

**CSM #2**  
**Colorado Department of Education I**  
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**Field Session 2007**  
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## **Abstract**

For four years, the Colorado School of Mines has held workshops to improve the education of middle school teachers across the state. These workshops have been held in Colorado, instigated by the Mathematical and Computer Science Department. Due to the increasing desire to attend these workshops, we are providing an online version of the curriculum. Our team will be developing a website which includes each topic covered at the meetings and presents it in an online course manner. This will include the following:

- Presentation of the material
- Activities
- Quizzes
- Activity and quiz solutions

Our goal is to develop the online curriculum in an easy to use, interactive environment. We will use math and science topics already given as a basis to create our own curriculum which will then be transferred to the website.

## **Executive Summary**

For this field session term, our team was asked to update provided curriculum and create a website including quizzes, activities, and many examples. The tool we decided upon to make the website was Dreamweaver. We added to the html code and implemented JavaScript as well as Flash. The homepage includes a brief summary of the site and links to each of the ten days of the workshop.

We first updated the curriculum and then added the material to the site by linking it as several PDF files. Quizzes for each day were placed directly onto the webpage. These are interactive questions where the user may check their work as they progress through the quiz. At the bottom of the page, a link to thorough quiz solutions is provided. Also, most days include activities and their solutions. Due to the amount of other sources of information, every day also has a link to additional educational websites.

The project itself was divided into two main sections; the first being implementing the website and the second being the creation of a database to store quiz answers and survey suggestions. Because of the limited time available, the team completed the first section, leaving the second as a project for future field session teams. Also, the survey was provided but not placed on the website because there is no storage space.

As stated above, we were unable to complete the second portion of the assignment so we left behind a section for future workers on the website. At first, our team was hindered by our lack of computer programming knowledge so a few days were spent learning about Dreamweaver. After sufficient skills were developed, the website was created. One final client request included the use of Flash objects on the website. We were able to make several of these after learning the basics of Flash and added a few to the CD.

Upon completion of the six week period, we have a fully functional, interactive website containing all lessons and activities that were provided. Users can complete each quiz and learn the results. The post test on day ten is a comprehensive quiz covering several topics in the curriculum. After finishing the post test, the user is able to see their score and what questions they missed. The main finished product is the online availability of all content from the educational workshops. Now, this material is accessible to a larger assembly of educator

## **Introduction**

For the past four years, Colorado School of Mines has held workshops to improve the education of middle school teachers across the state. These workshops have been held in Colorado, instigated by the Mathematical and Computer Science Department. Due to the increasing desire to attend these workshops, we are providing an online version of the curriculum. Our team developed a website which includes each topic that is covered in the classes. Our goal was to develop the online curriculum in an easy to use, interactive environment. We used math and science topics already given as a basis to create our own curriculum which was transferred to the website.

## **Requirements and Specifications**

Since this was the first year of the online curriculum, the specifications and requirements for the project were vague. Our team had to do most of the design and requirements ourselves. We determined specifications that we deemed necessary for the website. The website itself was designed as a teaching tool for middle school teachers who are unable to attend the workshops. By putting the material online, it is now available to a larger assembly of educators.

The tool we used to design and implement the website is Dreamweaver. To plan the curriculum, the team used the hardcopy of the material covered in the workshops. This included Power Point slides as well as short quizzes which gave us an idea of how to present the material online. The binder of topics given to us by the client also helped limit the amount of subjects we placed on the webpage.

The team completed as much as possible of the website in six weeks. Whatever was not finished was left for future work by CSM students and workshop coordinators. One of our main goals was to make this an easy to maintain website.

Not all of the material was explained on the site due to its difficulty to present and the abundance of already available references. However, we inserted links to these sources. After each topic was clarified, short quizzes were posted to test the student on their comprehension of the material. It was first suggested to have concept constant, numerically changing questions. These would ensure the user's understanding of each theory, not just memorization of an example. For this to occur, we would have to make a database to store the random number generators as well as scores and suggestions. This portion of the task was deemed too difficult to complete in the time allotted and was therefore left up to future students. However, the numerically changing concept would not pertain to the science portions of the curriculum. These sections require such things as chemical reactions and other conceptual knowledge so the random number generator would not have been necessary.

Two requirements given by the client included a counter on the main page to keep track of the visitors and a survey where feedback could be gathered from the users. Our team completed both of these requests. Upon completion of the online courses, a survey was developed but not used due to the need for a database. It asks questions regarding the ease of use and navigation, the site's helpfulness, and possible improvements to the website. The survey is on the CD given to the client so that future workers will have the opportunity to implement it on the site once the database is created.

Besides developing the website, the team revamped the mathematical material given. We took the topics provided and tried to improve upon their substance and the way the subjects are taught leading to a new online curriculum.

## **Design**

As stated in the previous section, our team used Dreamweaver to create the website. The homepage consists of the project name and logo, a short description of the site's contents and purpose, and the links to each section of material. These links are divided into the days where each topic is covered in the workshops.

- Day 1 – Learning Styles & Bridge Building
- Day 2 – Ratios & Proportions, Elements & Reactions, Intro to Matter
- Day 3 – Graphing, Stored Energy, Changes in Matter
- Day 4 – Exponents, Acids & Bases
- Day 5 – Trig & Fractions, Electricity, Voltage Divider
- Day 6 – Simple Machines, Technical Writing
- Day 7 – MS Excel, Filtration
- Day 8 – Statistics, Heat, Energy Audit
- Day 9 – Waves
- Day 10 – Posttest

A screenshot of the homepage is provided in Appendix A. Each link contains the curriculum covering each section of material as well as the examples and quizzes. To reach the information, click on the Lesson link at the top of the page. The topic is first described and then covered in detail. Examples are placed throughout the text. Quizzes covering all topics taught in that day are provided on each page. At the bottom there is a link to thorough quiz solutions, activities, and extra links pertaining to the subjects. A screenshot of day four is provided in Appendix B.

## **Approach**

Our client requested the domain space required for our restricted website. At first, we will be the only ones who have access to the space since we are the ones creating and updating the site. In the years to come, other field session groups will be asked to put years two through four online as well as create the database.

After the domain space was acquired, our team created the separate pages using Dreamweaver and linked them back to the homepage. Before we added the curriculum to the website, we updated it. We did this in Microsoft Word and then converted the documents to PDF files. From there we added the finished curriculum to the linked pages. Our team approached the task of making the curriculum for the online course by dividing it into days and adding to them. After that task was completed, we added each day to the site from there.

## **Implementation**

The project was broken down into two main parts. First, the curriculum was updated to transform the material from a physical class with a teacher to an online version with no professor. The second portion of the project includes creating a database needed to store quiz

answers and survey suggestions. Due to the overall size of this assignment, we were only able to complete the first section of the requirements.

Our team used Dreamweaver to design the web pages. At first, the homepage was created. Then each day was developed and linked back to the homepage. Links to extra sources were added as well as links to the PDF files. The quizzes covering the lessons were placed directly on the webpage for each day. Beneath these quizzes, a link to comprehensive solutions is provided. Once the pages were edited and completed, domain space was acquired from the Colorado School of Mines webmaster. He created the CDE group directory on Slate which allows us to place the site on the internet. From there, portions of the site were sent to several individuals for testing. These people read through the lessons, took the assigned quizzes, and then answered the survey questions. After all feedback had been gathered, our team made final adjustments to the project.

### **Assessments**

Most suggestions received from our users dealt with spelling errors and errors in the quizzes. They found the website easy to navigate and the lessons extremely detailed. Some commented on the color of the active links which our team then changed to make more consistent with other pages on the site. We asked these users to complete at least one quiz and share their results with us. Using this information, we reworded several questions so they would be easier to understand.

### **Complications**

As stated previously, due to the overall size of the project, we were only able to complete the first section of requirements. We did not take into account the time required to create the database needed to store quiz and survey answers as we only learned about this requirement late in the fourth week. The quizzes have been made and are a working, interactive function on the website. The survey is also a part of the website; however, the next group will have the task of creating the storage place for the answers and implementing it.

Our client has requested the use of Blackboard to keep track of quiz scores and survey comments, but we are inexperienced with the administrative aspects of the Blackboard system. Also, each visitor of the site would need to create a login and password in the Mines Blackboard system. Since each user is not a Mines student and since it would be difficult to keep track of each person, this request was found hard to complete. We instead decided upon a database to store the information. Therefore, this client request should be part of the next field session class because of our time constraints.

### **Progression of Project**

Our team was first led to believe our goal was to complete the first year of the CDE online curriculum. We had plans to implement the entire site with no need for future maintenance other than minor updates. However, after gaining understanding of the full scope of the project, we did only the preliminary portion of the website. We have completed the curriculum updating, as well as creating a fully functional website. Our last request was to design a short

animation using Flash. This was asked for by our client in week 5 of the course. We are currently working towards meeting this request. If it is complete, it will be a simple Flash object implemented for just one of the days. If we are unable to add this animation to the website, it will be included on the CD's and added to the website at a later date.

We have completed all of the initial requirements set aside by the client and our advisor so that future students will be able to start in on the computer science aspects of the project. They should be able to add the database and make the website more user-friendly.

### **Results**

All content is on the website, meaning all curriculums have been updated and changed into PDF files then linked to each day. All quizzes have been created and users are able to submit answers and see their scores. Activities including certain topics have been added to several of the days to reinforce understanding of the material. Extra links have been integrated into each day for additional information on each topic covered. The team attempted to include as much information as possible for future users of the website.

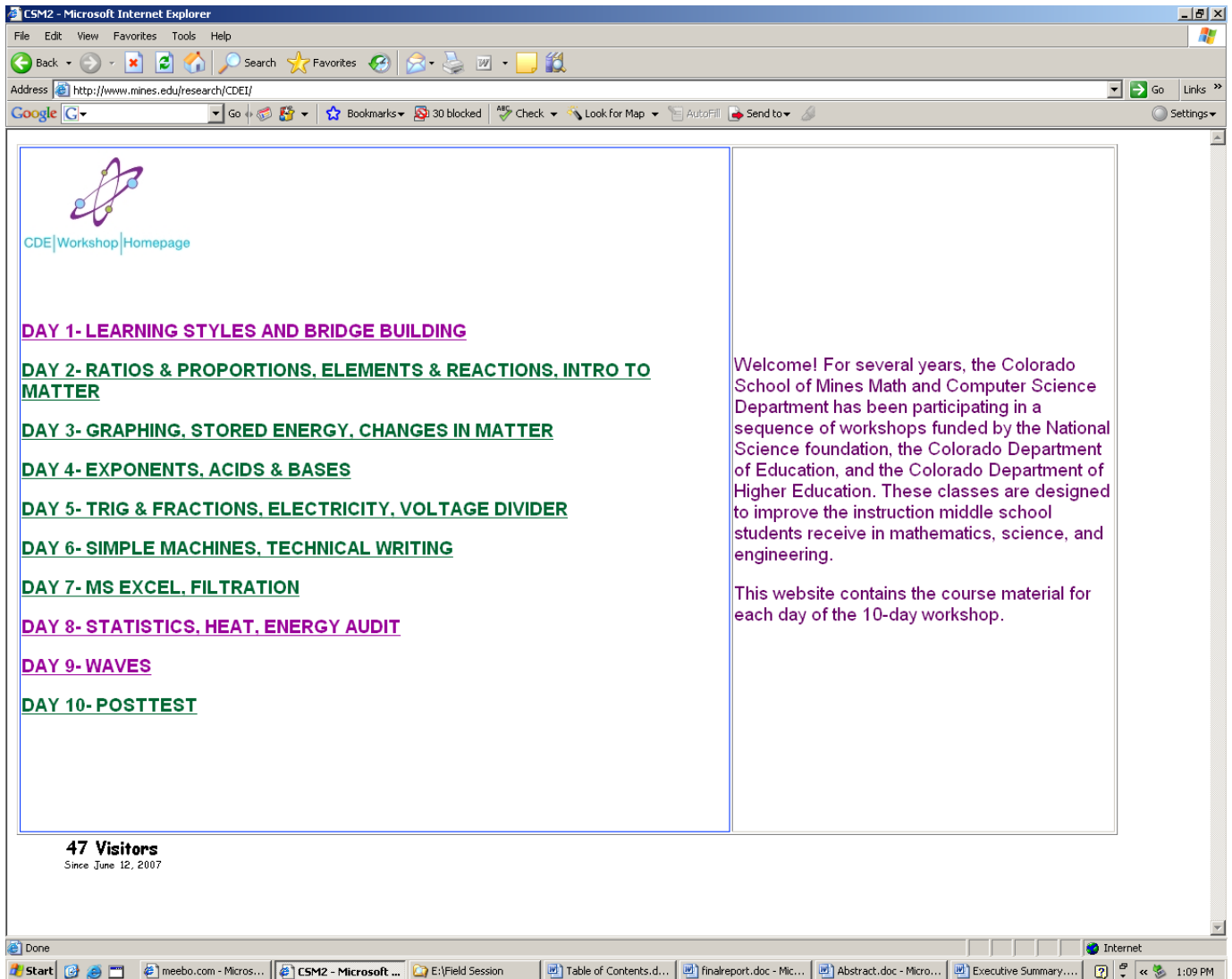
### **Suggestions for Future Work**

Future work for this project will consist mainly of revamping the website to make it more user-friendly. The first aspect of this will be creating a database. This database will be able to store information such as progress of the students. Also, this database will record quiz scores and suggestions generated by taking the survey so that our client can review them and make adjustments accordingly. Another responsibility of the future team to work on this project will be to add more Flash objects since the client desires a more dynamic website.


### **Conclusion**

At the start of this term, we were concerned with the scope of the project due to our limited knowledge of website design. However, we managed to learn what was necessary to complete the preliminary portion of this assignment. Our team also paved the way for future work on this project. As the assignment grew our views on our purpose changed. We met our goal of having a fully functional website with all of the course content.

## Appendix A:



The screenshot shows a Microsoft Internet Explorer browser window with the address bar displaying <http://www.mines.edu/research/CDEI/>. The page content is as follows:

  
CDEI|Workshop|Homepage

**DAY 1- LEARNING STYLES AND BRIDGE BUILDING**

**DAY 2- RATIOS & PROPORTIONS, ELEMENTS & REACTIONS, INTRO TO MATTER**

**DAY 3- GRAPHING, STORED ENERGY, CHANGES IN MATTER**

**DAY 4- EXPONENTS, ACIDS & BASES**

**DAY 5- TRIG & FRACTIONS, ELECTRICITY, VOLTAGE DIVIDER**

**DAY 6- SIMPLE MACHINES, TECHNICAL WRITING**

**DAY 7- MS EXCEL, FILTRATION**

**DAY 8- STATISTICS, HEAT, ENERGY AUDIT**

**DAY 9- WAVES**

**DAY 10- POSTTEST**

Welcome! For several years, the Colorado School of Mines Math and Computer Science Department has been participating in a sequence of workshops funded by the National Science foundation, the Colorado Department of Education, and the Colorado Department of Higher Education. These classes are designed to improve the instruction middle school students receive in mathematics, science, and engineering.

This website contains the course material for each day of the 10-day workshop.

**47 Visitors**  
Since June 12, 2007

The browser's taskbar at the bottom shows several open applications, including 'meebo.com - Micros...', 'CSM2 - Microsoft ...', 'E:\Field Session', 'Table of Contents.d...', 'finalreport.doc - Mic...', 'Abstract.doc - Micro...', and 'Executive Summary...'. The system clock indicates the time is 1:09 PM.



# Appendix B:

The screenshot shows a Microsoft Internet Explorer browser window displaying a lesson page. The address bar shows the URL <http://www.mines.edu/research/CDEI/day4.htm>. The page content includes:

## Day 4

[Back to Home](#)

In this lesson, there is a short quiz as well as a series of activities to reinforce the concepts covered.

Click below for the lesson of the day. Good luck!

### Lesson

At the end of the lesson, try answering the following questions. Press "Submit" following each question to check your work as you go.

#### Quiz

1) Simplify

$$-2c(6 - 4c) + 3c^2$$

a)  $-1c$   
b)  $23c^2$   
c)  $-4c + 3c^2$   
d)  $-12c + 11c^2$

2) If  $a^3 \times b^2 \times a^4 \times b^3$  can be written as  $(a^7)(b^5)$ , then  $2^3 \times 3^4 \times 2^2 \times 3^3$  can be written as

a)  $2^5 \times 3^7$   
b)  $4^5 \times 9^7$   
c)  $6^{12}$   
d)  $36^{12}$

d. 9 g

6) We check the original pH of a solution of laundry detergent and find that it has a pH of 10. We add lemon juice until the solution is neutral (it has a pH of 7). How many times stronger was the base in the original solution than in the neutral solution?

a. 10 times stronger  
b. 100 times stronger  
c. 1,000 times stronger  
d. 10,000 times stronger

Here are some fun activities that will reinforce your new skills:

#### Activities

Click below to see the worked out solutions to the quiz as well as the activities:

[Quiz Answers](#)

[Activity Answers](#)

Here are some additional links to more information on the topics covered in this lesson:

[Exponents](#)

[Acids & Bases](#)

[Top of Page](#)