Transition of an Effective E-Learning Platform

Application of Quality Program Elements into New Environment

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***Abstract*—This paper describes the strategies and considerations necessary in the transition of a highly effective e-learning teacher certification program for elementary preparation into secondary mathematics and science teacher preparation. The paper will review the effective elements of an existing program in elementary teacher preparation and an effort to make the transition to a secondary program, at a different university, in mathematics and science teacher preparation.**

Keywords-component; e-learning, education, K-12, university, mathematics education, science education, elementary, secondary, architectures, and collaboration.

I. INTRODUCTION

This paper will discuss a large-scale teacher certification program preparing academically competent individuals to teach elementary science and mathematics. In addition the policy and practice of teacher preparation in an alternative certification environment will be briefly explored. CalStateTEACH (CST), an integral part of the California State University System, the largest university in the world, is one example of a program that provides a high-quality teacher preparation in science and mathematics instruction through online supported instructional delivery. The academics of the program are delivered electronically and the coordinated practicum is school-based. The paper will discuss how over twelve years of lessons learned in the elementary teacher preparation area and how this knowledge was effectively transitioned to a single subject program, preparing secondary mathematics and science teachers.

II. ADVANTAGES AND DISAVANTAGES OF ONLINE INSTRUCTION

A. Advantages

As is true of any and all educational innovations the practice of learning and delivering curriculum via the internet has many advantages and disadvantages. Many researchers have considered the benefits of online learning at various educational levels (Cole, 2002 and Warschauer, 2003). Turoff (1990) offers the following as evidence that online learning environments offer advantages to the students involved in distance learning: students and instructors do not have to meet at the same time because the computer stores their communications; online education is available at any hour of the day or night, seven days a week; and, students can communicate with one another to promote collaborative learning. This is increasingly understood to be as important a part of the learning process as student to teacher communications: students anywhere in the world can be part of a single class; teachers can be anywhere in the world and still team teach a class; and the computer provides specialized communication structures that can actually improve on what can be accomplished in face to face classes.

Harraism (1990) argues that online education introduces "unprecedented options for teaching, learning and knowledge building." Harraism states one of the benefits of online distance learning is the availability of knowledge sharing—in that there are no boundaries of time and space and that makes access to knowledge great.

Additionally, the belief that online education is a unique expression of both existing and new attributes. Distance learning courses do provide students with learning that is convenient. Students can take courses at any time from work or home, daytime or nighttime. This is a considerable advantage over traditional classroom settings (Perreault, Waldman, Alexander and Zhao, 2002).

B. Disadvantages

Soles and Moller (2004) share some insights into a disadvantage that asynchronous learning environments pose. They suggest that asynchronous learning may lack the immediate support of a facilitator or trainer who is present and able to motivate and if necessary give attention to actual needs and difficulties that arise during the learning situation. They conclude that feedback from the facilitator may be critical. Soles and Moller point out that the online environment inherently may be non motivational for students considering the absence of an instructor at the very time students are actively working in the online environment.

Within distance learning there are several barriers as identified by Grubb and Hines (2000). Distance adult learners by definition often suffer from familial and personal responsibilities that younger learning populations may not

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experience. They suggest that it is a challenge for adult distance learners to juggle all of their responsibilities and still find time to attend to their online learning experience. It could be argued that the adult learning population that engages in online learning may not attend traditional campus programs at all and therefore not engage in furthering their education. Grubb and Hines also note the challenges that online learners must overcome in the area of technology. Many learners find that technology is a hindrance and not a tool to be seen as a vehicle for delivery of just in time learning. Online learning programs must make available, to their learners, technology support on a daily basis and that support must be immediate and positive in order to ensure success for all learners in an online environment.

Warschauer (2003) notes the issue of technology access in the area of internet availability. Surprisingly the United States, where the Internet was first started, has a great deal of inequity in the area of internet access. He notes that Internet use is stratified by race, income and education. High-income college graduates have Internet access rates over fifteen times higher than low-income high school dropouts. These facts speak to a barrier to distance education programs that depend on the Internet as part of the delivery model.

Many students have reported that they miss the face to face interaction that is offered by a traditional classroom setting that is not found in online education (Perreault, Waldman, Alexander and Zhao, 2002). This is a barrier to learning that can be avoided if a hybrid is implemented in distance learning with face to face meeting opportunities provided sometime during the distance learning program. Often students are better able to build a community of learners if they have a face to attach to a name.

III. An Example of An Effective Online Program

A. California State Teach Program

In order to meet the certification needs of districts and students the California State University (CSU) took on the challenge of providing a high quality alternative teacher certification program. CalStateTEACH (CST) is intended to meet the academic needs of future teachers in rural and remote areas or students that have access issues due to personal reasons or geography. This alternative certification program enrolled the first students in 1999 and has presently graduated over 2,500 teachers. Due to the fact that this alternative certification program implements an online supported instructional delivery model that is non-traditional, it became essential to conduct an external evaluation of the program's effectiveness. Over the past several years, there have been a number of external evaluations brought forth by the Chancellor's Office. For the purposes of this paper, the researchers have used the CSU System-wide Evaluation of Teacher Preparation (Deans' Report) as the primary source of data measurement for teacher effectiveness of graduates from this alternative certification program (CST) in a comparative analysis with the other 23 California State University traditional brick and mortar teacher preparation programs.

B. Methodology

The CSU Dean's Report collected data from all 23 traditional teacher certification programs as well as the CSU's only alternative certification program, CalStateTEACH. The Deans' Report collected data from site supervisors from recent CalStateTEACH graduates. The researchers attempted to gather data from the graduates following their first year of teaching. The CSU Chancellor's Office located approximately 95 percent of the program completers for that year. For the purposes of the survey, the Chancellor's Office mailed a set of evaluation questions to each K-12 teacher who had been located and selected for participation. In addition to the teachers, the teachers' immediate supervisors were located and data was collected from these individuals. The data is reported only when the two matched sets (student/supervisor) were paired, only when the two matched-sets (student/supervisor) were paired.

Historically, 95% of graduates, who were fully employed, were located and contacted to participate in the Deans' Report. In a past study, two hundred twenty one graduated teachers and 174 supervisors were contacted for their responses and of these contacted 131 and 95 respectively, participated in the survey to yield the data. The observed mean value in the reported data varied from 1.80-2.61. The margin of error at the 95% confidence interval for the mean values ranged from 0.08-0.20.

Both CSU graduates and their K-12 supervisors were asked to indicate how well the graduates had been prepared to perform certificated teaching responsibilities. These responses comprised the data for the survey results. The questions queried the supervisors by asking the following question: "Based on your observations of and conferences with this teacher, please assess how well s/he was prepared to…?" The questions addressed the first year teaching graduates by asking the following question: "Once you finished your CSU credential program, and when you were a K-8 teacher, how well prepared were you to…?"

C. Results of Data Study

The purpose of the data collection was to investigate and report the effectiveness of an online supported alternative certification teacher preparation program in preparation for the teaching of science and mathematics in the multiple subject classroom. Responses by both supervisor and teachers regarding the preparedness in concepts and practices of teaching were examined. The general concepts and practices of teaching were reported; the respondents indicated that the teachers were well or adequately prepared at the 71%-95% level. As reported by the first year graduates teaching in K-8 grades, general concepts and practices in teaching are reported; teacher respondents indicated that they were well or adequately prepared at the 70%-95% level. In both of these critical areas of general concepts and practices, both supervisor and teacher respondents indicated a high level of preparedness.

As evaluated by employment supervisors, concepts and practices of the effectiveness of first year teaching practices were reported 75% were well or adequately prepared to teach science and 86% were well or adequately prepared to teach mathematics. The supervisor respondents indicated that the

teachers were well or adequately prepared at the 71% - 95% level in areas that support a scientific and mathematical classroom.

As reported by first year graduates teaching in K-8 grades, concepts and practices of the effectiveness of first year teaching practices were reported 76% were well or adequately prepared to teach science and 90% were well or adequately prepared to teach mathematics.

In order to effectively report the CalStateTEACH first year teacher preparedness, the researchers examined the cumulative data from all teacher preparation programs in the 21 CSU campuses (2 of the 23 CSU campuses do not offer teacher preparation programs). Data reported from this cumulative report yielded 19 composite areas ranging from content specific questions, classroom management, and overall usefulness of the teacher's preparation. In all 19 areas reported CST reported a higher level of preparedness than their traditional brick and mortar prepared colleagues. More accurately, the data suggests that teachers completing the CST program do as well as those completing a traditional program.

IV. Implications

First, the study has established that alternative certification preparation programs that implement an online supported format can, effectively prepare teachers of elementary science and mathematics. Supervisors and graduates (first year teachers) responded consistently that the CalStateTEACH first year teachers were well prepared. This study is unique in that it asked the same questions of the site supervisors and the students with the intent of determining if the student self-reporting would be supported by the site supervisor responses. Specifically in the area of planning instruction, the teachers reported at the 90% level that they were well prepared. It is also critical to look at the data in the area of science instruction. The CalStateTEACH students and supervisors reported high levels of preparedness to teach science and mathematics in today's California classrooms. With quantitative studies it is important to consider the population that did not think that they were well prepared in a given area. Educators can learn from the Deans' Report of this alternative certification program what is working well and what areas need to be strengthened in a standardized system wide online supported delivery model.

Educators and program designers can benefit from identifying the successful factors associated with an alternative certification online supported learning environment such as the CalStateTEACH model, specifically as educators recognize the need for highly qualified teachers in every classroom. It could be argued that quality teacher preparation can be accomplished with alternative delivery models. As program designers at the university level attempt to prepare qualified teachers alternative delivery models should be considered, especially ones that have quantitative data that can inform program developers.

Many teacher preparation programs are now considering the era of technology-driven delivery models; thus allowing educators the opportunity to offer alternative programs that meet students' needs.

As CalStateTEACH has produced quantifiable data on the effectiveness of its graduates, rated by both student and supervisor, the transition of this effective program was a natural next step.

V. Transitioning Lessons Learned to New Program

A. Process

With a highly effective program in place, it became evident that other programs may want to duplicate the CalStateTEACH program, to the specific requirements of the new content of other specialized programs within teacher preparation. The process of making the transition to a different context required planning and collaboration. Initially, faculty who were curriculum writers on the initial CalStateTEACH program were provided academic release time to commit their writing efforts and construct the different elements. As Hall and Hord note (2002) change is a process and not an event and that the facilitation of change is a team effort. The initial planning event was loosely coordinated by faculty of the new university desiring to build a new program. Faculty specialists, from the College of Education, were brought in from the hosting campus, consisting of generalists and pedagogical specialists in mathematics and science. CalStateTEACH assembled a team of elementary pedagogy generalist as well as elementary education specialists in mathematics and science.

B. Collaboration

A grant was received from the United States Federal government as a Transition to Teaching grant (United States Department of Education, 2012). The goals of the grant were outlined as follows:

The Transition to Teaching program supports the recruitment and retention of highly qualified mid-career professionals, including qualified paraprofessionals, and recent college graduates who have not majored in education to teach in high-need schools and districts through the development of new or enhanced alternative routes to certification.

The program provides five-year grants to state and local educational agencies, or for-profit organizations, non-profit organizations, or institutions of higher education collaborating with state or local educational agencies. Grantees develop and implement comprehensive approaches to train, place, and support teacher candidates whom they have recruited into their programs, which must meet relevant State certification or licensing requirements. Grantees then ensure that program participants are placed to teach in high-need schools and districts and support candidates to serve in these placements for at least three years.

The principal investigator of the grant created the collaboration between the universities and respective programs. The hosting university requested that the academic online components be re-written to correlate to their secondary mathematics and science students. Once this was completed for the beginning units of study, the collaboration between the secondary and elementary curriculum ensued. Even though the

platform for instruction was electronic, face-to-face meetings were required to make the necessary transitions between elementary and secondary content. The entire team consisted of approximately 15 individuals with diverse academic interests, although all involved in teacher education. Due to geography of the different participants, electronic tools such as Drop Box and Google Docs were embraced early as necessary to maintain communication and collaboration.

C. Mentoring of Faculty and Students

In addition to the written curriculum, the team was matched with the teaching faculty so that mentoring could occur on the actual electronic teaching. The teaching platform and how to effectively implement the procedures and strategies needed specific focus for effective student learning. Considerations for engagement and increasing student interaction between professor and student were prime considerations (Ravenna, 2012). The body of literature points to student interaction online as a critical component (Durrington, 2006). It was this crucial element, that is research-based, that was designed to ensure and capture the new student population of secondary mathematics and science teachers.

Specifically, the online discussions and having these learning experiences engage the students and teachers was considered. Knapczyk and Hew (2007) stressed the importance of clear instructor guidelines and expectations. The authors further suggested that instructors model appropriate response techniques in the discussion. Many times discussions fall flat and lack engagement and the students sense this with their interactions. Effective elements to nurture these discussions include the relevancy of discussions, the use of a discussion moderator, student control in the discussion, and clear expectations about the quality and frequency of discussions. These elements of interaction in the student-to-student interaction can be deepened through instructor modeling and clear guidelines (Knapczyk and Hew, 2007). Even though the official curriculum was designed, the mentorship allowing modeling of effective discussions with the students was seen as an essential element in an effective learning forum for the students.

D. Challenges and Lessons Learned

Having been involved in a successful program, with high ratings through external evaluations, the Cal State Teach organization developed through growth and change over time. Many successful lessons were learned regarding organization, curriculum, leadership, management of online learning, and blending the online academic components the field-based practicum in the school classroom. The challenge in the development of this new program was to harness the strength of what CalStateTEACH had learned over the 12 years of continual development and revision and apply it to the new, secondary teacher preparation program.

Leadership was critical. Having a main decision-maker to navigate the process in both logistics and academics was necessary. Teams were established in different areas of pedagogy, science, and mathematics. The leadership evolved over time within the different content areas as well as pedagogy.

What had taken twelve years of development was being transitioned in a few short months. There were challenges on timing and responsibilities. Part of the challenges were due to leadership expectations and the division of work on the new curriculum. Even though the California State University is a system wide university, each campus reserves autonomy and decision-making. The autonomy created new challenges to maneuver between campuses to ensure the essential elements were in place for a successful program.

VI. Conclusions and Recommendations

Presently, the secondary mathematics and science teacher preparation program has initiated its first group of students in the first semester. Being a five-year grant, the program is in its infancy and had a successful start in the transition of this first semester. The program is being designed as a three-semester program and the writers are working on the remaining semesters.

Through this transition, there are some common themes between a previously successful program to a new program at a different university campus, including:

i. establishing common expectations for tools of communication and document sharing (email, Google Docs, etc.) from the start-up of the endeavor;

ii. design a leadership model to coordinate and manage the elements of the three main parts of the program: mathematics, science, and secondary pedagogy;

iii. respect and understand the difference in pedagogy and consideration of university faculty between elementary and secondary teacher preparation;

iv. developing specific responsibilities for curriculum writing and program implementation with students; and

v. ensuring that the grant funding flows appropriately to compensate faculty in a timely manner.

The author will follow these emerging stages of this transition and examine both qualitative and quantitative measure of program design, measured through student success as the program evolves. The application and transition of effective program elements from one successful program to the next is of great interest. When a highly successful program received such effective ratings, it must offer the educational community an opportunity to replicate these elements. Many teacher preparation programs are now considering the era of technology-driven delivery models; thus allowing educators the opportunity to offer alternative programs that meet students' needs.

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