David Greenfield

July 16, 2011

Methods Proposal- Teacher's Perceptions and Attitudes about STEM and STEAM Initiatives

EDLT 730B

Dr. Kay Davis

Abstract

The intent of this proposal is to provide an overview of the research methods to be employed for a dissertation study about the perceptions of arts teachers and science/math/technology teachers pertaining to differences and similarities between STEM (Science, Technology, Engineering, Math) and STEAM (Science, Technology, Engineering, Arts, Math) education initiatives. This proposal provides an initial review of the purpose of the study, proposed methods of data collection, population and validity issues. As the initial proposal, this method is still a work in progress and will be further refined and revised based upon instructor's feedback, future research, and recommendations made by the dissertation committee.

Methods proposal- STEAM or STEM: Teacher's perceptions about formal arts education in the classroom

America is in crises mode in two crucial and interrelated areas- economy and education. Since 2002, the US has lost close to 5.5 million manufacturing jobs. The US unemployment rate is 9.2% (14.1 million) and the rate of high school graduates has been hovering at about 68%, (although it can be as low as 30% in minority communities).

One of the primary causes for these alarming statistics is the ongoing transformation of our economy from one based on industry to one based on information management. Unfortunately there are no easy, instant solutions to these trends. Nonetheless, bi-partisan leaders have all agreed that one of the most important steps necessary to build for the future is the need innovate in all fields and professions. The challenge then is to identify ways to teach and promote innovation in the work place and in education.

For many years, the US government has promoted STEM (Science, Technology, Engineering, Math) education initiatives. But this is clearly not enough to stem the tide of unemployment due to factory and business closures, and the off shoring of jobs. One key component to addressing this challenge can be found in formal arts education. Current research shows that one of the best ways to teach innovation (as well as creative problem solving and collaboration) is through formal arts education. In other words, it is time to change STEM to STEAM.

Formal arts education is not a new idea. In the past, an understanding of all of the arts was considered a relevant and important component of a well-rounded education in order to prepare students to be valuable contributors to society. Among other educational

benefits, arts education will "Foster interdisciplinary learning; Build self-esteem; and Facilitate student success despite differences in languages or learning styles" (Nelson, 2009).

Yet, the arts are usually the first casualty of budget cuts in school systems and often are not included in the core curriculum of colleges and universities.

The arts are a growth industry- the NEA projects an 11% growth rate for arts-related jobs through the year 2018. It is essential to understand that there is more to formal arts education then simply design, illustration, film and television, theater, writing and music. Arts education promotes imagination, creativity, communication and other relevant 21st century skill sets necessary for solving 21st century problems. Dr. Joseph Piro, Associate Professor Curriculum & Instruction Long Island University writes "If creativity, communication and critical thinking- all touted as the hallmark kills of the 21st century success- are to be cultivated, we need to insure that STEM subjects are drawn closer to the arts".

Purpose

Even though there is a growing awareness about the importance of re-introducing formal arts education into schools across this country, arts and science teachers often have differences in perceptions and attitudes about the benefits of including formal arts education into the curriculum of K-16 education. The purpose of this research is to identify differences and similarities in attitudes and approaches of these different styles of teaching and teachers. The objective of this is to determine if and where there is overlap in educational approaches and styles in arts and science teachers. Significant similarities will be used to formulate an inclusive curriculum integrating arts and sciences that

encourage and model important, 21st century characteristics and skillsets: innovation, creativity and creative problem solving.

Research Design

This research for this study requires three separate, yet interrelated elements of inquiry. The first is to more fully understand the fundamental terms that make up STEAM and STEM, as well as understand how these terms are perceived. The second element is to gain an understanding of the educational standards employed in the two general disciplines- arts and sciences. The third element is to understand the personal attitudes of the teachers towards each other's disciplines of work and or research. The questions for this study will include the following:

$RQ_{1:}$ What are the characteristics and basic learning outcomes for teaching Science, Technology, Engineering, Arts, and Math?

$RQ_{2:}$ How do arts and sciences teachers view each other as well as their specific disciplines?

$RQ_{3:}$ How do arts and sciences teachers view innovation, creativity and creative problem solving?

$RQ_{4:}$ What is the educational background of the arts science teachers participating in the survey?

$RQ_{5:}$ Undetermined questions to be informed by responses to Q_{1-4}

The research methodology for this study will be qualitative, primarily focusing on evaluation research in order to understand the complex perceptions about art and arts instructions. This is necessary because often, both arts and

sciences teachers view the arts as less disciplined, intellectually demanding or academic as "hard" sciences.

In James Burke's PBS series- *Connections* and *The Day the Universe Changed,* Burke identifies connections between people, things and time by examining the narratives of people create these connections. This style provides crucial data difficult to obtain in "Y/N" or Likert scale questions often favored by science. Although accurate, these types of questions does not always capture responses that may fall outside of the realm of data necessary for this research- the "why" questions. The qualitative method's use of interviews provides data that will make sense out of these complex "why" perceptions. Additionally, the qualitative method will help describe details of the teaching settings, perceptions abut the disciplines taught, and instructor's purposes and teaching experiences. Interpretation of these narratives will identify connections and similarities between these disparate communities (art and science). A benefit of this data is the ability to identify common elements and desires used in the different disciplines in order to build a more balanced 21st curriculum across the K-16 educational spectrum.

Population

The research population will be university level teachers of arts and sciences teachers, as well as deans and directors of arts and sciences departments. These are the individuals who design and implement curriculum. They are the ones' most familiar with the relevant educational issues as well as being the individuals most able to be the change agents who can modify curriculums to include formal

arts education. The survey samples will be obtained from colleagues as well as arts and sciences professionals recommended by colleagues.

Data Collection and Validity

The data for this research will be obtained primarily from face-to-face, phone or web-based video interviews. These methods promote dialogue that not only provides pertinent data from the specific research questions asked, but also creates an environment where spontaneous questions can add relevant and important data that may not be apparent through quantitative methods or by written or web-based surveys. The interviews will be transcribed and sent to the individual subjects for authentication. This process provides a high degree of survey validation because it will insure that the responses truly reflect the views and narratives of the research subjects.

IRB policies of all institutions participating will be followed. In addition to this, these survey tools used will follow all best-practices protocols to insure the validity and accuracy of the responses and anonymity of the subjects (unless specific permission is granted to publicize a specific identity). All interview transcripts and digital media will be kept in locked cabinets.

Analysis

After all of the interviews have been completed and the individual subjects have verified the transcriptions, the data will be coded to identify common themes, similarities and also specific differences. Because of the limited samples, quantitative analysis will not be done. The data will provide answers to several questions:

- How arts and sciences teachers perceive each others disciplines in academic settings
- How arts and instructors view the importance of STEAM or STEM initiatives.
- If arts and sciences teachers place the same level of importance towards innovation, creativity, and creative problem solving.
- If there are other learning outcomes that can be identified.
- If and how teachers' perceptions about STEAM and STEM are influences by their education and degrees held.

Similarities in how different teachers approach their teachings styles, content and perceptions can be addressed to develop specific STEAM based learning guidelines for K-12 education. Differences can provide data that helps explain if there are perceptions that need to be, or can be changed to include formal arts education in K-12 curriculum, and if so, then how. In conclusions, this reseal will then help us to listen in a both rational and emotional manner- head and heart- to important issues facing arts and science educators. In turn, this will help us develop new curriculum that address the need for 21st century skillsets.

Resources

The Day the Universe Changed. Retrieved 6/30/2011 from http://en.wikipedia.org/wiki/The_Day_the_Universe_Changed

Knowledge Web. Retrieved 7/1/11 from http://www.k-web.org

Eger, J. M. (2011). Arts education and the innovation economy. Create Space. San Diego, CA.

Nelson, H. (2009). Arts education and the whole child. *Principal*, 88, 14-17

National Art Education Association. Retrieved 7/1/2011 from http://www.arteducators.org.

STE(+a)M. Retrieved 6/23/2011 from http://steammanifesto.com.

U.S. Arts education standards. Retrieved 7/1/2011from http://www2.ed.gov/pubs/ArtsStandards.htm.

U.S. Bureau of Labor Statistics. Retrieved 7/10/2011 from http://www.bls.gov/news.release/empsit.nr0.htm