CALIFORNIA STATE UNIVERSITY

MONTEREY BAY

Student Discourse

CAPSTONE Report

Submitted in partial satisfaction of requirements of the degree of

MASTER OF SCIENCE in

Instructional Science and Technology

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Capstone Approvals: (At least one advisor and capstone instructor should approve)

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Executive Summary

In the fall of 2016, La Honda Elementary kicked off a new beginning. The school name changed to La Honda STEAM Academy. STEAM stands for science, technology, engineering, art and math. STEAM teaching integrates the subjects so that students see the connections of unknown to known concepts and associate learning to real-life applications. Over a three-year period, the mission and vision were overhauled with overwhelming support from students (stakeholders), parents (stakeholders), teachers (target audience and stakeholders), Lompoc Unified School District administration (stakeholder), and the School Board (stakeholder).

A five-year school plan guides the school and community with benchmarks for gradual and sustainable implementation. This plan provides guidelines for different domains within the implementation. One of the domains in the plan, student discourse, promotes student communication of evidence-based learning. This part of the plan serves our large English Language Learner (ELL) population as well as other learner populations who need improvement in communicating their learning. (La Honda STEAM Academy timeline, 2015)

For the most part, teachers design and deliver instruction using a teacher-centered classroom model that revolves around the teachers themselves doing the large majority of academic speaking in the classroom. This persists despite the school implementation plan that includes integrating more student academic discourse into lessons. This course intends to raise teachers' awareness of the importance of increased student academic discourse, identification of its characteristics, and to train them to use a classroom observation tool to identify if student discourse is happening in their classrooms.

While searching for a definition for student discourse, many descriptions surfaced. For the purposes of its use in this proposal, student discourse will follow guidelines suggested by Resnick, Michaels and O'Connor (2010) "Our work on accountable talk - across a wide range of classrooms and grade levels - suggest that its critical features fall under three broad dimensions: (a) accountability to the community, (b) accountability to standards of reasoning, and (c) accountability to knowledge" (pp. 179-180). The intention of the sponsors, designer and developer of this program is to continue the work started during the 2016 -2017 school year with

the introduction of a website created to train more participants in student discourse so that they design and deliver more lessons that integrate student discourse on a regular basis.

The project deliverable, the Student Discourse website, contains four completed e-learning modules and a teacher resource section to be completed in the future. The completed learning modules include: What is Discourse, Why Discourse is Needed, Examples of Discourse and Documenting Discourse. These modules focus on providing teachers a more complete understanding of student discourse so that they may increase opportunities for students to speak more in classroom lessons. One of the key elements of the project uses recorded classroom video and images from Lompoc Unified School District in every learning module and the evaluation piece.

The project outcome resulted in learning effectiveness for learners following participation in the training modules. The pre- and post- test means showed a significant difference between before and after the final evaluation. The t-test analysis rejected the null hypothesis that the pre- and post-test means would be equal. Furthermore, the analysis supported the alternative hypothesis that the pre- test means would be less than the post- test means as a result of participation in the Student Discourse course modules.

Future implications for training modules such as these that involve the use of classroom video recordings to increase the effectiveness of classroom educators is hopeful. It will be used in an upcoming blended training for teachers at the site level in Spring 2018. Lompoc Unified School District Administration supports the use of this project to train teachers about the benefits of student discourse in the classroom. In addition, the Santa Barbara County Office of Education responded positively to a meeting request to discuss how this type of training fits with their vision of future professional development and training.

Introduction

Background on Project

In September of 2016, a teacher from Buellton Union School District, L. Melby, presented a program involving classroom observations by teachers based on research in the book *Instructional Rounds in Education* by City, Elmore, Fiarman and Teitel (2009). When the designer presented this idea to the La Honda STEAM Academy principal at the time, B. Valla, the potential of this type of a program to support the La Honda STEAM Academy school plan emerged.

The purpose of our observations, included a focus on student discourse and opportunities for gathering authentic examples of best teaching practices from teachers within the school site using an observational rubric. The first instructional round was scheduled for October 2016 with a follow up round in February 2017. For the first round, a short classroom training was provided on the use of the rubric to document student discourse. At that time, teachers verbally described a basic understanding of student discourse and the parts and purpose of the rubric. A debriefing session allowed for informal formative assessment by the presenter as to the effectiveness of the observations and understanding of the rubric.

During the debrief, it was apparent that teachers did gain some new ideas for teaching best practices however, 9 out of 10 teachers documented teacher discourse instead of student discourse on the observational rubric. The site principal (sponsor of the program) decided that due to the lack of knowledge and understanding about the program, a training program would serve the purpose of educating the teacher volunteers. A classroom session was presented in February 2017 with the dual purpose of educating teachers about what constitutes student discourse and calibrating participant documentation on the revised rubric so that the teacher rounds would have a greater impact on the teacher's understanding of the importance of student discourse. (see Appendix A) The training session had the desired effect of increased student discourse documentation on the rubric by participating teachers and the added effect of focusing the teacher discussion and comments at the debrief session on the topics in the observational rubric (see Figures 1 & 2).

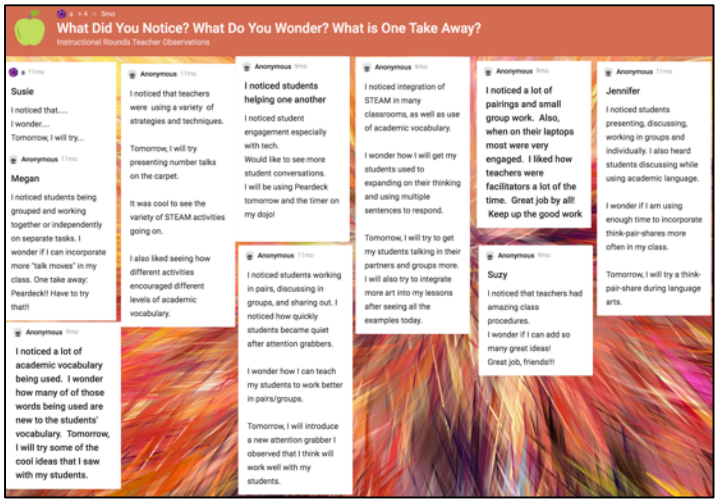


Figure 1. Teacher Instructional Rounds Debrief October 2016.

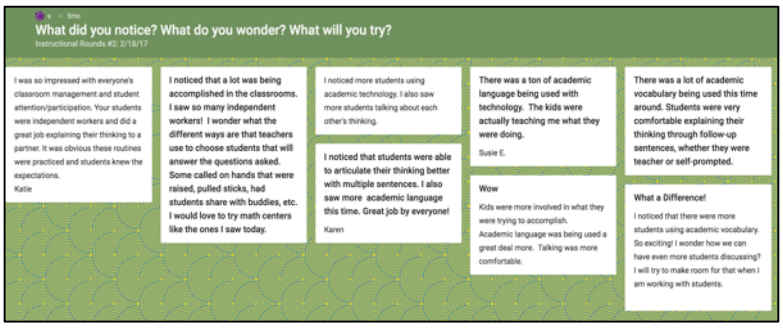


Figure 2. Teacher Instructional Rounds Debrief February 2017.

Due to the success of the training and the instructional rounds in 2016-2017, the program will be expanded this year (2017-2018) to include three teacher instructional rounds as well as teacher resources for infusing student discourse into classroom lessons on a regular basis. To accommodate for delivering consistent training to increasing numbers of teachers participating in instructional rounds and the increased cost of training in a landscape of shrinking educational budgets, a web-based training program including student discourse learning modules and teacher resources will be developed.

Problem Description

Upon formal and informal classroom observations, it is apparent that teachers are dominating the conversation in an overwhelming majority of designed and delivered lessons. There needs to be a shift in the classroom toward a much greater increase of student discussion

time and inversely toward a decrease of teacher discussion time in all lessons. In a 2016 survey, 61 students responded to the question, “I work with a partner to solve problems” with the following: 8.2 % marked “rarely”, 67.2 % marked “sometimes”, 11.5% marked “often” and 13.1% marked “frequently”. They have also stated that they discuss their learning with a classmate or teacher from 3 to 6 times in a normal school day (see Appendix B).

Teachers were surveyed about their knowledge of observing student academic discourse using face to face interviews and Google Forms. These interviews and surveys revealed teacher self-assessments of their perceived level of understanding and their actual level of understanding differed. The difference concerned characterizing teacher speaking separately from student speaking during a lesson in rubric documentation. Focus concentrated on the discourse of the teacher throughout the lesson even though the rubric was student centered, not teacher centered.

Target Audience

Kindergarten through sixth grade teachers make up the target audience of learners for this course. A learner analysis indicates that the La Honda STEAM Academy contains a teaching staff comprised of 21 out of 24 white female teachers aged 25 – 65 with 1 – 30 or more years of experience working in education. Within the past two years, eleven new teachers replaced veteran teachers with 30 or more years of teaching experience. A large majority hold or are currently in pursuit of a master’s degree. The year 2017 marks the 3rd year with new administration leadership at the site level. Within the past four years, a major overhaul in top level positions at the district level brought a complete replacement of administrative leadership (with exception of one person).

Still today, the negative effects of past No Child Left Behind (NCLB) policies cause a lingering attitude of anxiety in veteran teachers. This is key information, because most of the teacher leadership positions at the site are held by a dwindling group of these veterans. Due to La Honda’s Program Improvement status under NCLB, educational consultants ensured compliance with the directives of the program. The directives focused on mandating changes in teaching practices, not student learning practices, resulting in the main-focus being on what the teacher behavior was during a lesson and not on observable student behavior that indicates learning. One

major result of this program is that veteran teachers have a deeply entrenched resistance toward new initiatives that could serve to change and improve their teaching practices.

In contrast, a great opportunity has presented itself with the influx of new teacher hires that have reinvigorated some veteran teachers. Consequently, 10 out of 24 teachers with a variety of years of experience and grade levels volunteered to participate in teacher instructional rounds in 2016, with plans for even more participating in 2017. The Student Discourse website will provide training for teacher participation in teacher instructional rounds as well as training and support for everyday classroom lesson design and delivery that includes student discourse as a feature on a regular basis.

Literature Review

Research into the literature in support of student academic discourse in elementary yields sources that directly speak to the idea of learner centered instructional design and learning environments. The instructional design utilizes a few learning theories to form its basis, namely Social-Constructivist, Social-Cognitivist and of course, careful application of Cognitive models to motivate the learner. A social approach aids in the change management of teacher attitudes while also learning new material. Lesson delivery needs to incorporate the latest andragogy research to make learning relevant and offer more learner control.

To develop the eLearning modules, Malcolm Knowles theory of andragogy will be utilized to create a relevant learning experience that offers learner control and serves as a "just-in-time" resource to support workplace expectations.

To address learner differences and readiness, Vygotsky's Zone of Proximal Development (ZPD) principles address individual learner needs and allows for scaffolded mastery through work in the objective modules. According to Vygotsky (1934/1987b), in the ZPD "This capability requires the processes of attention, association, and the cooperation of judgement and representation (Gredler, 2009, p. 337). Although Vygotsky's research prescribes these considerations for educating children, these ideas effectively apply to educating adults, too.

Bandura's Social-Cognitivist theory promotes teacher self-efficacy. Guided practice using video from the home school district allows teachers to believe they can use the rubric with the challenging learner population they regularly work with. Video presents authentic modeling

of desired behavior for imitation. Bandura's social-cognitive work with modeling and imitation create a basis for using video, rehearsal and feedback to offer realistic teaching models "to code the observed behavior into visual images and word symbols and to mentally rehearse the modeled behaviors". The application of Bandura's self-efficacy theory helps develop the teacher's belief in their own mastery of tasks and modules contained in the learning objectives. This course must be designed in such a way that the experience activates "teacher judgement of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (Tschannen-Moran & Woolfok How, 2001, p. 783) (Gredler, 2009, pp. 374-375).

Along with teacher self-efficacy, motivation makes up a key factor in educating this specific learner population. For this eLearning course, Keller's ARCS model as well as Mayer's Multimedia principles will be used to build modules for this course that present material in such a way that gains the attention of teachers so they select key auditory and visual information to encode in working memory and integrate with prior knowledge in long-term memory. This will be important for retrieval of information once they get back in the classroom. The ARCS model applies to this learner population and purposes of instruction because "it is a problem-solving model which helps a designer identify and solve specific motivational problems related to the appeal of instruction" (Keller, 2006, p. 7). Gagne's 9 Events of Instruction will also be utilized in lesson design to aid the processing of new information.

The next source supplies the background for characterizing the student actions essential for improving the level of classroom student discussion. The name of this source is the *5 x 8 Card.* Its name refers to the information about student actions that was condensed down to fit on a card that measures 5 x 8 inches. The *5 x 8 Card* captures the real essence of the many facets of scaffolding and refining high level student speaking in the classroom. Six out of the seven "Student Vital Actions" (Daro 2003), directly relate to specific research-based mechanics and teaching strategies that support students in speaking about content in detail.

The *5 x 8 Card* was utilized in the creation of the observation rubric available on the website for participant use to observe student speaking. Teachers practice using the rubric to observe student behavior while viewing classroom video. Participant analysis of video using the

rubric helps define and shape the boundaries that characterize student academic discourse in the classroom. This will provide a scaffolded approach using an authentic, research-based teaching resource that is intended to illicit far transfer of best teaching practices once participating teachers are back in their classrooms.

Solution Description

Goals of the Project

The main goals of this web-based course provide teachers with a framework for including student discourse regularly in the classroom. The following outline the program goals:

- Explain the rationale behind the need for student discourse.
- Explain the meaning of student discourse using explicit examples.
- Train teachers on the use of an observational rubric for use during site classroom visits and in their own classrooms.
- Provide authentic experiences for teachers to rate the quality & quantity of student discourse at the site & in their classrooms.
- Provide job-aids and resources for just-in-time implementation & student discourse support in their classrooms.

Learning Objectives

This website is intended to serve as a one-stop introductory resource for kindergarten through sixth grade teachers to learn about student discourse in an educational setting. Topics covered in this website include: what student discourse is, why it is needed and how to recognize it in a learning environment. There will be a section of the website containing resources such as job aids available to teachers supporting the integration of regular student discourse in the classroom. The learning objectives provide the following structure:

1. When provided with a list of reasons, the learner will select the correct meaning of student discourse.
2. When provided with a list of reasons, the learner will select the three key reasons why student discourse is needed.
3. When provided with examples, the learner will select two positive examples of student discourse and two negative examples of student discourse.

4. When provided a video or image of a classroom for viewing, the learner will document student discourse using a provided rubric according to the guidelines provided by the *5 x 8 Card*. (serpmedia.org)
5. When given a completed rubric, the learner will analyze documented student discourse in accordance with the guidelines provided by the *5 x 8 Card*. (serpmedia.org)

Proposed Solution

La Honda STEAM Academy has a comprehensive school plan that includes supporting our large English language learner student population. One tenant of this plan includes moving lessons toward a more learner-centered approach focusing on students explaining their thinking as they learn. For this to happen successfully, teacher training and resources need to be readily available to support lesson design and delivery that include more student discussion in classroom lessons. This website will serve the needs of all students by guiding teachers toward increased awareness and knowledge about the importance of student discussion during the learning process. The overarching intent of this website is that by raising awareness of student discourse, this will lead to increased student discussion in classrooms.

Instructional strategies were used to deliver the content asynchronously within the website itself. The following are learning strategies that were included in the learning modules:
Background Knowledge – Background knowledge of learners is important for learners to have a base-line understanding of the concept and purpose of student discourse in a classroom setting. A research article and blog in module one provide background knowledge needed so learners realize the rationale behind the importance of student discourse in addition to characterizing what student discourse is.
Practice Opportunities - Practice opportunities offer structured feedback based on submitted learner responses. Ungraded practice opportunities in combination with feedback enable learners to check their understanding of the material.
Immediate Feedback – Corrective and confirming feedback provides motivation & support for learning.
Gradual Release of Responsibility - By providing guided and interactive video at the beginning with worked examples and then providing raw video with questioning and opportunities for

documenting discourse using the observational rubric, the learner will gain confidence and increased mastery of student discourse documentation.

Task Analysis

Table 1

Task Analysis Brief	
Module 1 Captivate eLearning Module	When provided with a list of reasons, the learner will select the correct meaning of student discourse. • Course opens with an intro explaining the benefits of learning about student discourse. • Course continues to explain the meaning of student discourse in detail. • Learners access a choice of resources to learn more about the meaning of student discourse. • Learners participate in a practice opportunity to check for understanding of learning objective #1: a hot-spot type activity with feedback when clicked by user.
Module 2 eLearning Module	When provided with a list of reasons, the learner will select three key reasons why student discourse is needed. • Interactive video with embedded questions explains the rationale behind the need for student discourse. • A drag & drop card sort practice activity provides the learner a check for understanding of learning objective #2.
Module 3 Captivate eLearning Module	When provided with a list of examples, the learner will select two positive examples of student discourse and two negative examples of student discourse. • Video provides examples and non-examples of student discourse. Learners will have the opportunity to practice in two ways to master learning objective #3:

	○ Annotated images provide the drag & drop card sort practice to check for understanding of objective #3: learners drag examples and non-examples under specified categories on the screen. ○ A quiz using video provides practice activities that will check learner understanding. Feedback guides the learner toward mastery of learning objective #3.
Module 4 Captivate eLearning Module	When provided a video or image of a classroom for viewing, the learner will document student discourse using a provided rubric according to the guidelines provided by the *5 x 8 Card*. (serpmedia.org) Learners have two opportunities for practice to master learning objective #4: • Hotspot practice activity using the provided rubric provides scaffolding & worked examples for rubric documentation (following viewing video and annotated images).
Module 5 Captivate eLearning Module	When given a completed rubric, the learner will analyze documented student discourse in accordance with the guidelines provided by the *5 x 8 Card*. (serpmedia.org) • To be determined and developed in the future.
Teacher Resources	Teacher resources (some that have been completed in the MIST program already) will be added in the future. • Job Aids • Teacher Tips & Research Based Strategies • Question Prompts • Student Discourse Sentence Frames • Wiki • Grade Level Standards-Based Lesson Supports

Media components

Three out of four of the eLearning modules were created using Adobe Captivate. Module two featured interactive video using the H5P web resources. Classroom videos were recorded using an iPhone or iPad with various mic attachments and edited using iMovie or Camtasia. Audio narration was recorded within the video recording or recorded afterward during the editing process. Captivate clickable interactive activities, card sort activities developed using the Desmos website and Google Forms were used for practice opportunities and evaluation purposes. More specifically, within the module learning objectives:

Table 2

Learning Module Media

Module Number	Learning Objective	Media Component	Media Integration
1	When provided with a list of reasons, the learner will select the correct meaning of student discourse	*Research: Provided blog and short article *Classroom edited video with narration *Classroom annotated images *Clickable practice activity *Audio narration	*Research and narrated classroom video is available to provide choice for learner to choose if they will learn more about the meaning of student discourse. Clickable practice activities provide learner a check for understanding.

2	When provided with a list of reasons, the learner will select 3 key reasons why student discourse is needed	*Classroom edited video with narration *Drag & drop card sort activity *Audio narration	*Interactive video explains the rationale behind the need for student discourse while at the same time checking for understanding with embedded questioning. *Drag & drop practice activity provides the learner a check for understanding.
3	When provided with a list of examples, the learner will select two positive examples of student discourse and two negative examples of student discourse	*Annotated images or edited classroom video. * clickable, interactive images *Drag & drop activity *Google Form practice using classroom video *Audio narration	*Video provides examples and non-examples of student discourse. *Annotated images provide the drag & drop practice: learners drag examples and non-examples into specified areas on the screen. A Google Form with video and follow-up questions provides practice that checks learner understanding.
4	When provided a video or image of a classroom for viewing, the learner will document student discourse using a provided rubric	*Observational rubric *worked examples for	*Image-based clickable practice activity provides scaffolding & worked examples for rubric

	according to the guidelines set forth in the *5 x 8 Card*. (serpmedia.org)	clickable practice *Edited classroom video with narration or annotated images *Audio narration	documentation (following viewing of a video or annotated image).
5	When given a completed rubric, the learner will analyze documented student discourse in accordance with the guidelines provided by the *5 x 8 Card*. (serpmedia.org)	Module 5 to be developed in the future.	
6	Teacher Resources	Teacher resources (some that have been completed in the MIST program already) will be reformatted to be added later.	

Challenges

The project challenges changed over the course of the design and development phase. Initially, the task of coordinating between a new sponsor and an old sponsor seemed daunting. These sponsors became uninvolved in the project altogether, which seemed challenging at first, but as the project was developed, new supporters emerged. These supporters continue to this day. There is much interest in developing additional learning modules to support the district English learner population.

Recording students seemed like it would be difficult, but the sheer volume of recordings gathered shifted the challenge from recording the video to sifting through recordings for quality footage that fit the needs of the project. Some of the strategies developed, such as shorter recordings and improved labeling of the videos for organization allowed keeping only the high-quality video that met the needs of the project modules.

By far the biggest obstacle that threatened this project up to the last minute was the responsive design selection in Captivate. The original design planned for a responsive module design allowing learners to access the modules using a variety of devices. This mistake led to issues that costed countless hours as the rendering issues with Captivate created problems with formatting that affected the drag and drop interactions and virtually every other function the designer planned to use in Captivate. It also ran the project way over on budgeted time. Sometimes, Captivate simply stopped responding altogether. This required the developer to constantly clear the browser cookie history to continue.

These problems resolved through using clickable interactions and other more stable functions in Captivate instead of the drag and drop activities. Outside of Captivate, other web-based resources provided similar functions, such as the card sort feature on Desmos. On the Desmos website, the developer created card sorts, that work similarly to the Captivate drag and drop practices. Also, the developer saved what seemed like countless versions of the project if Captivate operated for long stretches of time. This prevented the program from losing important changes to the learning modules when it crashed. Google searches furnished user suggestions and product fixes the developer used to keep the program working until completion.

Methods/Procedure

Design

Using the basic ADDIE model, the instructional design process describes information about the project.

Analysis - The learner and gap analysis provided the rationale and basis for the project design. There was a need for building knowledge about student discourse since teachers from La Honda STEAM Academy both lacked the prerequisite knowledge to utilize an observational rubric to document student discourse during instructional rounds and the motivation to integrate student

discourse regularly into classroom lessons. To offer consistency of delivery, possibility to train additional learners and to save money, a website seemed to be an appropriate choice to offer the course.

Design - Initially, the learning objectives design offered delivery in a responsive web-based platform using principles of Knowles andragogy to address the motivation of adult learners; Keller's ARCS and Mayer's multimedia models to gain and hold the learner's attention; and Social-Cognitivist theory to provide modeling and teacher self-efficacy. Gagne's Nine Events of Instruction enabled more effective cognitive processing.

Development – Contained within the website, an eLearning module for each objective features a lesson and a choice of interactive practice opportunities using authentic narrated classroom video or annotated images. Summative evaluation provides information about learning effectiveness after the final eLearning module.

Implementation – Implementation involved hosting the website on a web server and accessing the website through an internet browser. Implementation also requires internet access as well as a laptop or desktop computer for learners to access the website.

Evaluation – Formative evaluation via usability testing, reflection, monitoring and revising used throughout development improved every step of the process. Summative evaluation provided information about the learning effectiveness of the project and areas of improvement.

Development

Project development followed the design and storyboard as much as possible throughout. As the project developed, formative evaluation revealed areas that needed revising due to technological limitations, time constraints and minor design flaws. Technological challenges led to the greatest obstacles as the project took shape.

Technological challenges resulting from developing a major part of the project using a Captivate responsive design proved very daunting. Features of Captivate that the developer included in the design document, such as drag and drop, other interactive features and on-screen text did not function dependably in various browsers when rendered in a responsive design. These issues with Captivate nearly outstripped the time available for completion of the final project. An internet search about Captivate rendering issues explained that this is a common

problem that occurs in development using a responsive design. As a result, development focused on delivering the final product using clickable practice instead of drag and drop interactives for viewing on a laptop or desktop computer only.

Some of the initial design elements such as a real-world feel of an on-screen guide in a conversational style featured in an authentic setting were beyond the scope of this project size and time schedule. Instead of an on-line guide, extensive audio narration and authentic video and images provided enough of a real-world feel for the project deliverables. This is also supported by learning effectiveness testing in the final evaluation (see Table 5).

Deliverables

The Student Discourse capstone is housed in a developer created website. Each webpage contains learning opportunities for the learner to access as desired such as eLearning modules, practice activities, information and sources for further investigation. Learners may navigate the website through content tabs at the top of the website or links at the bottom of the website that take the learner to the next module, to the previous module and to the welcome page. The suggested path of learning explained in the Welcome module takes the learner through recommended steps as they scroll down each webpage (see Appendix F). Website navigation deliverables include the following:

Learning Module 1: Welcome and What is Student Discourse. The developer used Adobe Captivate to develop these eLearning modules. A practice opportunity is part of the What is Discourse module. Contained therein, the benefits of student discourse in the classroom and the learning targets inform the learner.

- **Step1:** The Welcome module greets the user and explains the navigation of the website and learning modules.
- **Step 2:** The What is Student Discourse module contains background knowledge of the basic idea of student discourse and goes deeper into the finer points of what student discourse really means. Concept explanations use classroom video of students speaking. Clickable activities offer low-threat opportunities for conceptual practice. The concluding slide summarizes the learning targets.

- **Step 3:** Linked to the website, a short article and blog help the participant find out more information.
- **Step 4:** Links to the next webpage (Why is Discourse Needed), or to the top (Welcome module) take the user to those places, respectively.

Learning Module 2: Why is Discourse Needed. This module contains interactive video and a card sort practice activity to teach and allow practice of the learning objectives.

- **Step 1**: Interactive video of a principal and two students explain the rationale of why student discourse enables deeper learning. Embedded video questions provide a check for understanding about the learning objectives.
- **Step 2:** This step provides a card sort, developed on the Desmos website that requires learners to drag provided reasons for and against student discourse under their appropriate headings. Following the sort, ending slides with reflective questions and a key for the learner to check their work allows verification of learning.
- **Step 3**: Links to the next webpage (Examples of Discourse) or to the previous webpage (Why is Discourse Needed?) or to the Welcome module take the user to those places, respectively.

Learning Module 3: Examples of Discourse. The developer used Adobe Captivate in the building of this learning module. A choice of two practice opportunities increase conceptual understanding. The benefits of including student discourse in classroom lessons as well as the learning targets follow in the concluding slide.

- **Step 1**: Student Discourse Examples begins with the learning module developed using Captivate. Learning targets as well as a review of the definition of student discourse from the previous module set the stage for learning. A narrated video features student examples and explains the parameters that make up examples and non-examples of student discourse.
- **Step 2**: The card sort uses authentic annotated images developed using a card sort function on the Desmos website. The learner sorts images by dragging them under the correct headings (Examples and Non-Examples of Student Discourse).

- **Step 3**: A check for understanding Google Form practice uses student video to solidify conceptual understanding of the learning objective.
- **Step 4**: Links to the next webpage (Documenting Discourse), or to the previous webpage (Why is Discourse Needed) or to the Welcome module take the user to those places, respectively.

Learning Module 4: Documenting Discourse. The Documenting Discourse learning module was developed using Captivate to instruct the learner how to document examples of student discourse using a provided rubric based on previously learned material. The benefits of including student discourse in classroom lessons as well as the learning targets are included in the concluding slide.

- **Step 1:** The learning module explains the parts and purposes of the student discourse documentation rubric. The rubric sections presented and familiarized the learner the tools they practiced with later in the module. Video, worked examples of completed rubric in a clickable format and reflections provided learning practice opportunities.
- **Step 2:** Links to the final quiz or to the previous webpage (Examples of Discourse) or to the Welcome module take the user to those places, respectively.

Learning Module 5: Discourse Analysis. Learning module 5 focuses on analyzing discourse as it is documented on the provided rubric from the learning module 4. This module will be developed in the future.

Quiz. This Google Form used for both the pre-test and final evaluation of the training modules 1 – 4 tested the learners. Identical test questions based on viewing classroom video and annotated images were used.

Resources. This module will be developed in the future to contain teacher resources for creating and delivering classroom lessons that contain increased levels of student discourse on a regular basis.

Sources. Website information and sources organized and linked under webpage titles offer additional learning opportunities.

Resources

The resources used in creating this Student Discourse website contain eLearning modules, practice exercises and a final evaluation quiz. The storyboard was made using PowerPoint. The developer used Dreamweaver for the website creation. Development of eLearning modules and clickable practice was made possible using Adobe Captivate. The Desmos website activity builder and lab creation made creating the drag and drop card sorts a reality. Google Forms made developing a practice quiz, the pre- and post- evaluations and learner survey achievable. The final evaluation data and survey results were analyzed using Excel. Video recording was accomplished using an iPhone or iPad with microphone attachments and edited using either iMovie and uploaded to YouTube.

All discussed products were purchased or tried out previously in the MIST program. The designer/developer possessed the requisite skills to accomplish the task at hand. Prior to beginning the project development, the time requirements of the project were estimated on taking 80 hours to complete. Including the technological difficulties experienced, the development amounted to about 20 hours per week for the past 14 weeks to complete the project from beginning to end. Finally, completion of the project equaled about 280 hours total.

Timeline

Table 3

Timeline

Benchmark	Description	Due Date
Capstone Proposal	Submitted the final version of instructional design document.	Sep 12
Capstone Storyboard	Submitted the final version of storyboard.	Sep 26

Learning Modules, Media, Video & Images	Media creation complete and uploaded to website.	Oct 24
Project Checkpoint	Share project progress with advisor and submit link to iLearn forum for peer review. Project revised based on advisor and peer feedback.	Oct 24
Project Submission	Final project submitted to iLearn and advisor.	Nov 21
Usability Test & Project Evaluation	Tested on 5 target audience users.	Nov 14-25
Capstone Project Completion	Capstone project completed, including formative evaluation.	Nov 25

Evaluation

Formative Evaluation

Along the project development, formative evaluation check points improved the product deliverables. Through the project proposal, storyboard and progress checks, instructor and peer feedback provided guidance to keep the learning modules, practice activities and evaluation on track. The following milestones offered opportunities for program improvement:

Table 4

Formative Evaluation

Benchmark	Recommended Improvements and Steps Taken
Capstone Proposal	Submitted the final version of Instructional Design Document
Capstone Storyboard	*Drag and drop activity: The drag and drop activity confused the learner. Why the trashcan? The trashcan was removed.

	*Text visibility: Making the orange text "Bold" really helps visibility. Consider it for the white text also. The text was changed to bold white.
Learning Modules Development, Media, Video & Images	Captivate crashing and not rendering correctly. Modules were uploaded to ICTDland frequently to check project viewing. The project was frequently saved to mitigate technological difficulty with Captivate. The browser was cleared frequently to enable accurate viewing of Captivate modules.
Project Checkpoint	*Remove on-screen guide to allow for more room on screen. On-screen guide was removed. *On-screen words and speech bubble text is not completely visible. Reformat so the text is not “cut off”. Captivate shapes were reformatted to allow extra boarder around text within on-screen shapes. *Drag and drop activities are not working consistently. Practice activities were changed to clickable practice instead. *Text highlighting is out of place. Highlighting is changed to signaling arrows instead. This served to make a cleaner look and feel. *Navigation of website is unclear. Add a welcome video that explains website navigation. Add links to next, previous and home modules or web pages. A welcome module explaining navigation and links to next, previous and the welcome module were added in the website navigation. *Highlight text with a color as narration happens to signal important points to user. A dark pink font color was added and cued in time with audio narration. *Font size is too small for readability. Font size on titles, subtitles and text increased for easier readability.

Usability Test & Project Evaluation	Testing revealed: *Feedback was needed on final quiz. *There needed to be more documenting discourse questions and they needed to be more varied. *One of the interactive video questions repeated itself instead of advancing the video. *One person found the final evaluation questions to be confusing.
Capstone Project Completion	Advisor Feedback: *Navigating out of quiz reviews is not obvious. Instructions say, "do not click on the 'X', but at the end of the thread, clicking on the 'X' is the only way out". Instructions will be more explicit in the future. *The learning modules and activities perform differently in different browsers. Next time, the Captivate modules will be published as a regular design (not responsive). Through on-line research, this was found to be a major problem with Captivate. *At the end of assessment, the person being tested gets congratulated on completing the quiz, but in checking the user test results, feedback explains learner accuracy errors. "The 'congratulations' gave me the impression that I had gotten everything right". Feedback was revised to reflect correct communication. *The fonts on the check for accuracy and the second link should be bigger. This is an unchangeable function of Google Form. Perhaps a feedback suggestion to Google will enable a future change in font size.

Usability Testing

The usability testing accomplished using five volunteer kindergarten through 6th grade teachers at school sites. Volunteer teachers were recruited using district email and by personal

invitation. Since the recruits reside within reasonable driving distance, usability testing was conducted at the user's classroom on either their available laptop or desktop computer.

The process of usability testing consisted of email notification with an explanation of the usability process, evaluation purpose and a note of gratitude for the participant's time and effort. On the day of the test, an email was sent with a reminder and instructions about what to expect. A few moments before the test, an email addressed to the participant arrived with links to the pre-test; the completed website with learning modules and practice activities, summative evaluation; and a post-survey that captured participant reaction and feedback about the experience. As the learner progressed through the website modules, an observation of their interaction with the website was taken. The observation included timing of how long it took the participant to get through the entire website including learning modules, practice activities and evaluation. The average time determined that the training is the appropriate length. Results from the usability testing will guide revisions of the learning modules, practice opportunities and evaluation to improve learning effectiveness for future learners.

Several, informal checks for understanding were embedded within or concluding each module. The learner showed mastery in a variety of ways such as through drag and drop activities, interactive video questions, interactive images and media. Corrective and confirming feedback allowed learner access to content. By the time the course wrapped up, several points in the learning modules supplied feedback to increase the likelihood that learners would master the learning outcomes of the training.

Summative Evaluation

A summative evaluation of learning determined if the learning modules resulted in greater learning outcomes after users participated in the program. A t-test for paired samples analyzed pre- and post- test scores. A post survey and observation revealed any functional issues with the project and gathered information about learner reaction to the learning experience.

The tryout and testing was administered in computer lab, office and classroom settings using user laptops over about a one-week period extending from November 14 through November 25, 2017. The time-frame for the tryout spanned 1 hour including the pre-test and post-test; the website and learning modules and the post-survey. An email with an explanation of

the evaluation process for users to gain awareness of the tryout session protocol with sequenced links for the tryout session were emailed to each participant at the time of participation to control the evaluation process and enable observation (see Appendix C). Teachers logged into the district network with their passwords before beginning. In the future, the module will be uploaded onto a Moodle learning management system to increase automation and learning effectiveness analysis.

The sequence for the evaluation consisted of a pre-test, the website and learning modules, a post-test and post-survey. The pre-test, post-test and post-survey were created and documented in Google Forms. The raw scores for the tests were imported into Google Sheets from the Google Forms then copied and pasted into Excel for further analysis. After, raw scores were averaged and then analyzed in Excel using the t-test: paired 2 sample for means (see Table 5). The summative analysis will inform future revisions of the learning modules and website.

The pre-test and post-test questions quizzed the participants prior to taking the training using questions based on learners viewing classroom video and images embedded in a Google Forms assessment. Appendix D shows that the pre- and post- tests used identical evaluation questions. The total raw scores from both tests were automatically imported into a Google Sheet spreadsheet via the Google Form. Then they were manually copied and pasted into an Excel spreadsheet for analysis.

During the learning phase of the tryout process, participants were encouraged to use the "think aloud" method of working through any difficulties or challenges as they proceeded through the module. Note-taking helped gain information for the evaluator. Learners did not require assistance as they progressed through the learning modules. The observer documented all questions, suggestions and challenges during the tryout and used those notes as points of discussion with the user after the post-test and survey completion.

Post-survey questions consisted of a reaction questionnaire created in Google Forms to gain understanding of learner reactions to the module and to the functionality of the product. During the post-survey phase, the observer left the area for a moment to provide privacy for the user to react honestly to the questions (see Appendix E).

Learning Effectiveness

Observed test score means were used in analysis (see Table 5). Identical pre- and post-quiz questions tested for improvement in scores following the learning module. The pre- and post- test results were compared using a t-test for paired samples to ascertain whether the learning module significantly affected learning outcomes. The t-test revealed that the P-value (0.024604) was less than the alpha (0.05) therefore statistically significant. On further analysis, the absolute value of the t Stat (2.792068) showed greater than the one-tailed critical value (2.131846). The analysis supports that the null hypothesis (Ho: Mu of pre-test = Mu of post-test) can be rejected and the alternative hypothesis (H1: Mu pre-test < Mu of post– test) can be accepted. The t-Test results support the alternative hypothesis that a statistical difference in learning occurred following participation in the Student Discourse training modules.

Table 5

T-Test: Paired Two Sample for Means

Pre-Test Means	Post-Test Means
38.5	61.5
69.2	84.6
69.2	69.2
38.5	84.6
15.3	69.2
Pre-test Mean	Post-test Mean
46.14	73.82
Pre-test Observations	Post-test Observations
5	5
T-Test: Paired Two Sample for Means	
df	4
t Stat	-2.792068055
t Critical one-tailed	2.131846786
P(T<=t) one-tail	0.024604029
alpha	0.05

Item analysis of the three individual test questions for the documenting student actions and tallies section revealed that learners did not score better on that section of the final evaluation after taking the Documenting Discourse module. Table 6 compares the three identical documenting discourse questions taken from the pre-test and post-test that showed lack of learning effectiveness. Pre- and post- test means showed a decrease after participation in the Documenting Discourse learning module. In the post survey, one learner commented that the "questions were confusing", leading the developer to think that the test questions and the test format need refining. Other possible causes could be learner fatigue, or the need for additional practice opportunities or scaffolding within the learning modules.

Table 6

Item Analysis: Pre-test and Post-test Documenting Discourse Section

Item	Pre-test Item Scores	Post-test Item Scores
1	40	40
2	80	60
3	20	20
Mean	46.66666667	40

Recommendations

Some key areas that need to be revised surfaced during the formative evaluation, especially during the try-out phase. Overall, since the project went through many iterations as I progressed through my work in the MIST program, many of the major issues that negatively impacted the learning effectiveness were previously resolved. The major project issues surrounded the learning effectiveness of the Documenting Discourse course work. Below are my recommendations for project improvements:

Documenting Discourse eLearning Module – Documenting student discourse using a rubric is a difficult task if the declarative knowledge about student discourse is limited. A deeper understanding of the topic and more practice are needed to solidify understanding. Perhaps extending this module into a series that builds conceptual understanding and practice opportunities would be effective. Or, it might be beneficial to offer this portion of the course as a

blended class with increased practical classroom observation and calibration of participant rubric documentation with an expert's rubric documentation or against a rubric key.

Card Sort Practice Activities – The card sort activities developed in the project lacked the immediate feedback that was intended in the design plan. In the future, I will develop and publish Captivate projects for computer only instead of in a responsive design. This will enable the use of the drag and drop activities that I planned to use in the initial design. If that is not possible, I will use another resource for creating activities, such as H5P.

Test Questions – The Documenting Discourse questions need to be revised and varied to allow questioning in different levels and formats to represent different dimensions of the topic. It was difficult to derive any instructional information about the knowledge level of the learner with the way the questions were written and the amount of questions that were present. Drag and drop and other types of questions will be added in the future for both the practice activities and for evaluative purposes.

Conclusion

This Student Discourse project started because of a gap in teacher understanding about student discourse as they participated in classroom instructional visits. Through learner analysis and formative evaluation, it was apparent that teachers responded well to a blended training design about what student discourse is and how to observe it during a classroom visit. Following the visits, teachers responded to follow up questions with a more developed understanding of the meaning and characteristics of student discourse.

To reach more teachers, save money and standardize the training delivery, a web-based solution containing eLearning modules was the perfect solution to teach the basic elements of the program. Hence, the Student Discourse hour long training course that focuses on basic knowledge that provides teachers the background knowledge they need to define and identify what discourse is, why it is needed in a classroom and have introductory information about a rubric to check if it is happening in their classroom or school.

The training proved to be an effective learning tool for these types of information. An area in the training that needs improvement is the documenting discourse module. Documenting

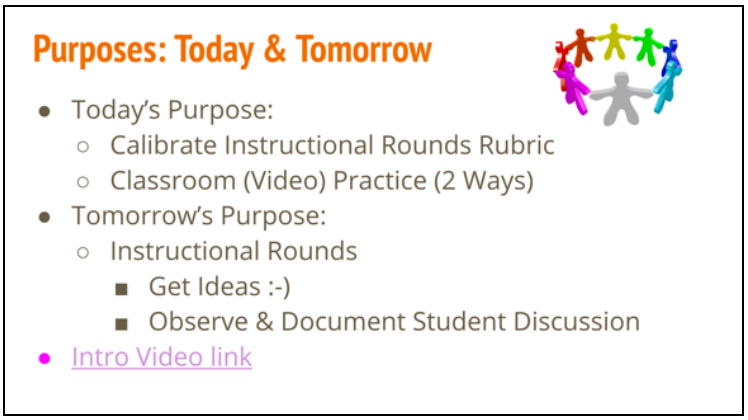
discourse using a rubric is a skill that requires more time to learn and experience than can be provided in an hour-long training module. Recommendations for future training in this area include a blended or synchronous approach that provides basic information about the rubric parts and purposes in an on-line format with increased time and opportunities for observation, training, practice and calibration of the learner's documented rubric against an expert's rubric documentation.

The future implementation of the project is in the planning stages. Meetings are scheduled at the district and county level to discuss how the project can be integrated into future trainings about kindergarten through sixth grade Common Core Math Practice Standards and support of content lessons integrating English language development in the classroom.

In conclusion, designing and developing this website and 60-minute training served as a worthwhile learning experience in project management, application of learning theory, multimedia principles, statistical analysis of learning effectiveness and instructional design. Overall, it proved to be a valuable learning experience.

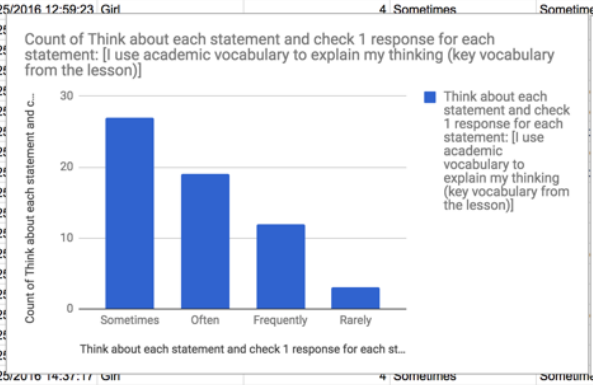
Appendices

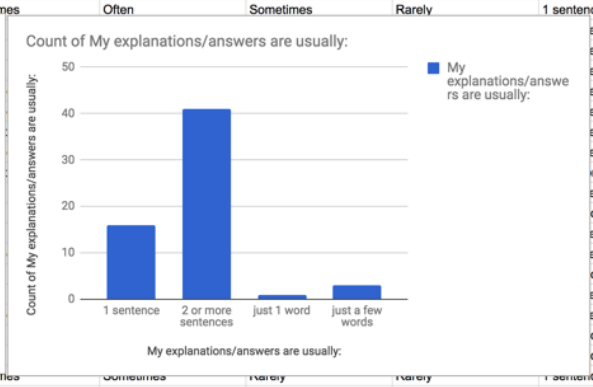
Appendix A: Presentation Agenda



Appendix B: Student Survey Results

Timestamp	Are you a boy or a girl?	What is your grade level?	Think about each stateme	Think about each stateme	Think about each stateme	Think about each stateme	Think about each stateme	My explanations/answers
10/25/2016 11:54:28	Boy	4	Sometimes	Often	Often	Sometimes	Rarely	1 sentence
10/25/2016 11:56:18	Boy	4	Sometimes	Sometimes	Often	Sometimes	Often	1 sentence
10/25/2016 12:46:19	Boy	4	Rarely	Sometimes	Frequently	Often	Rarely	2 or more sentences
10/25/2016 12:47:36	Boy	4	Sometimes	Often	Sometimes	Often	Sometimes	2 or more sentences
10/25/2016 12:48:46	Girl	4	Sometimes	Sometimes	Often	Sometimes	Often	1 sentence
10/25/2016 12:51:38	Girl	4	Sometimes	Often	Frequently	Often	Rarely	2 or more sentences
10/25/2016 12:52:59	Boy	4	Sometimes	Often	Sometimes	Frequently	Sometimes	2 or more sentences
10/25/2016 12:53:07	Boy	4	Sometimes	Often	Sometimes	Frequently	Sometimes	2 or more sentences
10/25/2016 12:53:08	Boy	4	Sometimes	Often	Sometimes	Frequently	Sometimes	2 or more sentences
10/25/2016 12:54:41	Girl	4	Sometimes	Frequently	Sometimes	Sometimes	Rarely	1 sentence
10/25/2016 12:57:49	Boy	4	Sometimes	Frequently	Frequently	Frequently	Sometimes	2 or more sentences
10/25/2016 12:59:23	Girl	4	Sometimes	Sometimes	Often	Sometimes	Rarely	1 sentence
10/25/2016 14:39:22	Boy	4	Sometimes	Frequently	Frequently	Sometimes	Rarely	2 or more sentences
10/25/2016 14:40:57	Girl	4	Sometimes	Frequently	Frequently	Often	Frequently	2 or more sentences





Appendix C: Email to Usability Participants

Thank you for agreeing to test my Capstone project. This process is important to help me develop a more effective product. We will be following a specified sequence for this tryout. After we are finished, I will talk to you about anything I noticed as you went through the modules. If there is anything that is especially difficult as you go through the modules, please let me know so it can be fixed later. Well, let's begin!

Please do the following in order:

1. Pre-Quiz LInk: https://goo.gl/forms/AGwnr9mFydcD8shJ3

2. Learning Module

Go in the following order:

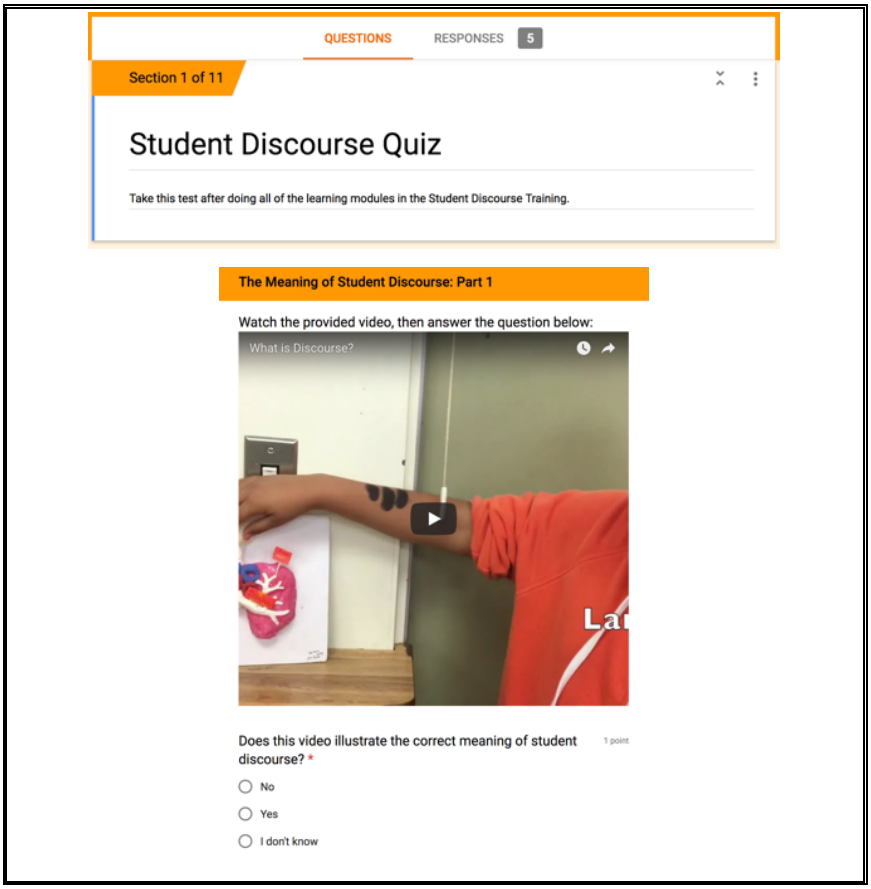
a. Welcome
b. What is Discourse?
c. Why is Discourse Needed?
d. Examples of Discourse
e. Documenting Discourse
f. Quiz

Link: http://itcdland.csumb.edu/~sreilly/capstonewebsite/student.discourse1/navigation/menu1/

3. Do the Survey: https://goo.gl/forms/rJMWNli92fO8xRoa2

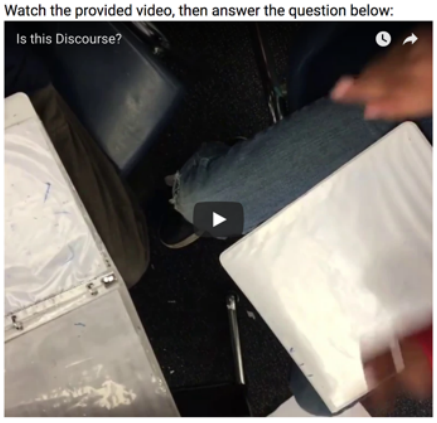
Finished! Thank you for helping me today!!

Appendix D: Pre- and Post- Test Questions



The Meaning of Student Discourse: Part 1 (continued)

Watch the provided video, then answer the question below:

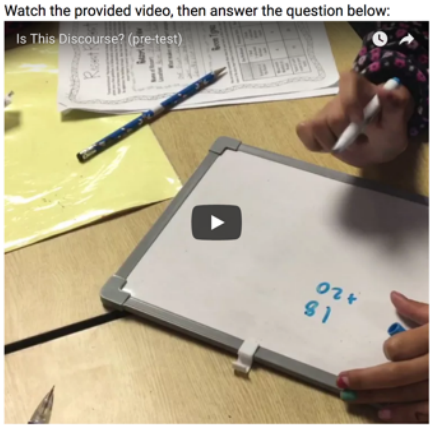


Does this video illustrate the correct meaning of student discourse? * 1 point

- ○ No
- ○ Yes
- ○ I don't know

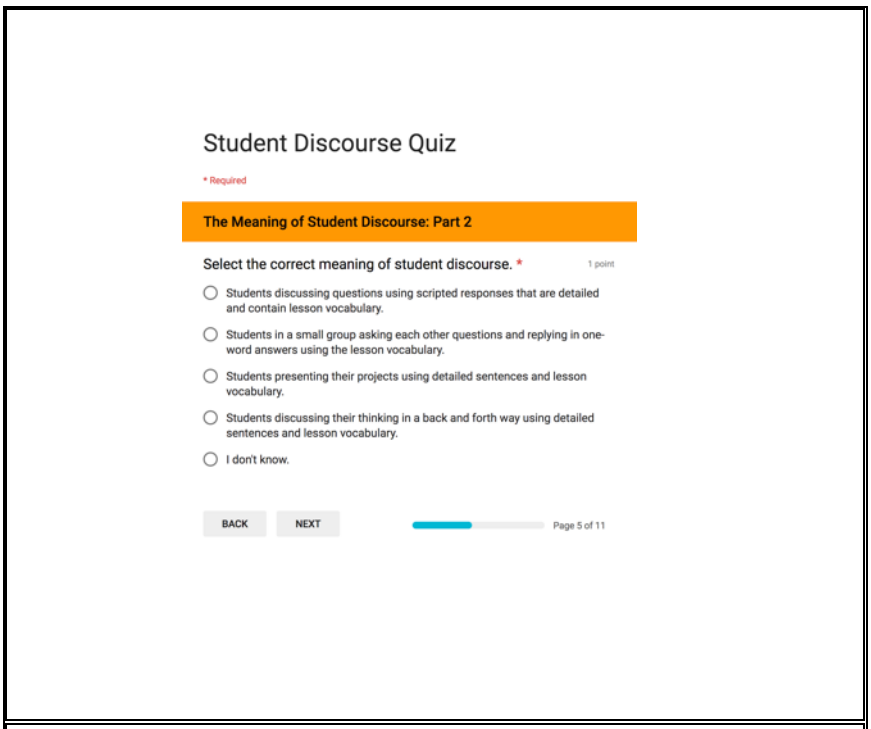
The Meaning of Student Discourse: Part 1 (continued)

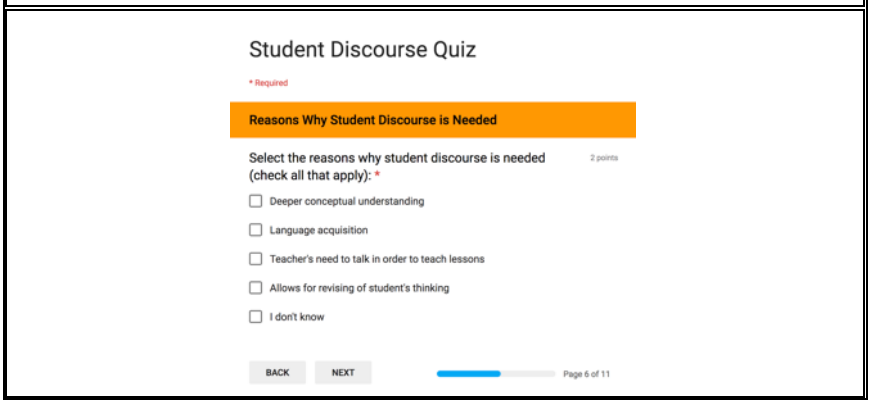
Watch the provided video, then answer the question below:



Does this video illustrate the correct meaning of student discourse? * 1 point

- ○ No
- ○ Yes
- ○ I don't know

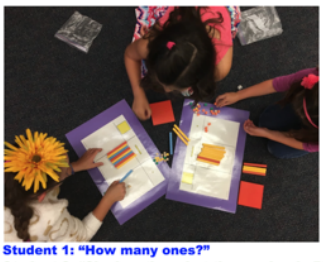

Student Discourse Quiz
* Required
The Meaning of Student Discourse: Part 2
Select the correct meaning of student discourse. *
1 point
Students discussing questions using scripted responses that are detailed and contain lesson vocabulary.
Students in a small group asking each other questions and replying in one-word answers using the lesson vocabulary.
Students presenting their projects using detailed sentences and lesson vocabulary.
Students discussing their thinking in a back and forth way using detailed sentences and lesson vocabulary.
I don't know.
BACK
NEXT
Page 5 of 11


Student Discourse Quiz
* Required
Reasons Why Student Discourse is Needed
Select the reasons why student discourse is needed (check all that apply): *
2 points
Deeper conceptual understanding
Language acquisition
Teacher's need to talk in order to teach lessons
Allows for revising of student's thinking
I don't know
BACK
NEXT
Page 6 of 11

Examples of Student Discourse (continued)

Based on the image and description below, is this an example of student discourse? *

1 point



Student 1: "How many ones?"
Student 2: "She has three but the number is 589. You have three, you need nine."
Student 3: "I have 3 and I need nine. Four, five, six, seven, eight, nine. Is that six more?"
Student 1: "Yes, three and six more is nine."

- ○ No
- ○ Yes
- ○ I don't know

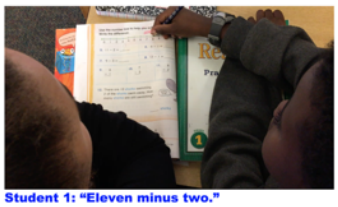
Student Discourse Quiz

* Required

Examples of Student Discourse (continued)

Based on the image and description below, is this an example of student discourse? *

1 point



Student 1: "Eleven minus two."
Student 2: "Nine"

- ○ No
- ○ Yes
- ○ I don't know

BACK NEXT Page 9 of 11

Student Discourse Quiz

* Required

Documenting Student Discourse

View this video, then answer the questions below. Turn the video closed captions on to understand the dialogue between the teacher and the students more clearly.

Based on the video above, is this the most accurate way to document student actions and tallies on the provided rubric? *

Tally Here	Student Actions	Student Examples/Quotes
2	Students say a second sentence.	And the family could get in and they could walk. Everywhere and they could play. The bottom could be the bridge.
0	Students talk about each other's thinking.	0
0	Students revise their thinking.	0
1	Students use academic language.	bottom, bridge

- No
- Yes
- I don't know

Based on the video above, is this the most accurate way to document student actions and tallies on the provided rubric? *

Tally Here	Student Actions	Student Examples/Quotes
1	Students say a second sentence.	And the family could get in and they could walk. Everywhere and they could play.
0	Students talk about each other's thinking.	0
1	Students revise their thinking.	The bottom could be the bridge.
1	Students use academic language.	bottom, bridge

- No
- Yes
- I don't know

BACK NEXT Page 10 of 11

Based on the video above, is this the most accurate way to document student actions and tallies on the provided rubric? *

Tally Here	Student Actions	Student Examples/Quotes
1	Students say a second sentence.	And the family could get in and they could walk. Everywhere and they could play.
0	Students talk about each other's thinking.	0
0	Students revise their thinking.	0
1	Students use academic language.	bottom, bridge

- No
- Yes
- I don't know

Documenting Student Discourse (continued)

Observation Rubric (for reference only)

Student Speaking

Estimate: About how many students are speaking at this time? (check one)

__0% (none)	__Up to 25% (some)	__50% (about)	__75% (most)	__90% or more (nearly all)

Using the rubric above in addition to the image and description below, about how many students are speaking? (don't try to click the rubric above - answer under the classroom image below) *

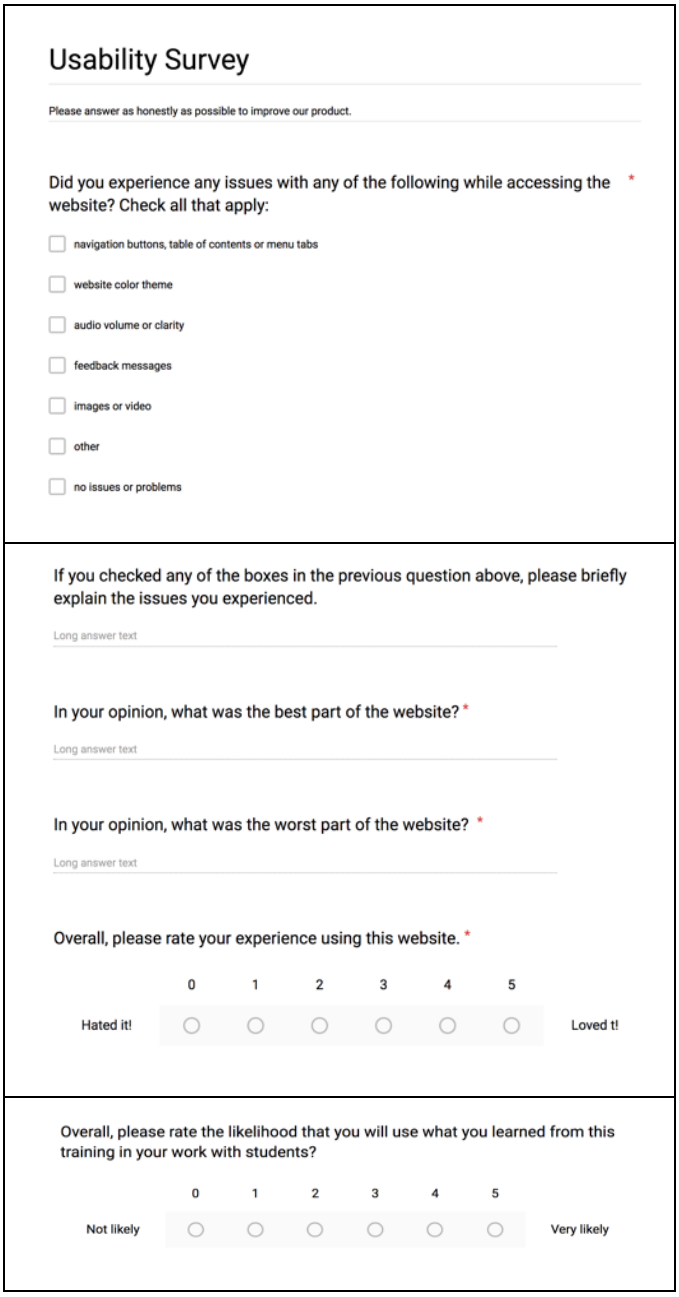
1 point

You observe in this intermediate classroom for 10 minutes. During that time, 10 out of 11 students had a discussion about the lesson topic. About how many students were speaking?

- ○ 0 % (None)
- ○ Up to 25% (Some)
- ○ About 50%
- ○ 75% (Most)
- ○ 90% or More (Nearly All)
- ○ I don't know

BACK SUBMIT Page 11 of 11

Appendix E: Usability Survey Questions



Usability Survey

Please answer as honestly as possible to improve our product.

Did you experience any issues with any of the following while accessing the website? Check all that apply: *

- [ ] navigation buttons, table of contents or menu tabs
- [ ] website color theme
- [ ] audio volume or clarity
- [ ] feedback messages
- [ ] images or video
- [ ] other
- [ ] no issues or problems

If you checked any of the boxes in the previous question above, please briefly explain the issues you experienced.

Long answer text

In your opinion, what was the best part of the website? *

Long answer text

In your opinion, what was the worst part of the website? *

Long answer text

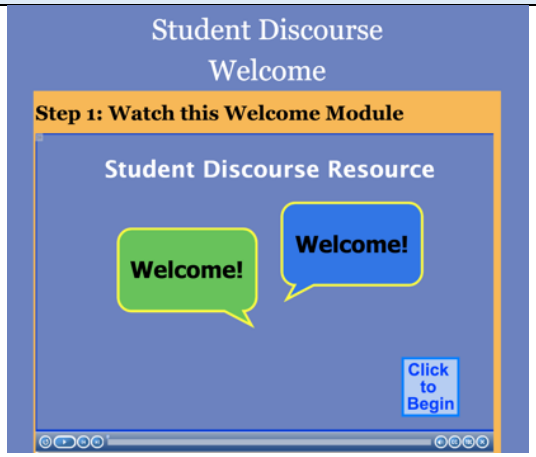
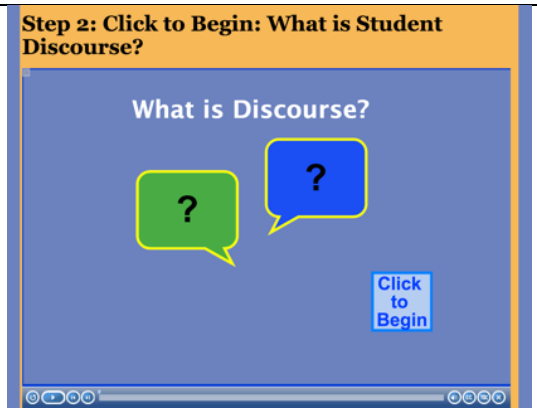
Overall, please rate your experience using this website. *

	0	1	2	3	4	5	
Hated it!	○	○	○	○	○	○	Loved t!

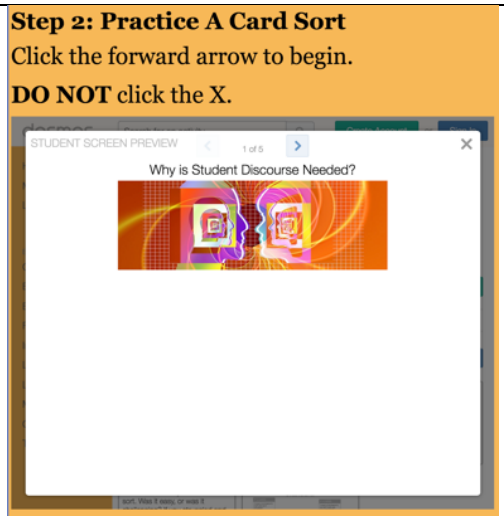
Overall, please rate the likelihood that you will use what you learned from this training in your work with students?

	0	1	2	3	4	5	
Not likely	○	○	○	○	○	○	Very likely

Appendix F: Learning Modules

Learning Module 1: Welcome Module and What is Discourse?




Learning Module 2: Why is Discourse Needed?



Step 4: Click a Link Below:

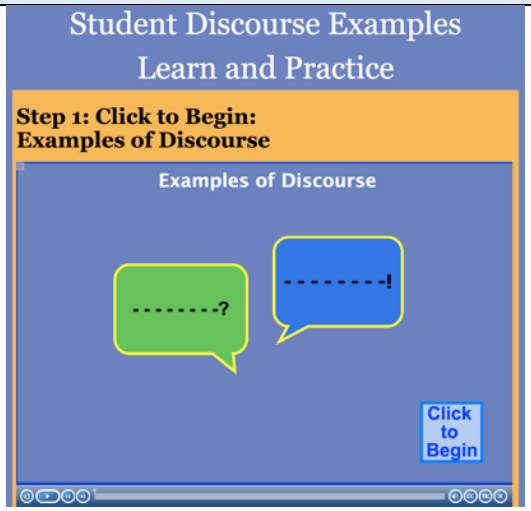
Next: Examples of Discourse

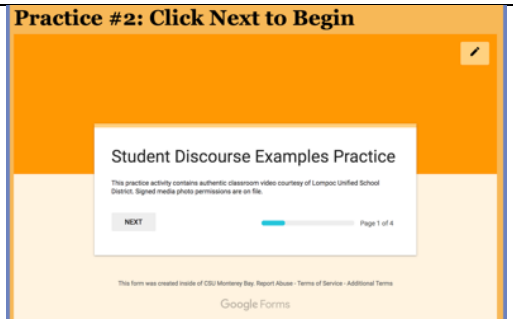
Previous: What is Discourse?

Welcome Module

Learning Module 3:

Examples of Discourse





Step 3: Click a Link Below:

Next: Documenting Discourse

Previous: Why is Discourse Needed?

Welcome Module

Module 4: Documenting Discourse

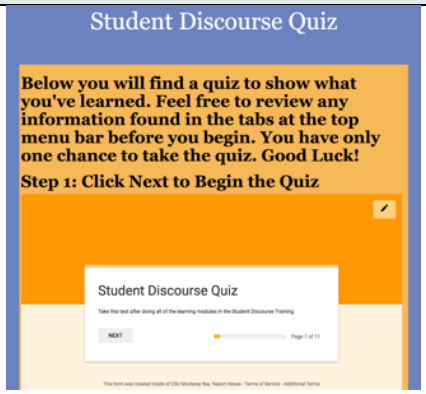
Step 2: Click a Link Below:

Next: Quiz

Previous: Examples of Discourse

Welcome Module

Quiz



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MIST LEARNING PORTFOLIO

RELEASE FORM FOR USE OF STUDENT WORK SAMPLES

The School of Computing and Design at CSUMB collects samples of student work – work that demonstrates the outcomes and criteria of the Learning Outcomes. Faculty groups will analyze the work as part of a process of studying the MLO's and related assessment processes.

You are asked to sign the release form below to indicate your permission for use of your work in your portfolio for education and research purpose. If you chose not to permit use of your work, you are also asked to sign the form below.

We are also asking for your permission to use your work to help us advertise the MIST program. Our enrolment is low and one of the best ways to attract more students is to show actual work done by alumni.

RELEASE FORM

I understand that the School of Computing and Design (SCD) at CSUMB is collecting student work samples for analysis in the process of examining learning outcomes and related assessment processes. My work may be used by SCD for research and educational purposes.

[X] I give permission to use my work by SCD for research and educational purpose

- [X] with my name revealed
- [ ] without my name revealed

[ ] I do not give permission to use my work for research and educational purpose.

[X] I give permission to use my ePortfolio work (including my MIST experience video) for marketing purposes, with the goal to increase enrollment.

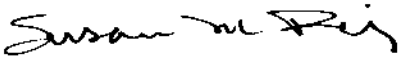
[X] with my name revealed

[ ] without my name revealed

[ ] I do not give permission to use my ePortfolio work for marketing purposes.

Susan M. Reilly

Print your name



12 December 2017

Signature Date

reillyshome@gmail.com

Permanent email address