again. All students used ASSISTments to do their homework but we turned off all of the intelligent tutoring aspects of hints, feedback messages and mastery learning as appropriate to the two practice conditions. The teacher had access to summaries of the homework performance of individual students and the group as a whole and could adapt the next day's homework review accordingly.

Students in both groups showed that their initial performance on the homework problems covering the day's instructional targets was far from initial mastery. The control group who did not receive immediate feedback when completing their homework showed no overall learning gain during the homework practice. For these students, the teacher reviewed their homework answers the next day and the review tended to cover all the problems. In the experimental group, students were given immediate feedback as to whether the answers were correct or incorrect and were allowed to try again to answer a problem correctly. As a consequence, they learned during the homework exercise. The teacher was therefore able to use the data from the item report to focus the homework review the next day on the most challenging problems based upon individual and group performance. Both groups learned from the teacher led homework review but the overall gain across the two activities of engaging in online homework and subsequent teacher-led homework review was greater for the students who experienced the initial web-based correctness feedback, with an effect size of 0.56. Discussion will focus on the benefits to students and teachers of adaptive homework activities mediated by technology-based data collection and reporting systems like ASSISTments.

Strategically Determining Type of Example Presented to Student Based on Target Algebraic Misconception

Kelly M. McGinn, Christina Barbieri, Julie L. Booth

Temple University

Many students hold persistent algebraic misconceptions, which tend to follow them through their academic career, negatively affecting their success in mathematics. The combination of worked-examples and self-explanation prompts have been used been to reduce algebraic misconceptions. Recently, researchers have determined the benefits of using *both* correct and incorrect worked-examples; however it is unclear whether certain misconceptions are more easily eliminated by one type of worked-example. The purpose of the current study is to determine whether the type of worked-example, correct or incorrect, influences the rate of reducing specific algebraic misconceptions.

Algebra I students (N= 140) from classrooms of five teachers participated in this study. Within classrooms, students were randomly assigned to one of three conditions (receiving either typical mathematics problems, all correct worked-examples, or all incorrect worked-example). Students completed a pre-test, followed by four study worksheets, and ended with a post-test. The worksheets consisted of four problem sets (two items per set). Each condition's worksheets were made up of the same eight procedural items, however the supplemental interventions differed. The two experimental conditions were similar in that the items focused on same common errors or misconceptions. The only difference between the two was that one group received all correctly worked-examples, while the other received all incorrectly worked-examples.

The Relationship Between Fraction Magnitude Knowledge and Pre-Algebra Learning

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Two quasi-experimental classroom studies were conducted with the following purposes: 1) To assess the influence of supplementing traditional problem-solving workbooks with a combination of correct and incorrect worked examples on middle school students' pre-algebra knowledge and 2) To explore the relationship between fraction and whole number knowledge and learning of conceptual and procedural pre-algebra knowledge. In study 1, sixth-grade students (N=48) in two ethnically diverse public school classrooms completed whole number and fraction magnitude tasks as well as an arithmetic test before and after working with either a traditional Connected Mathematics workbook or an experimental workbook which was supplemented with worked examples. The pre-algebra assessment measured procedural and conceptual knowledge of ratios, decimals, and percents. In the whole number magnitude task, participants were asked to place 12 whole numbers on number lines with endpoints of 0 and 6257 at pre- and post; the fraction magnitude task was identical except for all target numbers were fractions and the endpoints were 0 and 1.

Results from Study 1 suggest that the experimental workbook was no more effective at increasing conceptual and procedural scores than the control workbooks. Whole number magnitude knowledge did not predict conceptual or procedural learning. However, fraction magnitude knowledge, as represented by students' R^2_{Lin} , was a significant and unique predictor of conceptual knowledge at post-test, controlling for pre-test. That is, students with stronger fraction magnitude knowledge at the start of the study strengthened their understanding of the meanings of the features of the problems over the course of the study. This relationship was not found for procedural skill.

A follow-up study was conducted with a larger sample for purposes of replication. In Study 2, sixth-grade students (N=108) in six ethnically diverse public school classrooms followed the same procedures used in Study 1. The experimental workbooks were not more effective at increasing learning than the control workbooks. Again, whole number magnitude knowledge did not predict conceptual or procedural learning. As in study 1, students' fraction magnitude knowledge at pre-test demonstrated predictive power. However, with the larger sample size in Study 2, the nature of the relationship differed. Results indicated a linear relationship between students' fraction magnitude knowledge at the start of the study and their procedural learning over the course of the study. The relationship between students' fraction magnitude knowledge at pre-test and conceptual learning was cubic, indicating that fraction magnitude knowledge is particularly predictive at the more extreme ends of the range of values. Relative contributions of fraction magnitude knowledge for particular types of fractions, such as unit fractions, are also explored. Implications for both theory and practice are discussed.

Errors as Predictors of Algebra Learning

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Errors in mathematics classrooms, while common, are often discouraged. These errors can indicate certain misunderstandings that students have about mathematical concepts. Prior research demonstrates that certain types of errors are related to math achievement difficulties (Booth, Barbieri, Eyer, & Paré-Blagoev, 2014). However, some researchers suggest the use of errors as a mechanism for learning within specific types of instruction. The current in-depth analyses focus on the types and frequency of errors middle school students (N = 140) make while learning to solve systems of equations and whether making certain types of errors is indicative of learning struggles. Students' problem-solving across the worksheets used within the unit was coded for errors. Through the use of correlations and conceptual similarities, the 23 specific errors found were collapsed into five error categories. These categories included *terms errors*, *operation errors*, *equal sign errors*, *graphing errors*, and *mechanical errors*. *Operation errors*, or errors involving incorrectly performing operations or performing the wrong operation, were most frequent (M = 3.03, SD = 3.66). *Terms errors*, or errors involving incorrectly working with variables, constants, and coefficients, were also frequent (M = 2.03, SD = 2.61). Multiple regressions were run to determine whether certain types of errors were predictive of learning as indicated at post-test after controlling for pretest as well as number of problems attempted overall. The relationships between specific types of errors and learning are discussed. For example, the number of *terms errors* made across the unit predicted a small but significant amount of overall learning (β = -.16, p = .028). Students' errors as potential representations of algebraic misconceptions, as well as implications for education, are discussed.

Cognitive Principles for Effective Uses of Visual Information Improve Mathematics Learning by Encouraging Deeper Processing

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Images in mathematics textbooks are intended to be informative, stimulating, and to catch and hold student interest. How images are used in concert with text greatly influences student comprehension and learning (e.g., Butcher, 2006). Instructional design principles based on cognitive processing theories prescribe best practices for presenting images along with text in learning materials (Mayer, 2009). Yet little previous work has examined cognitive processing in widely used, commercially-available, mathematics curriculum materials.

Working with the creators of the *Connected Mathematics Project* (*CMP2;* Lappan et al., 2006), we made revisions to the commercial materials, based on three principles: Assisting in the integration of information between text and images (*Contiguity)*, highlighting mathematically relevant information (*Signaling)*, and eliminating potentially distracting images

(*Coherence;* Mayer, 2009). Our revisions were reviewed for inter-rater reliability, and approved by mathematics educators and curriculum developers.

Participants were 57 middle-school students entering sixth or seventh grade (M = 11.12 years). Eye-tracking measures were used to study cognitive processing based on the *eye-mind assumption* (Just & Carpenter, 1980), which states that the location of a person's visual attention indicates what they are currently cognitively processing.

We compared first pass and second pass dwell times for images and text across Signaling, Contiguity, and Coherence revisions. First pass dwell time was the total duration of fixations in an area of interest from first entry to exit (Holmqvist, et al., 2011), with longer processing time indicating greater cognitive load (Hyönä & Nurminen, 2006). Second pass dwell time was defined as the total duration of all fixations in an area of interest after first exiting the area (Hyönä et al., 2003), and served as an indicator of how much time was spent on integrative processing (Hyönä & Nurminen, 2006).

For lesson pages which included Signaling and Contiguity revisions, second pass dwell time on the image was greater for students in the revised condition ($F(1,55) = 4.47$, $p < 0.05$). Increased second pass dwell time on images in the revised condition was positively correlated with higher learning outcomes ($r = 0.52$, $p = 0.004$). Previous research found that increased second pass dwell times on images are positively associated with learning (Rau, Michaelis, & Fay, 2015). While the cognitive processing of images with signaling and contiguity features is less efficient, the additional dwell time benefits learning.

For pages that included revisions where an irrelevant image was removed (*Coherence*), first pass dwell times on the text were negatively correlated in the original condition ($r = -0.42$, $p = 0.032$), but positively correlated in the revised condition ($r = 0.380$, $p = 0.046$) with higher post-test scores (Figure 1). For these pages, we found that higher post-test scores were positively correlated for both second pass dwell times on the image in the original condition ($r = .47$, $p = 0.013$), and on the text in the revised condition ($r = 0.45$, $p = 0.016$).

We contribute to the theory of cognitively based design principles by investigating when greater processing demands are desirable for increased learning.

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FIGURES & TABLES

Table 1

Example of a Revision Based on the Signaling and Contiguity Principles.

Original

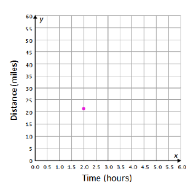
Step 4 Plot the data points.

At 2 hours, Celia had biked 22 miles.

You can see this in the table.

Time (hours)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Distance (miles)	0	7	12	18	22	26	30	34	40	45	49	52	58

To plot this information on a coordinate graph, start at the *x*-value of 2 on the *x*-axis (time) and follow a line straight up. On the *y*-axis (distance), start at the *y*-value of 22 and follow a line straight across. Make a point where the two lines intersect. You can describe this point with the **coordinate pair** (2, 22). The first number in a coordinate pair is the *x*-coordinate, and the second number is the *y*-coordinate.



Revised

Step 4 Plot the data points.

At 2 hours, Celia had biked 22 miles.

You can see this in the table.

Time (hours)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Distance (miles)	0	7	12	18	22	26	30	34	40	45	49	52	58

To plot this information on a coordinate graph, start at the *x*-value of 2 on the *x*-axis (time) and follow a line straight up. On the *y*-axis (distance), start at the *y*-value of 22 and follow a line straight across. Make a point where the two lines intersect. You can describe this point with the **coordinate pair** (2, 22). The first number in a coordinate pair is the *x*-coordinate, and the second number is the *y*-coordinate.

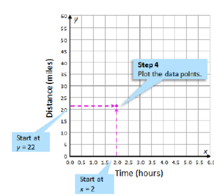


Table 2

Example of Revisions Based on the Coherence Principle (Irrelevant Image Removed).

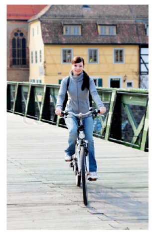
Original

Recording Data and Making Tables

Celia took a practice ride in her hometown of Atlantic City. She used an app on her smart phone that recorded how far she had biked every half hour. She made the table below of the distance in miles she had biked every half hour.

Time (hours)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Distance (miles)	0	7	12	18	22	26	30	34	40	45	49	52	58

After the first half hour (0.5 hours), she had biked for seven miles. At four hours, she had biked for 40 miles. At the end of the day, she had biked six hours for a total of 58 miles.



Revised

Recording Data and Making Tables

Celia took a practice ride in her hometown of Atlantic City. She used an app on her smart phone that recorded how far she had biked every half hour. She made the table below of the distance in miles she had biked every half hour.

Time (hours)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Distance (miles)	0	7	12	18	22	26	30	34	40	45	49	52	58

After the first half hour (0.5 hours), she had biked for seven miles. At four hours, she had biked for 40 miles. At the end of the day, she had biked six hours for a total of 58 miles.

Table 3

Example of a Revisions Based on the Coherence Principle (Relevant Images Added, Irrelevant Image Removed).

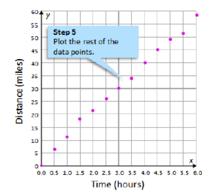
Original

Step 5 Finish plotting the data points. Continue plotting the information in the data table on the coordinate graph.

Revised

Step 5 Finish plotting the data points. Continue plotting the information in the data table on the coordinate graph.

Time (hours)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Distance (miles)	0	7	12	18	22	26	30	34	40	45	49	52	58



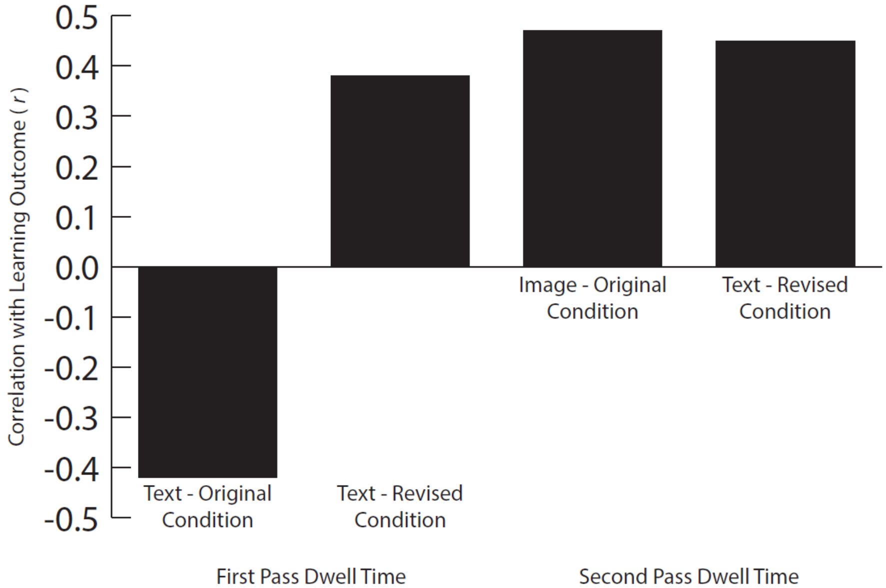


Figure 1: Correlations Between Dwell Time and Learning Outcome Comparing Original Materials Versus Coherence Revisions (Irrelevant Image Removed).