

INTEGRATING DIFFERENT MODES OF INQUIRY FOR PRE-SERVICE TEACHERS

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At San Francisco State, about half of the students enrolled in Liberal Studies (LS) plan to be elementary school teachers. The LS faculty consists of an anthropologist, a physicist, a geographer, a performance scholar, and a writing composition specialist. Between 2007-2009 the five faculty members developed curriculum that integrated our areas of expertise and attempted to make students aware of different disciplinary approaches. In this paper, the authors will discuss the changes of curriculum at the Liberal Studies program at San Francisco State University, how we integrated the disciplines, and how we addressed the needs of our students planning to be elementary school teachers.

1. Introduction

In a 1989 paper, Jacobs introduces us to a 4th grader, Mike, who thought that mathematics is "something you do in the mornings." Though sadly funny, Mike's view is not surprising. It contains a certain element of truth. In school, classes are divided in single-subject time slots. Math is taught separately from Science; Science disconnected from History; History unrelated to English; and so on. This shouldn't be the case. The elementary school classroom is ideal for interdisciplinary approaches. A glimpse of the California Frameworks (Ong and Lundin, 2002) reveals that a typical implementation of the science curriculum can be integrated into other subjects. However, curricular segmentation, with its consequences to students' fragmented epistemological views, is the norm, not the exception. This problem only increases at advanced levels, where specialists teach single-subject courses. It is not hard to see why Mike sees math the way he does.

By emphasizing standardized tests on Math and English, the No Child Left Behind Act (NCLB) may be exacerbating curricular segmentation. It sends the

message that what matters is context-free Math and English. NCLB is arguably the reason why other subjects are being pushed aside, with 80% of the San Francisco Bay Area elementary school teachers spending less than one hour per week in science (Dorth et al., 2007). This is striking, given San Francisco Bay Area's contributions to high-tech and science.

If elementary school teachers should draw connections between disciplines, then they need to be trained to be interdisciplinary. Teachers with this training will be able to create integrative lesson plans. For example, a teacher discussing the industrial revolution may look at it from historic, scientific-technological, or economic points of view (just to mention a few). But a teacher trained in thinking about problems interdisciplinarily may be able to integrate those aspects in his/her lesson plan, enabling a more comprehensive view of the industrial revolution. Thus, we believe that teacher preparation should include interdisciplinary preparation (Koirala & Bowman, 2003; Jacobs, 1989).

In this paper, we describe the interdisciplinary collaboration of the Liberal Studies (LS) faculty at San Francisco State University (SFSU). We focus on the process of changing the LS program to increase its interdisciplinarity, and in particular on the issues of pre-service teacher preparation. We start by situating our program in the context of teacher preparation in the State of California, and then describe the process of transition going from a multidisciplinary program to an interdisciplinary program with a teacher track (for definitions of interdisciplinary and multidisciplinary, see Augsburg, 2006 or Repko, 2008). We will recount how a faculty from diverse disciplines and backgrounds worked together to create the curricular changes. Finally, we will discuss some of the challenges and successes we had working as part of a very heterogeneous and diverse faculty, including some compromises we had to make as a group. As we believe, our experiences demonstrate interdisciplinary teamwork within an academic setting that illustrates that disciplinary silos can be bridged for the betterment of addressing complex societal problems, such as improving teaching preparation.

2. Teacher preparation

In California, teacher preparation begins at the undergraduate level and is completed at the postgraduate level. After graduating from college, prospective elementary school teachers are required to obtain a multiple subject teaching credential. The Teacher Preparation and Licensing Law of 1970 (Ryan Act) emphasized educational breadth in a range of courses that were distributed among four areas:

1. English, including Grammar, Literature, Composition, and Speech;
2. Mathematics and the Physical or Life Sciences;
3. Social Sciences, other than education and education methodology;
4. Humanities and the Fine Arts, including foreign languages. (Lewenstein, 1972)

Such educational breadth was designed to reflect the needs of elementary school teachers, as they are required to be proficient in a range of subject matter. This is because the multiple subject credential allows its holder to teach multiple subjects from grades K-8. However, starting with the sixth grade (the gray area of middle school), teaching positions exist that require single subject credentials.

During their credential candidacy, a pre-service teacher's proficiency in the above areas is currently established by a series of standardized tests, the California Subject Examinations for Teachers (CSET). A credential candidate needs to score satisfactorily in the corresponding CSET exams to obtain his/her credentials. For Multiple Subject credentials (K-8), pre-service teachers take the Multiple Subject part of CSET, corresponding to three subtests: (I) Reading, Language, and Literature; History and Social Sciences; (II) Science; Mathematics; (III) Physical Education; Human Development; Visual and Performing Arts. Usually, credential candidates take their exams during their last year in college or shortly after they graduate.

In the credential program, prospective teachers learn about teaching methods, but not about the content subject matters. Content is presumed to be known. Usually pre-service teachers take separate classes on how to teach mathematics, reading, history, arts, and sciences. Therefore, if a candidate didn't learn the necessary content matter in his/her undergraduate program, very little is done to fulfill this gap. The underlying assumption is that if a candidate scored satisfactorily on the CSET, the candidate has enough content knowledge to teach in K-8. However, what constitutes enough content knowledge, and in particular enough depth of content knowledge, is a matter of ample debate. For example, in mathematics Liping Ma observed that the US teachers lagged behind their Chinese counterparts, despite the fact that on average the US teachers had more formal math education, often including advanced math courses. What the US teachers lacked was in-depth knowledge of elementary mathematical concepts, such as area or the different meanings of division. This more advanced knowledge without enough depth into the foundational aspects of the subject was responsible for most of the difficulties that US teachers had in the classroom (Liping Ma, 1999).

Adding to the problem of lack of in-depth knowledge, elementary school teachers have a hard time integrating different subject matters. The elementary school classroom is integrative in nature, and good lesson plans evolve around a theme where different subjects are used to shed light on. But if integration among the different subjects does not exist, students will see the differing approaches to a problem as disconnected and unrelated. If teachers compartmentalize their lessons without using a context that allows for integration of knowledge, they run the risk of fostering among their students the concept that knowledge itself is naturally divided into compartments. As an example of the consequences of this view of knowledge, we repeat Jacobs's remark about the fourth grader Mike, who said that math "is something we do in the mornings" (Jacobs, 1989).

When we think about elementary school teacher preparation, in addition to covering a plethora of subject areas (hopefully in-depth), we should also think about how to integrate those subject areas, training future teachers to see knowledge as interdisciplinary and not as discipline specific. In fact, teacher preparation programs that foster interdisciplinary thinking are shown to have positive effects on teachers graduating from such programs (Jacobs, 1989). And as with the subjects themselves, the integration of different disciplines should be transparent and effortless from the part of the future teacher. We may argue that integrative interdisciplinary skills are like a window: the best windows allow you to see the outside, without distracting you, integrating the internal space with the external. In the same way, the ability to integrate knowledge from different disciplines should enable you to see the problem from different angles, and not distract you with the attempt of integration itself. Therefore, we advocate teaching future teachers how to build windows of knowledge by not only teaching them about the literature of interdisciplinarity—its terminology and methodology—but also by providing opportunities for future teachers to do integration themselves.

3. Our background

As part of the California State University (CSU) system, San Francisco State University created its Liberal Studies (LS) undergraduate major in 1972 as a multi-disciplinary general liberal arts degree that organized itself along the four teacher preparation areas discussed above. The only noticeable difference was that foreign languages were grouped with English and Communication, instead of Humanities and the Creative Arts. According to Goldsmith (2009), Liberal

Studies at San Francisco State has been an unusual program within the CSU system, as it has “always attracted an almost equal number of students who choose it for the pre-professional training or for an interest in the multidisciplinary curriculum and even some who choose it for both reasons.” On most other CSU campuses, well over 90% of the students majoring in Liberal Studies intend to become teachers (Goldsmith, 2009).

Throughout its history at San Francisco State, Liberal Studies has always been a popular major. At its peak in 1999, its enrollment exceeded 1,100 students (Goldsmith, 2009). Despite its popularity, the Liberal Studies program had no faculty of its own, and it was not housed in a department or college. Instead, it was located in the Division of Undergraduate Studies. Faculty from all over the university advised Liberal Studies majors, and a program coordinator coordinated it. A Liberal Studies Council created under the umbrella of the Academic Senate and composed of elected faculty from all colleges on campus (except the College of Business) oversaw curricular decisions.

Numerous educational and university developments arose that required curricular and program changes. San Francisco State did not escape from nationwide trends in assessment, but without its own faculty the program was unable to do any. The explosion of interest in interdisciplinary research and education trickled down to elementary and secondary education, where integrated approaches to subject matter ranging from important figures as Abraham Lincoln and Martin Luther King, Jr. to California history became increasingly deployed. At San Francisco State, a longstanding interdisciplinary social science program was discontinued, jeopardizing the two interdisciplinary social science courses required for the Liberal Studies major. A change in university-wide upper-level writing requirements to include a writing course in every major, however, necessitated the hiring of faculty, and in 2007, much to the University’s amazement, Provost John Gemello authorized the hire of five tenure-track faculty to teach new courses, one of which would satisfy the writing requirement. The faculty were hired with the expectation that they would revamp the existing curriculum by making a multidisciplinary degree more interdisciplinary, as well as more coherent in the advising process. There was hope that the new faculty would oversee each of the four areas. Moreover, the faculty were expected to do program assessment, something that had not occurred in its over thirty-year existence as a degree program.

Five faculty were hired: Matthew Luskey for Area I (English and Communication), Acacio de Barros for Area II (Math and Sciences), Tendai Chitewere and Logan Hennessy for Area III (Social Sciences), and Tanya

Augsburg for Area IV (Creative Arts and Humanities). Two faculty were hired in Area III, as those faculty would also be teaching the jeopardized interdisciplinary social sciences courses since there were no longer any tenured or tenure-track faculty teaching them.

Matt Luskey is a composition specialist with his doctorate in English. He brought to the program knowledge and passion about writing. The two social scientists hired have complementary areas of expertise. Logan Hennessy is an environmental geographer who received his doctorate in environmental studies. He teaches SS301, an interdisciplinary social sciences course that introduces students to Economics, Political Science, and Geography. Tendai Chitewere is a cultural anthropologist with a water engineering background who studies consumption in green communities. She teaches SS300, the other required interdisciplinary social sciences courses, which introduces students to cultural anthropology, psychology, and sociology. The authors of this paper are also interdisciplinarians. Tanya Augsburg's undergraduate degree is in dramatic literature, and her doctorate is in the interdisciplinary humanities. She taught writing composition and public speaking at an engineering university. She spent ten years building an interdisciplinary studies program at a large public university that did not have any tenure lines. She also brought to the program experience working with student portfolios. Acacio de Barros' doctorate and undergraduate degrees were in Physics, but his interests have always been interdisciplinary. In his dissertation he integrated concepts in the philosophy and foundations of mathematics and logic to gravitation. After working on the US on the foundations of quantum mechanics, de Barros went back to Brazil, where he accepted a faculty position and later became the Physics credential program director. This contact with future Physics teachers led to his physics education research.

4. Working together for changing the major

In addition to students interested in being schoolteachers, the LS program at San Francisco State has a significant amount of majors seeking an interdisciplinary Liberal Arts education. For that reason, some of the core curriculum courses in the LS program are essentially interdisciplinary, within a major area of knowledge such as the aforementioned SS300 and SS301 courses. However, even though those courses are interdisciplinary, because LS students do not have the strong tradition of a discipline (they are not Physics majors, or Anthropology majors, or English majors), they struggle to see the integration of different disciplines in those courses, simply because they struggle to see the disciplines

themselves. For that reason, the LS faculty decided to include two new courses that teach about disciplines, interdisciplinarity, and integration of knowledge.

The first course created is usually taken when students reach their Junior year, and it is called Perspectives in Liberal Studies (LS300, for short). We often refer to LS300 as our gateway course. One of the main goals of this course is to introduce students to the concept of disciplines, and to show how different disciplines approach questions and consider evidence in different ways. But we also discuss how some questions do not have a natural disciplinary domain, and how it is necessary to draw from multiple disciplinary perspectives to have a better understanding of those questions (Augsburg, 2006). The second course is taken at the last semester before graduation, and is called Liberal Studies Senior Seminar (LS690). The main goal of this course is to provide students with the opportunity to apply the knowledge they acquired during their education towards culminating integrative projects, and to look back at their education and assess it critically. In the next section we will focus on the process of creating LS300, as well as the reasoning that led to our main choices. We will not discuss LS 690, as neither of us will be teaching it when it is taught for the first time Fall 2009.

4.1. *The process of creating LS 300*

During the summer of 2007 Robert Cherny, the Dean who hired the new LS faculty, introduced all of us to each other over email, encouraging us to share our CVs before we even met. He furthermore told us that we needed to think about changes to the major what would be useful toward assessment. Our first meeting was a social event, rather than strictly work related. We learned about each other in a relaxed atmosphere, with the sharing of food, wine, and conversation.

Once the Fall 2007 semester began the faculty met regularly and started working on the initial goals of creating program learning objectives and a gateway class. It is important to note that we were given time to work together—while we did not have a complete teaching release, we had a reduced teaching load that permitted us to meet weekly to work on program and curriculum development. While discussing program goals and learning objectives, the disciplinary traditions of each faculty became evident. For example, while one faculty member pushed for goals that could be measured, another defended goals that could be more open to interpretation and not necessarily subject to clear performance-based outcomes.

The faculty were making good headway on program objectives and were planning to complete them before creating the class; however, the Academic Senate calendar dictated otherwise, and the faculty succeeded in having their course proposal approved by the designated university committees, the library and the Academic Senate so that we could launch it Fall 2008. Thus we ended up giving up on the goals (temporarily), in order to create two courses: LS300 and LS690. The idea behind having two courses was that one would be the program entrance point, and the last the exit point, thus allowing for assessment. Moving quickly whilst abandoning the work on program goals was necessary in order to launch LS300 in the Fall 2008 semester. The consequence was that our discussion of program goals and learning objectives was truncated and deferred.

The essential goals of the gateway course are the following. First, it should introduce students to the different modes of inquiry among the disciplines and to foster interdisciplinarity. Second, it should also be a writing intensive course, where students learn writing within the discipline (a tricky definition for Liberal Studies). Finally, it would be desirable for LS300 to facilitate program advising by encouraging students to reflect on their education and goals.

Early in our course development the faculty made two key decisions consensually:

1. To introduce students to the the concepts of disciplinarity and interdisciplinarity through a common theme, climate change.
2. To use an anchor text: Al Gore's *An Inconvenient Truth*.

Why did we choose climate change as a topic? First, climate change is an extremely complex problem, with ramifications that extend well beyond climate science. For that reason, no single disciplinary approach can address but the simplest questions in climate change. For example, to understand the greenhouse effect and the role CO₂ plays required the collaboration and methods of Physicists, Chemists, and Geologists, just to name a few disciplines used, and today's politics and social effects of climate change are undeniably beyond the scope of any scientific approach. Therefore, because of its complexity, the subject certainly qualifies as an interdisciplinary, if not transdisciplinary, problem.

Another reason for choosing climate change is its increasing importance, and corresponding presence, in today's world. As a consequence, it is a topic that is increasingly being taught in schools. In fact, in California there was a recent attempt by the legislative body to mandate the teaching of climate change (in combination with environmental education) throughout the K-12 curriculum. The State Senate approved the bill in January 30th, 2008, but in July 26th

Governor Arnold Schwarzenegger vetoed it. Nevertheless, the possibility of a future state mandate to teach climate change in schools is not far fetched. Furthermore, as the possible consequences of climate change mount, citizens will need to make tough but informed political decisions that may have a deleterious impact for future generations. Given the high level of political engagement of San Francisco State students, we thought that climate change would be a topic of general interest among our students, and not only something useful to future teachers. Anecdotally we found that this was indeed the case.

Why did we select *An Inconvenient Truth* as the anchor text? We realize that it is neither academic nor scholarly. This text, accompanied by the award-winning film, serves as an accessible and popular introduction to climate change. It has been already adopted for use in schools worldwide. Because it evolved from years of Al Gore trying to increase popular awareness of the urgency of dealing with the climate consequences of our current behavior, it is a very accessible way to introduce climate change as a scientific problem, as a social problem, as a political issue, a moral problem, and a theme for the creative arts. This accessibility allows the use of the text as a starting point to address how particular modes of inquiry. *An Inconvenient Truth* opens up the complexity of climate change and shows that it needs to be approached from several different angles (or disciplinary perspectives).

Because Gore writes in the book about the interconnections between his political career and his personal life, and because the book had an important effect in the collective consciousness of climate change, we can examine this text from multiple perspectives. For example, *An Inconvenient Truth* can be seen as an autobiographical work. Gore uses his personal story to illustrate issues related to climate change. And he makes it clear that throughout his life, climate change was one of the main threads tying all his work together. But you can also see it as a political work, where his intent is to shape policies and to establish interests and relations. Finally, you can see the text from the point of view of a very effective piece of rhetoric, and with its graphic design, photographs, and graphs you can also appreciate it as a fine example of visual communication.

In addition to Gore's book, we used other ancillary texts that went in depth into some of the processes discussed on *An Inconvenient Truth*. For the scientific aspects of it, de Barros suggested Spencer Weart's *The Discovery of Global Warming* (Weart, 2003). Instead of discussing the science of climate change in detail, something well beyond the scope of our course, Weart's book allows us to examine the history of the science behind global warming. By looking into this history, we could focus on providing our students with a very

good look into the process that is science, instead of getting lost into the endless (and very specialized) details of scientific theories. In other words, we could concentrate on how scientists approach problems, weigh evidence, and answer questions. Furthermore, we found it intriguing that Weart highlights the interdisciplinary nature of the discovery of climate change. For the humanities component of the course, Augsburg found Intuit personal narratives that were useful in considering the impact of climate change on difficult cultures in various geographical regions (see International Institute for Sustainable Development, 2000). The faculty later realized that these Intuit personal narratives were better suited for introducing the social sciences than the humanities. The narratives were extremely useful in introducing climate change's impact on various geographical locations and local cultures. Other texts such as those on environmental criticism, and climate change's impact on mining, were shared among the faculty, but not all faculty elected to use them.

The process of choosing the course-reading list was interesting in itself. One of the major challenges we had was to limit the number of texts from each area. For example, at some point one of the faculty suggested to limit to two the number of texts per major areas, i.e., Natural Sciences, Communications and Literature, Creative Arts and Humanities, and Social Sciences. Even though everybody agreed, when it came to their contributions to the list, exceptions were asked and more than two texts were presented. This is not surprising, as each one of us believe that our (disciplinary) approach is important, and therefore deserves additional consideration.

Another challenge was in developing an overall structure for the course that had some invariant characteristics across semesters and sections. The reason for seeking this invariance was grounded on the necessity to create courses that could be used for future program assessments. Because all LS students are required to take LS300, and this is the first interdisciplinary course they take, it would make sense to use it as a baseline for any program assessments.

Despite weekly meetings about developing LS300, consensus could not be reached on the details of the course. The main reason was that each faculty had strong feelings about what was important to teach and how much time should be spent on each component. During those meetings, we often had a "spirited discussions" between how to think about the selected complex problem, and how to approach it in the classroom.

Another issue was how much time in LS300 do we devote to the examination of climate change? For example, one of the problems was to balance enough discussions of a discipline with an analysis of the contributions

of this discipline to the overall question. Ultimately the faculty agreed that an important amount of discussions should be about the ways different disciplines view climate change. In so doing faculty could present various disciplinary approaches to a complex problem, allowing students to see through the lenses of multiple disciplinary perspectives.

During a faculty retreat late Spring 2008, the faculty met to discuss the remaining details of developing LS300. The initial goal was prepare our courses together, but we eventually moved from this goal to how to make sure that our assignments and requirements could be compared and used in the future for assessment. The retreat concluded with agreed upon core assignments and an overall structure with which everybody felt comfortable. Our shared assignments, such as an integrative essay and team presentations, were designed to "prompt" students to integrate different modes of inquiry. Only after the Fall 2008 semester, while we were conducting research for American Association of Colleges and Universities (AAC&U) VALUES Initiative in early January 2009, did we discover that each of us had interpreted each of the shared assignments differently.

Once the course was created, it was challenging for all of us to teach it. First of all, none of the faculty were experts on climate change. Not only were we not experts on climate change, we were not experts on our colleagues' areas. For example, de Barros found himself quite comfortable when the topic was on the methods and questions of science, and fairly comfortable with the social sciences, but when the subject moved to eco-criticism, he felt very uneasy. So, we all found ourselves teaching outside one's comfort zone and areas of expertise. Yet all faculty recognized the importance of teaching the topic, hence our commitment to trying.

This commitment at times clouded our overall teaching objectives: the course was not about climate change per se; climate change was used as an example for students to examine how various modes of inquiry address an interdisciplinary complex problem, which was climate change. We realized quickly that our initial design of the course foregrounded the content of climate change, thus overpowering the course objectives in introducing students to the study of interdisciplinarity. In Augsburg's section of the course, students were initially confused: they thought the class was a class about climate change. It took much fancy footwork on the instructors' part to help students understand what we were trying to accomplish: we were teaching students the common elements of every discipline, familiarizing them with concepts, theories,

methods, assumptions, and approaches to problems in order for students to understand differences among disciplinary perspectives.

Interestingly, there was a perceived initial challenge we faced teaching the class that turned out to be not the case: what we fondly refer to as "the odd couple" syndrome. What, you may ask, is the odd couple syndrome? Our definition can be found in the answer to the following: Did you know the joke about the physicist and performance artist sharing an office? Well, Acacio and Tanya didn't know it either, but we have been sharing an office since the fall of 2007. To situate a physicist and a humanities scholar/performance artist in the same office initially struck some people as odd. It was as if we were the latest incarnation of the popular Neil Simon play that later became a film and successful 70s American television show. Each of us was asked repeatedly how we were getting along. Each of us found the question odd, since, from the very start, we were able to find commonalities, such as an interest and commitment to education, and we also discovered that we have similar work styles. From both of our experiences in academia we know that similar work styles do not always occur within disciplines. We are both thriving from our workspace situation, as we have learned to appreciate the differences in our epistemologies and learning "styles." Acacio, the physicist, is more analytical and evidence-based, while Tanya, the humanities scholar and occasional performance artist, is more intuitive and interpretive. Instead of conflict, we find complementarity and synergy. Much had to do with the fact that the Liberal Studies faculty invested time and effort from the start to get to know each other and communicate, and we believe that the initial investment has yielded profitable dividends, as evidenced by all of our joint projects completed in the first two years of working together: our curriculum development; shared assignments, which included the design and implementation of a program electronic portfolio; a joint conference panel at a national conference; a national grant, and this conference presentation in which Tanya Augsberg and Acacio de Barros co-wrote this paper.

5. Future challenges

In 2009 the state of California faced a severe budget crisis. In order to close an approximate \$28 billion deficit, approximately half a billion was slashed from the California State University budget. This amount represented approximately 20% of the total CSU budget, a nontrivial amount. To cope with these cuts, 40 thousand less students would be admitted during the 2009-10 and 2010-11 academic years with no Spring 2010 admissions. Tuitions were raised by more than 30% in 2009, and university employees (including faculty) were furloughed

twice per month during the 2009-10 academic year. How all this will impact teacher preparation is unknown, but surely it will be detrimental. Given the extent of the cuts at our campus, our ability to work "full steam ahead" has been compromised. After the furloughs were announced in July 2009 we lost one faculty member, Matt Luskey, who accepted a position elsewhere. This has been a blow to the program for a myriad of reasons, including that his departure will hamper the rest of the faculty moving forward on a future joint project concerning *An Inconvenient Truth*.

As mentioned above, the faculty jointly presented "An Introduction to A Convenient Text: Utilizing *An Inconvenient Truth* in an Interdisciplinary Gateway Course at San Francisco State University," a panel at the annual conference of the Association for Integrative Studies in Springfield, Missouri, in October 2008. From our work on this panel, we have discussed the possibility of a book project that would enable us to share our ideas about teaching *An Inconvenient Truth* in both multidisciplinary and interdisciplinary manners. With the scarcity of time and overabundance of work, we have limited time to start research projects of this magnitude when existing projects await completion and publication. The pressure to publish is very real for probationary faculty, which is why Augsburg made the painful decision to return to her areas of expertise rather than to continue focusing on climate change for the near future. In so doing, she hopes to model more effectively interdisciplinary knowledge and practice.

6. Conclusion

In this paper, we argued for the introduction of interdisciplinarity into the undergraduate teacher preparation curriculum in California. We have also recounted how we transformed a longstanding multidisciplinary undergraduate degree into a more interdisciplinary one by introducing two new core classes into the major. We have briefly mentioned the addition of a teacher preparation track into San Francisco State's Liberal Studies curriculum. And we have discussed the challenges of faculty with different academic disciplinary backgrounds working together in the design and implementation of a new course intended to introduce students to disciplinarity and interdisciplinarity. In so doing, we have provided a partial case study for undergraduate interdisciplinary studies curriculum development and program building.

Since the teacher preparation track has been implemented Spring 2009 semester, students can take courses designed specifically for future teachers, such as Oral interpretation of Children's Literature. de Barros's Physical Science

for Elementary School Teachers, a course he has designed and taught, has been very successful. As long as these classes can continue to be offered, we have confidence that teacher preparation at San Francisco State has been improved. We have anecdotal evidence that this confidence seems to be shared by our students, who seem to now think that our major is a consistent whole, and not a collection of unrelated courses thanks to the addition of the two new Liberal Studies courses. In our estimation students are now better prepared to become teachers as the result of the Liberal Studies faculty interdisciplinary collaborations that began in 2007, and are ongoing. We plan to do further research to quantify and validate our initial preliminary findings.

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