Application

The original grant application was developed by Clearwater Economic Development Association (CEDA) in response to perceived need by regional manufacturers for employees and lack of local employees. CEDA submitted a pre-proposal to National Science Foundation (NSF). Based on NSF’s response that their grants should be administered through an institution of higher education and a Principle Investigator who has obtained a Ph.D., CEDA invited Lewis-Clark State College Workforce Training’s Dr. Linda Stricklin to participate. Originally, Ms. Frei (Executive Director Clearwater Economic Development Association) was to perform the duties of the Principle Investigator, but based on NSF’s preference for the PI to hold a Ph.D., Dr. Stricklin was asked to serve, and accepted as the Primary Investigator. Additionally, prior to submittal of the grant, a meeting of potential partners was arranged by CEDA at the University of Idaho September 10th of 2010. This meeting was designed to bring partners together to share information and more clearly define the scope and direction of the grant proposal.

Dr. Stricklin and Ms. Frei worked on the changes suggested by NSF for the final submittal of the proposal due October 21st 2010. A brief list of issues that were solved follows:

- Gathering information about all individuals involved in administration of the grant, such as biographical sketches of senior personnel.
- Establishing the organization of Senior Personnel.
- Scope of Work.
- Budget.
- Decisions regarding use of Sub-awards or contractors.
- Obtaining commitment letters from all partners, including school districts.
- Evaluation Design.
- Learning the NSF system; establishing a PI.
- Revising grant application based on feedback from NSF; several items required clarification

Grant

Monday April 25, 2011 Lewis-Clark State College received notification of the grant award and the planning team began to meet to work on activities of the project.
Initial Challenges

Collaborative Efforts
Any undertaking of the magnitude of this one requires a great deal of collaborative effort. The collaboration between economic development agencies, secondary schools, post-secondary workforce training department, post-secondary PTE programs, a university college of education and manufacturer’s in the region was and remains a prodigious feat; one in which there is a paucity of literature or research (Austin, 2000). The definition of collaboration is elusive; collaborative theorists agree a collaborative effort, especially between diverse entities, is a difficult endeavor that often fails. (Gajda, 2004; Gajda & Koliba, 2007; Gratton & Erickson, 2007; Hughes & Weiss, 2007; Peterson, 1991; Rubin, 2009; Slater, 2006; Thomson, Perry, & Miller, 2007; R H Woodland, 2012; R. H. Woodland & Hutton, 2012). However, in the 21st Century government, education, business and industry all recognize the increasing need for collaborations (Austin, 2000; Gajda, 2004; Gajda & Koliba, 2007; Gray, 1989; Hughes & Weiss, 2007; Idelchik & Kogan, 2012; Peterson, 1991; Rubin, 2009; Slater, 2006; Thomson et al., 2007; R H Woodland, 2012). Literature indicates defining collaboration is difficult and unless there is a clearly spelled out, mutually accepted agreement of purpose the effort will most likely be unsuccessful (Leana & Frits K., 2006; Peterson, 1991).

To establish a successful collaborative effort requires formation of strategic partnerships between entities who share a congruence of values with clearly defined expected rewards for participation; at the same time each partner’s goal(s) for participation must share enough overlap of vision to promote integration and collective action. Furthermore, the most productive collaborative partnerships are those in which each organization embraces a culture of collaboration (Austin, 2000; Gray, 1989; R H Woodland, 2012). Once appropriate partners are identified through common goals and vision, it is necessary to establish a clear plan of action with well-defined roles and expectations. Even though organizations are the founding partners in any collaboration such as this, individuals selected to participate must internalize common project goals for success to avoid hidden agendas, unequal balances of power, conflict and to build necessary trust relationships (Leana & Frits K., 2006; Nardi, 2005; Rubin, 2009; Slater, 2006; Thomson et al., 2007; R H Woodland, 2012); collaborative projects may be committed to by organizations but all collaboration is personal (Rubin, 2009). The membership appointed by organizations must be carefully selected to enable the partnership to be successful. Organizations must carefully select representatives whose personal values reflect those of the organization that mesh with the goals of the collaboration. Appointed members must be allowed time required to fulfill the duties of the project, they must be action oriented, be
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competent communicators, and they should not be involved in too many activities as this can decrease effectiveness (Gajda & Koliba, 2007).

**Time Commitments**
Before the grant was awarded it was acknowledged by all players the grant funds would not cover actual cost of time and effort required to achieve desired goals. This was not only an initial challenge, but remains a challenge throughout the life of the project. One of the challenges faced by any collaborative effort is individuals may overextend, at which point they return to their originating organization and focus time and effort on other projects (Gajda & Koliba, 2007; Nardi, 2005).

**Personnel Changes**

**External Evaluator**
The grant was awarded late in April with a beginning date of July 1, 2011. Dr. Mary Emery with the University of Illinois was hired as external evaluator. In early May, Dr. Emery accepted a new position at South Dakota State University (SDSU). This occurrence required several administrative actions to make this change through NSF. As the change happened before the grant period actually began and Illinois University’s Office of Sponsored Research had not processed the sub-award, the step of petitioning the University for release of the sub-award was not necessary. However, it was required for Dr. Emery to petition SDSU’s Office of Sponsored Research to accept the sub-award.

Once SDSU accepted the sub-award activities for Dr. Emery it was necessary to obtain permission for the change from the NSF program officer. The request was processed by Dr. Stricklin through the Fast Lane online system by submission of a new sub-award budget. The NSF Program Officer approved the request and a new sub-award contract was sent to South Dakota State University.

**Co-PI**
The grant application was written with Dr. Jim Gregson as the Co-PI and representative of the University of Idaho’s Department of Education. The activities in which he was involved were written to capitalize upon his strengths. However, on July 13th, 2011, Dr. Gregson announced he had been offered and accepted the Associate Dean’s position for the University of Idaho’s College of Education. Dr. Gregson’s replacement Dr. Raymond Dixon was scheduled to move from Illinois and begin work at the University in August of 2012. While everyone regretted the loss of such a valuable team member, inclusion of Dr. Dixon was an exciting and valuable addition. Dr. Dixon came to the University of Idaho from the Center for Mathematics Science.
and Technology, Illinois State University. He is a Fellow of The National Center for Engineering and Technology. He holds a Ph.D. in Human Resource Education from the University of Illinois at Urbana-Champaign with a concentration in human resource development/engineering and technology education. His qualifications added a level of educational expertise allowing closer relationships with manufacturers.

To make this change Dr. Stricklin petitioned NSF through the online Fast Lane software; the change was accepted by the program officer.

**Budget**

The budget from NSF was returned with dollars dedicated to generalized line items. The actual working budget for Lewis-Clark State College (LCSC) required detailed line items with very specific dollar amounts dedicated for all three years of the grant. Dr. Stricklin worked with the LCSC Controller’s office and Office of Grants & Contracts to develop a working budget. This is an area that required a steep learning curve for Dr. Stricklin. The complexity of this grant and the numerous activities required a very detailed and complex budget. Additionally, learning NSF rules governing grants and restrictions on how dollars could be spent presented an enormous challenge; Guidance from the Controller’s and Grants & Contracts offices was very much necessary and appreciated. Additionally, reading the National Science Foundation’s “Proposal and Award Policies and Procedures Guide: Part II Award & Administration Guide,” provided information required to successfully develop this detailed and complex budget.

**Activities**

Grant activities were inherently complex with numerous partners and outcomes. The establishment of who was responsible for which activities and who would lead the charge presented as an issue very early on in the grant activity period; changes in personnel contributed to difficulties in these areas. The excellent team of people dedicated to the project and common shared values and expectations allowed this collaborative effort to move forward. The addition of Dr. Raymond Dixon from the University contributed exponentially toward integration of STEM concepts into the project, allowing a closer fit with movement toward current educational goals and evolving standards at the high school level.

**Evaluation Plan**

Evaluation of the project was (and is) performed by an external evaluator, Dr. Emery. It was determined by the planning team and Dr. Emery to use a participatory style of evaluation. Dr. Emery attended a planning team meeting and an outline for evaluation was developed. Dr. Emery also attended the NSF ATE PI conference to learn specifics regarding evaluation expectations for these type of grant projects.

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Work Plan Lessons Learned
The work plan in the grant application outlined activities and expected deadline dates for activity completion. However, with the change in personnel and as the committee moved forward it was discovered, as can be expected with a project as large as this, the timeline and individual abilities required modifications; however, the goals remained the same so no request for change or notification to NSF was required.

April 25, 2011 Lewis-Clark State College was notified of the grant funding. Changes in personnel began May 5, 2011 before the actual funding date of the grant (July 1, 2011) when Dr. Emery notified Dr. Stricklin of her impending change in employment.

May 13, 2011 a press release was presented by Lewis-Clark State College announcing the receipt of grant funding. It was recognized that dissemination of information is important with any undertaking to garner support and recognition both within organizations and without (Rubin, 2009). Other efforts for dissemination were limited during this first year due to the early nature of the project. Routine reports were provided to upper management supervisory personnel at both University of Idaho and Lewis-Clark State College and to the Clearwater Economic Development Association and Valley Vision economic development agencies.

Developing the Working Budget
The learning curve for budgeting and reporting was very steep at this point for all individuals involved. Although individuals at Lewis-Clark State College (LCSC) participated in National Science Foundation (NSF) grants, this was the first one in which LCSC acted as lead. The Fast Lane help line was very helpful for answering questions. It was also very helpful to have access to the University of Idaho’s grants office; their help and guidance was extremely important in directing us through the initial set up period; their input and patience was greatly appreciated. Additionally, our NSF Program Officer was able to answer many questions and provide guidance; her assistance was valuable. One important lesson learned was about employing contractors for services in a grant such as this; it is beneficial to hire individuals directly not working through their college campus when possible. The indirect cost funds add a considerable expense that could be avoided through direct hires. Also, if a contractor changes employers, there is no paperwork for permission from NSF required!

Unexpected Expense ATE PI Conference
An unexpected expense item presented in July of 2011, shortly after the grant was funded was NSF’s expectation of the PI to attend the annual ATE PI conference in Washington DC. This is an excellent conference that offers opportunities to network and learn about other NSF ATE...
activities from throughout the U.S. However, these expenses were unexpected and budget modification was required to accommodate. At the time of this writing the PI has attended two such conferences; the information and knowledge regarding management of the grant and opportunities for sharing findings are well worth the effort and expense, but prior knowledge of the expense would have been helpful for planning and budgeting.

Information regarding the October 2011 year 1 ATE PI conference; it is a good idea to have your external evaluator attend the PI conference. There are many activities associated with evaluation specific to these types of grants. A lesson we learned was there is a grant available to pay the largest portion of cost for an evaluator to attend the conference. We were fortunate enough to be provided with funding to help Dr. Emery attend for the first year.

**Delay's to Project Activities**

July 13, 2011 Dr. Jim Gregson announced he has been promoted into an Associate Dean’s position and that Dr. Raymond Dixon would replace him in the role of the Co-PI. Dr. Dixon was relocating and was not planned to be in the region until August of 2011. As mentioned previously, Dr. Dixon’s knowledge and talents have added a great deal of value to the grant; however the change in personnel delayed formation of a working team as is required for effective collaboration (Austin, 2000; Leana & Frits K., 2006; Rubin, 2009; R H Woodland, 2012).

August of 2011 one of the key players in the regional high schools (Mr. Salisbury) had to leave the area. The loss of this individual presented a formidable challenge as he was integral to professional technical programs in the high schools and the previous project using Solid Works software in classrooms. Fortuitously, Dr. Dixon’s background in engineering provided insights and abilities the group might have been hard pressed to find without his participation. Additionally, Mr. Salisbury was able to return to the region to provide teacher trainings in the summer of 2012.

Personnel changes and contract development delayed beginning project activities. In September 2011, an evaluation meeting was conducted which included all collaborative planning team participants and the external evaluator. The purpose was to determine direction and tasks associated with evaluation activities. At this time questions began to surface as to what tasks team members were expected to perform. The grant application had a pretty clear outline of tasks, and Dr. Stricklin developed a timeline in May of 2011, but project complexity with the eclectic organizational membership and communication difficulties experienced between the diverse organizations confused issues; this is not unusual in collaborative efforts between diverse organizations (Gajda & Koliba, 2007). The initial timeline included the
person(s) responsible for oversight and individuals involved in each task with starting and end dates. However, it did not clearly spell out who was responsible for completion of each task or a clear definition of tasks. The timeline did not provide clear enough guidance to direct project activities.

Additionally, at this time confusion arose regarding who was expected to assume the role of collaborative leader. As is expressed in literature, these issues caused consternation, conflict, and loss of trust and contributed further to delays in action. In order for collaboration to produce deliverables it is essential to have clearly defined and delimited tasks and assignment of responsibilities (Austin, 2000; Nardi, 2005; Rubin, 2009; Thomson et al., 2007; R H Woodland, 2012).

To resolve these issues within this collaborative group took almost a full year. Project activities moved forward during this time due to all members’ efforts; however addressing issues early on could have prevented strife and confusion. Dr. Stricklin accepted responsibility for the collaborative leader role with Dr. Dixon’s assistance and support, Ms. Christine Frei accepted the responsibility as the project director.

Dr. Stricklin developed a different project timeline using a modified Gantt chart with MS Excel. A Gantt chart provides visual depiction of tasks as compared against the timeline. These charts are very useful in planning and evaluation of progress of projects (Software, 2013). The developed chart provided very specific information about who was to assume the collaborative leader role, which individual was responsible for each task with clear definitions and expectations for each task; all required for collaborative efforts to be successful (Rubin, 2009).

Due to member professionalism and desire of all team members for this project to be successful, these issues were resolved and the project moved forward with a great many deliverables developed in the first year. However, a valuable lesson learned was that issues such as who will be the collaborative leader(s) and a clear designation of task responsibilities with concrete assignments of expectations must be developed and agreed upon by all members prior to or shortly after a project begins.

Language Barriers
Another issue experienced by the collaborative team at this time was one that is defined in the literature as a problem for any collaborative effort involving many diverse organizations. This issue was one of misunderstandings and miscommunications due to differences in language usage and definitions (Gajda & Koliba, 2007). Again, due to the willingness to work through issues this barrier was overcome through communication and development of working
relationships. The members of this collaborative group definitely preserved through areas of conflict with their sights set on outcomes and action.

**Manufacturer's Survey**

One task included in this project was to survey manufacturers for ideas on which to base educational module development. This survey went out to 200 manufacturers but only 16 responded. The decision was made to substitute the results of the DACUM process (described later in this narrative) as the Research Chart provided required information.

**Computer Hardware**

Computer hardware became an issue during this project. The 3-D modeling software selected for this project was Solid Works because ninety percent of the manufacturers in the region use this software. In the previous project (information on this project is available in the background section of the web site), this software was purchased and installed in the regional High schools who were participating in this project. However, upgrades to the software’s version required stronger and faster computers. This issue created two major problems; first, the computer lab chosen to install licenses of Solid Works did not have computers fast enough or with required video cards. Second, the high school’s computers old versions of Solid Works would not open some of the training modules provided by the grant project. To overcome the first obstacle, Lewis-Clark State College Workforce Training purchased new computers with required speed and video cards. Funds for this purchase were provided by Workforce Training. The second issue for high schools is at this time being addressed by Clearwater Economic Development Association through potential grant funds or industry donations.

**Development of High School Partnerships**

Prior to grant submittal six regional high schools agreed to participate in and support the project. Once funding was received the work of communicating specifics regarding participation and obtaining signed agreements was necessary. One high school dropped out due to circumstantial changes beyond their control. Fortunately, regional interest in the project was high and another school was agreed to participate.

The process of communication with high schools was a tremendous undertaking which required a great deal of time. The unanticipated amount of time required with great distances between schools and short funding provided by the grant created issues around performance of this vital undertaking. The choice of membership was well-thought out and fortunately a collaborative member with a close high school connection was able to step in and take over communications; relieving the member who was originally responsible for the task who had taken on more work tasks from their organization. The commitments were solidified and communications were

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maintained. The issue of short funding created more problems as collaborative members became involved in other activities within their organizations. This is an issue that can derail a collaborative project yet, the success of this project speaks volumes about the dedication and professionalism of all members (Gajda & Koliba, 2007).

A webinar (Kick-Off Meeting-May 2, 2012) was held by Christine Frei from CEDA once all six high school superintendents indicated willingness to participate. The webinar informed superintendents of exact project activities and explained what was expected of each school. It was well received and well-done. This was a great way to reach all the audience using technology in our rural region.

**DACUM Research Chart**

A very important portion of this project is to help education align with business and industry in our region. A prior project by Northwest Manufacturers Associations found that regional manufacturers ranked a quality workforce as a number one need. Employers indicated they had a difficult time finding and retaining employees with the level of education and training required. To align the educational pathway with industry needs it was necessary to ascertain exactly what industry required in entry level employees. This is a documented need, especially for small manufacturers throughout the United States (White, 2012). Early in the project it was recognized there was a need for information regarding the duties and tasks required in North Central Idaho for an entry level computer aided drafting and designing technician.

Dr. Dixon is a certified Developing A Curriculum (DACUM) facilitator. The DACUM process is a job oriented task analysis designed to solicit information from subject matter experts who are working in the field of study regarding the skills, theoretical knowledge, and personal attributes required to perform a specific position. Research supports the DACUM process as a valid, cost-effective, efficient job analysis process (Halasz, 2003; Norton, 1995). In the case of our project it was determined that a DACUM research chart existed from circumstances that matched ours close enough on which to use as a template. The use of the previous Research Chart allowed a modified process of one day of meetings instead of the normal two to three days. This was beneficial for manufacturers who depend heavily upon their expert employees.

A DACUM committee was formed from regional manufacturers and met for a full day on January 31, 2012. The resulting [DACUM Research Chart](#) is available by clicking on the link. The resulting information provided a basis for development of online educational modules and STEM Reflective Guides developed for teacher use.
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Teacher Training Sessions
The limited financial resources for the grant provided the impetus to seek ways to save dollars. One method that was discovered was the ability to provide Professional-Technical high school teacher training at an annual “Summer Conference” held by the Idaho State Division of Professional-Technical Education. A training session on the use of STEM Reflective Guides was held in the summer of 2012. The session was moderated by Dr. Dixon and was well received. Student evaluations were positive and indicated excitement over the tool and possibilities for use.

The second teacher training was a four day session to train Math and Science high school teachers on the basic use of Solid Works software to teach STEM concepts using engineering techniques. This session was also a success as determined by student evaluations and input. This session was planned and executed with the help of Debora Baker from Valley Vision, an economic development agency in the Lewis-Clark Valley.

Workforce Development Council
A task included in this project was the development of a regional Workforce Development Council. To assure sustainability it was developed as a council of the Clearwater Economic Development Association (CEDA) Board of Directors. To institute this council took a considerable amount of work in determining appropriate membership and obtaining approval of the CEDA Board of Directors. This Council is a very important part of the project with the purpose of supporting and facilitating development of a business focused and skilled workforce system that meets the needs of business and industry, enhances workplace productivity, and increases opportunities for employment and entrepreneurship. The Council was established with the first meeting in May 2012.

Synopsis of Work Performed Year One
- Develop Evaluation Plan.
- Develop line item budget.
- Develop contracts.
- Signed participation agreements from High schools.
- Regular meetings of Collaborative planning committee.
- Evaluation Activities.
- Purchase of 3-D modeling software for training lab.
- Modified DACUM research chart.

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• Manufacture survey.
• 2-day training session for PTE teachers at yearly Professional Technical Education’s Summer Conference.
• 4-Day STEM teacher workshop to train introductory use of Solid Works for STEM concepts (6/2012).
• Workforce Development Council formed.
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