IMPLEMENTING A BUILDING CONSTRUCTION VISUAL DICTIONARY PROJECT INTO A FRESHMAN COURSE

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Abstract: Freshman Architecture and Construction Management Engineering Technology students in my sections of a Materials and Methods of Construction I course are required to create a visual dictionary of a list of assigned construction material terms. This project requires that each student produce a PowerPoint™ presentation with one construction material photograph and corresponding definition per slide. Each student is required to locate and then be photographed with each of the listed construction materials, provide a matching definition in their own words, create a presentation of the photos and definitions, and be prepared to present their project to the class. Digitally or otherwise re-mastered photos are not permitted. The goal of this paper is to discuss visual dictionaries and assess qualitative data from a student survey taken after the project is completed. The results of this study will provide faculty with an understanding of the relative benefits of integrating a visual dictionary project into their courses.
Key words: student-produced visual dictionary, active learning

Introduction:

A visual dictionary is a dictionary that combines drawings, diagrams or photographs and corresponding text to explain the meaning of a word or term. There are visual dictionaries in book and digital form. Visual dictionaries are usually broken into themes within one source [1] or dedicated to a specialized subject area such as language translation, architecture, anatomy, and even *Star Wars* Episodes. [2] Per Pappas, Glezer, a postdoctoral researcher in neuroscience at Georgetown University Medical Center, has found that "the brain holds a 'visual dictionary' of words we have read allowing quick recognition."[3] The brain uses different pathways to process verbal and visual information. Therefore when students receive information in verbal/written and visual forms, it makes them use more of their brain[4] than when they only see information presented as text. Safford, in an article titled "Visual Dictionaries: Pictures + Text = Learning" stated that, "The combination of pictures and their word analysis appeals to a combination of learning styles."[5] Students also have better recall of ideas learned from visual sources compared to text sources after many years. [6]

In 2009, Gangwer stated that 65% of students are visual learners, 30% are auditory learners and 5% are kinesthetic learners.[4] In an earlier study by Fowler et al, it was found that 75% of students are visual learners and 80% of students are active learners.[7] Active learners learn more by working on projects, solving problems and working in teams. Visual learners prefer to learn from drawings, videos, photographs and diagrams. [8] They typically close their eyes to recall something that they have seen, often think in visuals, learn best from visual media and find oral information difficult to remember. [6] Engineering students today are surrounded by visuals

through sources such as computers, the internet and videogames, not to mention television, movies and PowerPoint™ /video presentations in the classroom. In his paper titled "Learning and Teaching Styles in Engineering Education" Felder states that most college students are visual learners. [9]

Background:

Evidence has shown that we have been a visual society from the earliest recordings of human experience in Paleolithic cave paintings, to Egyptian hieroglyphics, to the modern era of the visual language. [4] Per the old saying "A picture is worth a thousand words,"[10] visuals in education have stemmed from drawings on slates, to paper, to blackboards and whiteboards, to images on overhead projector screens, to the computer and the internet. It fact it would be difficult, if not impossible to teach any subject but especially architecture or engineering programs without visuals.

A visual dictionary is a tool that aids the teaching of new words and terms with labeled visuals. Visual dictionaries are used by learners of all age groups and learning abilities. In a secondary student study it was shown that visual dictionaries used in the classroom benefited students in improving comprehension, speech development and language, writing skills, self-confidence via conversation, social skills, and technology and art skills. [11]

Per Gangwer, there are 6 "methods of visual learning:" Investigate (focus words and images), Chronicle (document/record to capture a moment in time), Express (see the world through emotive images), Communicate (share ideas), Inspire (persuade behavior through images) and Envision (imagine personal and occupational goals). The student-produced visual dictionary, or pictorial dictionary, exemplifies a number of these visual learning methods. This project is an active, visual, written and verbal project which reinforces classroom learning by requiring the students to find the new construction terms in the community. [12] Students have to actively investigate their surroundings, find the required construction terms and write their own definition. As an example, for the term 'split-faced concrete masonry unit (CMU)' they must examine building exteriors and find one clad in split-faced block or they may go to a masonry yard to find the material. When they have found an example, they have to not only photograph the building material, but they must also be in the photograph for this project. This step chronicles that they have seen and perhaps touched the material (kinesthetic learning) and combats copying photographs from other sources, such as publications and the work of other students. The students then communicate their projects through PowerPoint™ presentations, a sample of which is presented in class when the projects are submitted. The final presentation is an oral and visual presentation, which aids the students who prefer auditory learning.

As a clarification, there are two distinctions between the traditional visual dictionary and the student-produced visual dictionary in this project. The student visual dictionary project is researched and created by the student using photographed visuals and not labeled drawings or diagrams as in the published visual dictionary.

Course Evaluated:

Two Fall 2010 sections and one Fall 2011 section of a freshman Materials and Methods of Construction I course were part of the qualitative testing for this paper. Materials and Methods of Construction I (CON 161) is a required course for all students in both the Architecture Engineering Technology and Construction Management Engineering Technology programs in our department. It is also a prerequisite course for a number of other courses in both programs. CON 161 is a 2 hour and 50 minute per week lecture course that introduces students to construction material characteristics, residential and small-scale commercial building construction methods, and the construction industry as a whole. Other than a soil sieve test, CON 161 lacks a laboratory component. Assessment of student learning in this course has traditionally been either via weekly quizzes, mid-term and final examinations. Faculty members teaching the three sections of this course normally draw construction details on the board and supplement their teaching with PowerPoint™ presentations, short videos, and construction material samples. The students are freshmen and mainly commute to campus from their homes on Long Island, Queens, and Brooklyn. In traditional lecture-only classes such as CON 161, there is little opportunity for students to interact or learn from each other or from the built environment.

Methodology:

Each of the 3 Fall 2010 and 2011 Material and Methods of Construction I classes was given a visual dictionary project containing 25 building construction terms that would be covered during the semester. The project was assigned at the beginning of the semester and was to be completed and submitted via upload to the Angel courseware system at the end of the semester. Student submissions were only visible on Angel to the course faculty and to the student uploading their project. All students were notified that a random selection of students would present their projects on the submission date. Due to time constraints, it was not feasible for each student to present their project. Although the students were encouraged to work together to source the materials, assist with taking photographs, share a camera where necessary, and to interact with other students, each student was required to submit their own visual dictionary presentation. The project deliverable was a PowerPoint™ presentation containing a title slide, index slide and one slide with a photograph and a definition (in their own words), for each building construction term. The students were instructed that they were to be visible in each photo and that digitally re-mastered photos were not permitted. Each slide was worth 1% of their final grade (0.5% per correct photo and 0.5% per correct definition) therefore this project accounted for up to 25% of their final grade for the course. On the project submission date, a random sample of presentations was selected by asking the class to randomly call out any 5 numbers between 1 and "X" (the total number of students in the class). The 5 numbers were noted and then the faculty read out the names of the presenting students whose names corresponded to each of these numbers on the class list. The randomly selected students then presented their projects to the class. After the projects were submitted, the students were given a blind survey asking questions about their opinions on the course tests, projects, textbook and exercise workbook. The results for the question regarding the visual dictionary project will be presented and discussed here in addition to the course outcome assessment for this project.

Results:

The qualitative survey results in Table 1 below show that all 3 groups of Materials and Methods of Construction I course tested agree that the Building Construction Visual Dictionary was a good learning experience for this course.

The outcome assessment percentages of students who met or exceeded the standard is as follows: 2011 = 64%, 2010 afternoon = 86%, and 2010 evening = 76% (Table 2 below).

Discussion:

The qualitative survey indicates that the majority of the students, 71.48% on average in the 3 sections of the Materials and Methods of Construction course surveyed, believed that the Visual Dictionary of Building Materials Project was a good learning experience for this course. Of the remainder of the students surveyed, an average of 16.63% neither agreed nor disagreed with this statement and an average of 11.89% of students surveyed disagreed or strongly disagreed with this statement. The overall Likert score for all three sections is 3.9 − i.e. the average response for all 3 sections "agreed" with the statement, "The Visual Dictionary of Building Materials Project was a good learning experience for this course."

Approximately 57% of the students in all 3 sections exceeded the standard for this project, 18% met the standard, 11% approached the standard and the remaining 14% did not meet the standard for this project.

Conclusion:

There is a qualitative benefit to incorporating a visual dictionary into a freshman course. The author plans to keep this project in the coursework for freshman and encourages other faculty to implement it into their courses. Further research on this topic with a larger sample sizes and a quantitative pre and post-test is recommended.

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Table 1:

Materials & Methods: CON 161 Fall 2011, 2010 (2 Sections) ABET Student Survey Q3	Strongly Disagree 1	Disagree 2	Neither Agree Nor Disagree 3	Agree 4	Strogly Agree 5	Number of Respondents	% of Students that Strongly Disagree and Disagree	% of Students that Neither Agree nor Disagree	% of Students that Strongly Agree and Agree	Average	Average Response
2011 Evening 3. The *Visual Dictionary of Building Materials Project* was a good learning experience for this course.	2	1	2	5	12	22	13.64%	9.09%	77.27%	4.09	Agree
2010 Afternoon 3. The **Visual Dictionary of Building Materials Project** was a good learning experience for this course.	3		3	8	5	19	15.79%	15.79%	68.42%	3.63	Agree
2010 Evening 3. **The Visual Dictionary of Building Materials Project** was a good learning experience for this course.		1	4	5	6	16	6.25%	25.00%	68.75%	4.00	Agree

Table 2:

The following is the outcome assessment of the Visual Dictionary project from 3 different sections of Materials and Methods of Construction I course:

Students would be able to identify, locate, photograph and define assigned building material terms.	Percentage Exceeded Standard	Percentage Met Standard	Percentage Approaching Standard	Percentage Did Not Meet Standard
Fall 2011	52	9	13	26
Fall 2010 Afternoon	62	24	9	5
Fall 2010 Evening	56	20	12	12
Average	57	18	11	14