
List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Not Listed

REVIEWERS NOT TO INCLUDE:

Not Listed

The following information regarding collaborators and other affiliations (COA) must be separately provided for each individual identified as senior project personnel. The COA information must be provided through use of this COA template.

Please complete this template (e.g., Excel, Google Sheets, LibreOffice), save as .xlsx or .xls, and upload directly as a Research.gov or FastLane Collaborators and Other Affiliations single-copy document. Do not upload .pdf. Grants.gov Users: The COA information must be provided through use of the COA template and uploaded as a PDF attachment.

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COA template Table 3:

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- All of the individual's Ph.D. thesis advisees.

COA template Table 4:

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1	Your Name:	Your Organizational Affiliation(s), last 12 mo	Last Active Date
	Katerba, Charles W	Flathead Valley Community College	

Table 2: List names as last name, first name, middle initial, for whom a personal, family, or business relationship would otherwise preclude their service as a reviewer.

R: Additional names for whom some relationship would otherwise preclude their service as a reviewer.

to disambiguate common names

2	Name:	Type of Relationship	Optional (email, Department)	Last Active

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T: All of the individual's Ph.D. thesis advisees.

<i>to disambiguate common names</i>			
3	Advisor/Advisee Name:	Organizational Affiliation	Optional (email, Department)
G:	Chesebro, Eric B	University of Montana	eric.chesebro@mso.umt.edu

Table 4: List names as last name, first name, middle initial, and provide organizational affiliations, if known, for the following:

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<i>to disambiguate common names</i>				
4	Name:	Organizational Affiliation	Optional (email, Department)	Last Active
A:	Casella, Alex	Florida State University	acasella@fsu.edu	6/31/20
A:	Tillmann, Stephan	University of Sydney	stephan.tillmann@sydney.edu.au	6/31/20
C:	Morris, Timothy	New York Institute of Technology	tmorri08@nyit.edu	8/15/21

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	Alexander, Janice E	Flathead Valley Community College	

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T: All of the individual's Ph.D. thesis advisees.

<i>to disambiguate common names</i>			
3	Advisor/Advisee Name:	Organizational Affiliation	Optional (email, Department)
G:	Hunt, Donald F.	University of Virginia	Chemistry

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	Paulson-Hofseth, Amber	Flathead Valley Community College	

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G: Phillips, Delores		Old Dominion University	English

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COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./DUE DATE NSF 22-527		<input type="checkbox"/> Special Exception to Deadline Date Policy 02/22/2022		FOR NSF USE ONLY NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.) DUE - S-STEM Track 1: Institutional Capacity Building				2220972	
DATE RECEIVED 02/18/2022	NUMBER OF COPIES 1	DIVISION ASSIGNED 11040000 DUE	FUND CODE 1536	DUNS# (Data Universal Numbering System) 111111111	FILE LOCATION 07/27/2022 10:34am S
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN) 810299199		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input type="checkbox"/> IF YES, LIST ACRONYM(S)	
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Flathead Valley Community College		ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE Flathead Valley Community College 777 Grandview Drive Kalispell, MT. 599012662			
AWARDEE ORGANIZATION CODE (IF KNOWN) 0067777000					
NAME OF PRIMARY PLACE OF PERF Flathead Valley Community College		ADDRESS OF PRIMARY PLACE OF PERF, INCLUDING 9 DIGIT ZIP CODE Flathead Valley Community College 777 Grandview Drive Kalispell ,MT ,599012622 ,US.			
IS AWARDEE ORGANIZATION (Check All That Apply)		<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> FOR-PROFIT ORGANIZATION	<input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> WOMAN-OWNED BUSINESS	<input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE	
TITLE OF PROPOSED PROJECT S-STEM: The STEM Core Experience					
REQUESTED AMOUNT \$ 749,999	PROPOSED DURATION (1-60 MONTHS) 72 months	REQUESTED STARTING DATE 07/01/2022	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE		
THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW					
<input type="checkbox"/> BEGINNING INVESTIGATOR <input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES <input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION <input type="checkbox"/> HISTORIC PLACES <input type="checkbox"/> VERTEBRATE ANIMALS IACUC App. Date _____ PHS Animal Welfare Assurance Number _____ <input checked="" type="checkbox"/> TYPE OF PROPOSAL Research					
<input checked="" type="checkbox"/> HUMAN SUBJECTS Human Subjects Assurance Number _____ Exemption Subsection _____ or IRB App. Date Pending <input type="checkbox"/> FUNDING OF INT'L BRANCH CAMPUS OF U.S IHE <input type="checkbox"/> FUNDING OF FOREIGN ORGANIZATION OR FOREIGN INDIVIDUAL <input type="checkbox"/> INTERNATIONAL ACTIVITIES: COUNTRY/COUNTRIES INVOLVED <input checked="" type="checkbox"/> COLLABORATIVE STATUS Not a collaborative proposal					
PI/PD DEPARTMENT Mathematics		PI/PD POSTAL ADDRESS 777 Grandview Drive Kalispell, MT 59901 United States			
PI/PD FAX NUMBER					
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Email Address	
PI/PD NAME Charles W Katerba	PhD	2017	406-756-4583	ckaterba@fvcc.edu	
CO-PI/PD Janice Alexander	PhD	1991	406-756-3948	jalexand@fvcc.edu	
CO-PI/PD Amber Paulson	MA	2005	406-756-3882	apaulson@fvcc.edu	
CO-PI/PD					
CO-PI/PD					

CERTIFICATION PAGE

Certification for Authorized Organizational Representative (or Equivalent)

By electronically signing and submitting this proposal, the Authorized Organizational Representative (AOR) is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding conflict of interest (when applicable), flood hazard insurance (when applicable), responsible conduct of research, and organizational support as set forth in the NSF Proposal & Award Policies & Procedures Guide (PAPPG). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, §1001).

Certification Regarding Conflict of Interest

The AOR is required to complete certifications stating that the organization has implemented and is enforcing a written policy on conflicts of interest (COI), consistent with the provisions of PAPPG Chapter IXA; and that, to the best of his/her knowledge, all financial disclosures required by the conflict of interest policy were made; and that conflicts of interest, if any, were, or prior to the organizations expenditure of any funds under the award, will be, satisfactorily managed, reduced or eliminated in accordance with the organizations conflict of interest policy. Conflicts that cannot be satisfactorily managed, reduced or eliminated and research that proceeds without the imposition of conditions or restrictions when a conflict of interest exists, must be disclosed to NSF via use of the Notifications and Requests Module in FastLane.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:

- (1) community in which that area is located participates in the national flood insurance program; and
- (2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF grants when more than \$25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)

(This certification is not applicable to conference proposals.)

By electronically signing the Certification Pages, the Authorized Organizational Representative is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Chapter IX.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research.

The AOR shall require that the language of this certification be included in any award documents for all subawards at all tiers.

Certification Regarding Organizational Support

By electronically signing the Certification Pages, the Authorized Organizational Representative (or equivalent) is certifying that there is organizational support for the proposal as required by Section 526 of the America COMPETES Reauthorization Act of 2010. This support extends to the portion of the proposal developed to satisfy the Broader Impacts Review Criterion as well as the Intellectual Merit Review Criterion, and any additional review criteria specified in the solicitation. Organizational support will be made available, as described in the proposal, in order to address the broader impacts and intellectual merit activities to be undertaken.

Certification Regarding Dual Use Research of Concern

By electronically signing the certification pages, the Authorized Organizational Representative is certifying that the organization will be or is in compliance with all aspects of the United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern.

Certification Regarding the Meeting Organizer's Written Policy or Code-of-Conduct that Addresses Sexual Harassment, Other Forms of Harassment, and Sexual Assault

(This certification is only applicable to travel proposals.)

By electronically signing the Cover Sheet, the AOR is certifying that prior to the proposer's participation in the meeting, the proposer will assure that the meeting organizer has a written policy or code-of-conduct that addresses sexual harassment, other forms of harassment, and sexual assault, and that includes clear and accessible means of reporting violations of the policy or code-of-conduct. The policy or code-of-conduct must address the method for making a complaint as well as how any complaints received during the meeting will be resolved. The proposer is not required to submit the meeting organizer's policy or code-of-conduct for review by NSF.

Certification Regarding Family Leave Status (or equivalent)

(This certification is only applicable to career-life balance supplemental funding requests)

By electronically signing the certification pages, the Authorized Organizational Representative hereby certifies that the request for a technician (or equivalent) is because the (PI/co-PI/senior personnel/ NSF Graduate Research Fellow/postdoctoral researcher/graduate student) is, or will be, on family leave status (or equivalent) from the organization in accordance with the organization's policies. The Authorized Organizational Representative also affirms that the organization is able to fill the position for which funding is being requested, in an appropriate timeframe.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME Charles W Katerba	Electronic Signature	Feb 18 2022 9:07PM
TELEPHONE NUMBER 406-756-4583	EMAIL ADDRESS ckaterba@fvcc.edu	FAX NUMBER

NATIONAL SCIENCE FOUNDATION
Division of Undergraduate Education

NSF FORM 1295: PROJECT DATA FORM

The instructions and codes to be used in completing this form are provided in Appendix II.

1. **Program-track** to which the Proposal is submitted: **S-STEM Track 1: Institutional Capacity Building**
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
Katerba, Charles
3. Name of submitting **Institution** (as shown on Cover Sheet):
Flathead Valley Community College
4. **Other Institutions** involved in the project's operation:

Project Data:

- A. Major Discipline Code: **99**
- B. Academic Focus Level of Project: **LO**
- C. Highest Degree Code: **A**
- D. Category Code: _____
- E. Business/Industry Participation Code: **NA**
- F. Audience Code: _____
- G. Institution Code: **PUBL**
- H. Strategic Area Code: _____
- I. Project Features: **1** _____

Estimated number in each of the following categories to be directly affected by the activities of the project during its operation:

- J. Undergraduate Students: **30** _____
- K. Pre-College (PreK-12) Students: **0** _____
- L. College Faculty: **13** _____
- M. Pre-College (PreK-12) Teachers: **0** _____
- N. Graduate Students: **0** _____
- O. Postdoctoral Fellows: **0** _____

PROJECT SUMMARY

Overview:

The STEM Core Experience (SCE) will address the effects of academic, socio-emotional, and mental health support on the retention, transfer, and graduation rates of low-income, high-potential STEM students at Flathead Valley Community College (FVCC), located in rural northwest Montana. These students face a complex set of obstacles in pursuit of a STEM degree. A 2020 FVCC STEM student survey revealed that many of our students struggle financially, with mental health, and with aspects of their identity. This project will employ evidence-based practices to reduce STEM students' financial stress, support their mental health, and foster their STEM identity. More specifically, the project will reduce financial stress through scholarships; promote STEM identity and academic success through learning communities; support career exploration through faculty mentoring and participation in a STEM Colloquium; and foster personal growth and persistence through wellness counseling.

The SCE will utilize a cohort model by implementing learning communities centered around a 1-credit college success course and a 1-credit course built around FVCC's STEM Colloquium. Through three cohorts of 10 scholars each, a total of 30 low-income students in the Associate of Science degree program (which includes emphases in biology, chemistry, computer science, engineering, forensic science, forestry, geology, mathematics, and physics) will receive up to three years of scholarship support. The SCE will collaborate with FVCC's recruitment coordinator and the Flathead STEAM Alliance to advertise the scholarships through print, email, social media, video, and recruitment events. The SCE scholarships will be merit-based; application criteria will include both absolute criteria such as citizenship and financial eligibility, as well as relative criteria that will be considered holistically including GPA, college course placement, and a personal statement.

The Mathematics and Computer Science Division, Science and Engineering Division, Humanities Division, Student Support Center, Financial Aid Office and Academic Affairs will work to create a student success system for the SCE scholars. The project will leverage current institutional support systems and build upon them by introducing structured mental health and wellness support and a formal faculty mentoring program. FVCC's licensed counselor will educate faculty mentors on campus wellness and support resources. The PI and CoPIs of the project will attend a conference on mentorship best-practices, and then use their knowledge to train the remaining faculty mentors. By providing the interventions outlined above, the project expects to achieve 1-year retention rates of 100% and graduation and transfer rates of 80% among SCE scholars.

Intellectual Merit:

Intellectual merits focus on how academic, socio-emotional, and mental health/wellness supports for STEM majors inform their retention, transfer, and graduation rates. In addition, how mentor/faculty training informs student success will be evaluated. The SCE expects to provide immediate benefits to the scholars, FVCC, and the region at large by fostering inclusive classroom environments, supporting academic success, and improving STEM workforce skills.

Broader Impacts:

Broader impacts include systemic improvements to the college community from staff/faculty training. This project will provide a model for local high schools and other colleges looking to support student mental health as a means to foster student success. Wider ranging benefits include STEM student persistence and retention in rural college settings, stronger student workforce skills, and an increased number of STEM transfer students within the Montana University System. The project will ultimately bolster the STEM workforce in northwest Montana, which is projected to grow over the next decade.

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Project Description: The STEM Core Experience

a. Project Significance, Objectives, and Rationale

The overarching aim of the Track 1 S-STEM: The STEM Core Experience (SCE) at Flathead Valley Community College (FVCC) is to increase persistence and resilience of low-income, high-talent STEM scholars with the intention of better preparing our students for transfer to bachelors-granting institutions. FVCC is in rural Northwest Montana, a region with a high cost of living and low median wage. The SCE will prepare our scholars to enter high-wage STEM careers on the regional and national scale. The project will provide scholarships for a total of 30 students (3 cohorts of 10 students each) over 5 years and the average scholarship will be \$5,000 per academic year.

Table 1. Current and target SCE key performance indicators (FVCC IR, 2021).

	1 Year Retention Rate	Graduation Rate	Transfer Rate
Current:	69%	51%	53%
Goal:	100%	80%+	80%+

Through student surveys, financial aid data, and county data, we have learned that our students' biggest obstacles to

success are financial, socio-emotional, and identity based. In fact, out of 21 respondents to a 2020 voluntary response survey of STEM students at FVCC, 43% reported STEM identity as a challenge to success, 57% reported financial concerns, 81% reported socio-emotional difficulties, and 90% reported at least one of these obstacles as a challenge to their academic success (FVCC STEM Division, 2020). We thus propose an integrated approach to supporting our scholars with three primary components: 1) scholarship, 2) wellness and mental health counseling, and 3) STEM identity and community building. These components work together to not only support and strengthen the individual students in the SCE but also to strengthen FVCC by building a more robust STEM community. The results of our project will also be relevant for rural community colleges around the country as the problems faced by our students are common to many rural communities.

Table 2. SCE Goals and Objectives

Project Goal	Objectives	NSF Goals
1) Increase STEM student persistence and resilience.	1.1) Provide students with scholarships. 1.2) Increase first year retention rate. 1.3) Increase AS graduation rate. 1.4) Increase transfer rate.	1, 2, 3
2) Increase STEM student success by providing holistic wellness support to STEM scholars through integration and adaptation of services.	2.1) Establish SCE learning community and cohort through COLS and WRIT courses. 2.2) Engage students in wellness coaching. 2.3) Engage students in faculty mentorship.	2, 3, 4
3) Create and foster a sense of identity and belonging in STEM communities.	3.1) Establish and maintain STEM colloquium course and community. 3.2) Establish cohort development activities.	2, 3, 4
4) Build a trained and integrated community of FVCC faculty and staff to support student persistence and success.	4.1) Train mentors on best-practice mentorship. 4.2) Faculty and staff support team building through COLS class, mentorship, and wellness education.	2, 3, 4, 5

The SCE will emphasize Associate of Science (AS) degree graduation and transfer preparation, but the degrees we confer will prepare our scholars to enter high-wage, and high-demand careers on regional and

national scales after they finish a four-year degree. A majority of STEM students at FVCC are pursuing AS degrees with emphases in engineering, biology, chemistry, forestry/natural resource science, computer science, geology, math, or physics. In Northwest Montana STEM careers pay \$70,000 on average, almost double the state's median wage of \$37,860; these careers also demonstrate strong growth potential over the next decade (Montana Department of Labor, 2020). The projected national job growth in each of these areas is more than hopeful: STEM careers are expected to grow by 8% by 2029, more than double the expected growth of 3.7% for all occupations (Zilberman and Ice, 2021). The SCE will prepare the scholars for careers in these fields in a more substantial capacity than their non-SCE peers. Students from low-income and rural areas often lack a sense of belonging and identity in STEM; STEM belonging and identity correlate with greater interest and willingness to pursue a STEM career (Tonso et al., 2014). A survey of STEM students at FVCC revealed that many of our potential scholars struggle with identity (FVCC STEM, 2020). Similarly, knowledge of and access to mental health resources in rural areas is often low; mental health challenges prevent people from pursuing career ambitions inside and outside of STEM (Eisenberg et al., 2016; Rtor.org, n.d.). By fostering the SCE scholars' sense of identity and providing consistent positive mental health and wellness coaching, the SCE will produce scientists and STEM professionals with not only the requisite technical skills for a STEM career, but with a belief system and the resiliency necessary to persist in a STEM career. See "STEM Career Projections" in the Supplementary Documents for this application for more details and information.

Next, we provide brief descriptions of the three components of the SCE.

Component 1: Financial assistance

Nearly 60% of the respondents to our Spring 2020 survey of STEM students ranked financial difficulties as one of their top obstacles to completing an AS degree. We queried the institutional database at FVCC to identify pools of potential SCE scholars for the 2017-2020 academic years and found, on average, 50% of the potential scholars were enrolled full-time and 50% were enrolled part-time. The unmet need for the full-time and part-time groups was similar, with an expected average need of \$5,000 (see section b., Table 3 for a more detailed analysis). The financial difficulties our students face increase their employment workload and decrease their time available for scholastics. On average, our potential applicants carry an average load of 10 credits per term; since an AS degree at FVCC requires 60 credits, the SCE scholars will need 3 years of funding. The scholarship component of the SCE will meet many of our scholars' unmet need. By eliminating this need during their tenure at FVCC, the SCE will increase our scholars' physical and emotional availability for scholarship, which will in turn yield an increase in graduation and transfer rates.

Component 2: STEM identity and community building

Many rural, low-income students struggle to find success in STEM degree programs and careers, at least in part because they do not view themselves as STEM professionals or scientists. In fact, student identity and beliefs are better predictors of enrollment, persistence, and retention in STEM than academic success (Chelberg and Bosman, 2019; Godwin et al., 2016; O'Keeffe, 2013; Tonso et al., 2014). FVCC's Spring 2020 STEM student survey indicated that many of our potential scholars struggle with their STEM identity and with their role in STEM communities. Thus, a primary goal of the SCE is to foster student STEM identity through a collection of individual and community building activities. By bolstering STEM identity, these activities will lead to increases in persistence and retention, which will lead to increases in graduation and transfer, and will culminate in our students finding gainful employment as STEM professionals. The program will establish

- 1) One-on-one faculty mentorship for each SCE scholar. Mentors will be role models for the scholars and will demonstrate that the scholars can, in fact, become STEM professionals.
- 2) Learning communities (LCs) with first-year common courses. The SCE will establish learning communities in each cohort. The LCs will be centered on a 1-credit, first-year experience course, COLS 107, and common STEM courses.
- 3) A frequent STEM colloquium for SCE students and STEM faculty to interact in an informal, co-curricular environment. Second-semester SCE scholars will be encouraged to take a 1-credit course centered around the STEM colloquium to reinforce participation. The course will provide guidance on intellectual curiosity and research skills. The colloquium environment will provide SCE scholars an opportunity to interact with STEM faculty as near-peers in a less rigid, more jovial environment.
- 4) While FVCC has few formal articulation agreements with the universities in Montana, the STEM faculty at FVCC has strong bonds with the faculty at the University of Montana and Montana State University in numerous STEM disciplines. The SCE will leverage these relationships to help bridge our scholars' transfers from FVCC to the state universities.

The two 1-credit courses mentioned above will not increase our scholars' time to graduation; rather, they will provide a skillset and a sense of belonging that will help keep them on track to graduate.

Component 3: Mental health and wellness coaching

Montana, broadly, and Flathead County, specifically, both typify the mental health crisis looming in rural America. For instance, Flathead County averaged 24.8 deaths by suicide per 100,000 people annually between 2014 and 2016; the national average for the same period is 13 deaths per 100,000 (Flathead City-County Health Department, 2018-2019). The low-income and high-talent STEM students at FVCC are not immune to this crisis: 81% of the respondents to our Spring 2020 STEM student survey reported socio-emotional problems contributing to their academic difficulties. To combat this problem, the SCE will encourage students to attend wellness meetings with FVCC's resident mental health counselor, Mandee Johnson, at least once a month. These meetings will provide the students with strategies for coping with mental health issues before the issues develop into more serious problems, thus increasing the resilience of the SCE scholars.

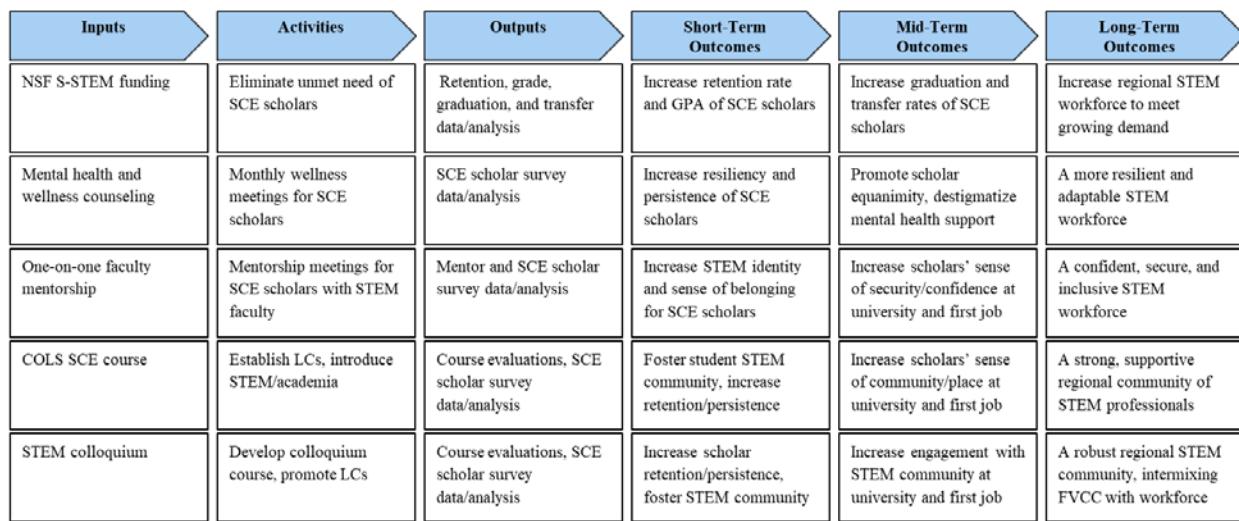
Knowledge Generation

We believe that the three components of holistic intervention described above will increase the retention and graduation rates of FVCC's low-income, high-talent STEM students and set the students up for success in future STEM careers. The SCE will answer the following questions:

- 1) In what ways do learning communities increase students' sense of belonging and identity in STEM?
- 2) In what ways does one-on-one faculty mentorship influence students' sense of belonging and identity in STEM?
- 3) Does wellness coaching increase a student's sense of well-being and resilience?
- 4) Does the SCE's holistic approach to student support increase STEM graduation and retention rates?

See section h., Generation of Knowledge, for further details. The logic model below summarizes the STEM Core Experience project writ large.

Figure 1. STEM Core Experience logic model



b. Pool of Potential Scholars and Determination of Scholarship Amount

FVCC offers only a generic Associates of Science (AS) degree per State of Montana regulations. Students may identify an emphasis in a STEM discipline on their application that directs their advising and course schedule, but the emphasis is not reflected on a student's degree. For this scholarship, we will consider any domestic student enrolled in the AS degree program, excluding students in the Registered Nursing program. The cost of attendance at FVCC was \$16,133 for the 2021-2022 academic year. ("Cost," n.d.). We define low-income students to be those who are Pell eligible. To create Table 3 below we filtered the set of low-income domestic students enrolled in the AS degree program during their first term to include only students who had unmet financial need, who were enrolled at least half time (6 credits per term) each term at FVCC, who maintained a GPA of at least 2.75, and who met the prerequisites to take at least College Algebra. For comparison's sake, the average cumulative GPA of *all* FVCC students meeting the baseline enrollment requirements over the same period of time is approximately 3.37. The math courses with the highest enrollment and largest number of sections are remedial, so requiring a SCE scholar to be College Algebra ready helps ensure that they are high talent and academically prepared for STEM success. While our GPA minimum is below the institution-wide average, we believe it is fitting as STEM student GPAs are, on average, lower than those of institutions at-large (Witteveen and Attewell, 2020). Moreover, our potential applicant pool's average cumulative GPA exceeds that of FVCC.

Table 3. SCE Potential scholar pool summary (FVCC IR, 2021).

Year	Num. Scholars	Num. (Full-time)	Num. (Part-time)	Avg. FT Unmet Need	Avg. PT Unmet Need	Avg. Unmet Need	Mean Cum. Credits	Mean Cum. GPA
2017	25	11	14	3466.08	2447.81	2895.85	59.4	3.53
2018	33	12	21	3306.05	4033.43	3768.93	46.3	3.53
2019	36	14	22	4662.19	4649.35	4654.34	32.99	3.65
2020	36	27	9	5934.26	5732.11	5884.22	15.22	3.50
Mean	32.5	16	16.5	4738.99	4134.03	4431.99	9.6/sem	3.55

Note that both the pool of potential scholars and the average unmet need grow with

time. Given the filtering criteria listed above, this phenomenon has a reasonable explanation: students with higher unmet need are unable to maintain eligibility in some capacity. Thus, given the recent jump in

inflation and local housing costs (Dresser, 2020), we anticipate an average annual award of \$5,000 per scholar per year. Our potential pool of applicants takes on average about 10 credits per semester and the AS degree program requires 60 credits total. We thus anticipate funding each scholar for 3 years.

Table 4. SCE Scholarship award plan.

Number of cohorts	Students/cohort	Total scholarships	Annual award/student	Total to be awarded
3	10	30	\$5,000	\$450,000

Recruitment

FVCC lies in the Northwest corner of Montana in a rural county that is predominantly white, even though there are two large tribal reservations to its east and south. The median household income of Flathead County is \$56,182, roughly \$11,000 less than the national median household income (U.S. Census Bureau, n.d.). On the other hand, the median home price in the county is about \$662,000 compared to a national median of \$408,000 (Federal Reserve Bank of St. Louis, 2022; Realtor.com, n.d.). Thus, county residents face a high cost of living and comparatively low wages. The income and demographic breakdown of students at FVCC largely parallels that of the county. We note that the student body does not have a large proportion of tribal members largely because the reservations mentioned above have tribal colleges. Table 5 below gives summary statistics of some basic demographics of our applicant pool.

Table 5. SCE Potential Scholar Demographics (FVCC IR, 2021; U.S. Census Bureau, n.d.)

Year	Num. Scholars	% Male	% Female	% Non-white
2017	25	52%	48%	8%
2018	33	27%	73%	12%
2019	36	36%	64%	11%
2020	36	31%	69%	14%
Pool Mean	32.5	35%	65%	12%
Flathead County	NA	49.8%	50.2%	5%

Much as with unmet need in the previous section, notice that as the year increases, the percent of male potential scholars decreases while the percent of female and the

percent of non-white potential scholars both increase. This indicates that students who are non-male and non-white are struggling to maintain eligibility more so than their white male counterparts. Moreover, the average proportion of non-male and non-white potential scholars is greater than the corresponding proportions in the county at large. The STEM Core Experience project will make a multipronged effort to recruit a group of scholars that is representative of all demographic groups (Shadding et al., 2016).

The project will partner with the Flathead STEAM Alliance, a local non-profit, and FVCC's recruiting department, led by Cole Dykhuizen, to host in-person, virtual, synchronous, and asynchronous recruitment events. The recruitment plan includes

- 1) Advertise the scholarship in print and through social media.
- 2) Have faculty liaison for dual enrollment classes visit pipeline high schools to discuss STEM opportunities at FVCC, highlighting the STEM Core Experience Program.
- 3) Set up booths at local and regional science fairs.
- 4) Email high school juniors and seniors in the county and all students enrolled in the AS program at FVCC; mail all students enrolled in the AS program targeted postcards.
- 5) Have STEM faculty advertise the scholarship in all classes and reach out to individual students.
- 6) FVCC STEM faculty present at the yearly Expanding Your Horizons middle school girls STEM event run by the STEAM Alliance.

- 7) Advertise the scholarship at the beginning of every STEM colloquium.
- 8) Post STEM colloquium presentations on the STEAM Alliance website.
- 9) Encourage the first STEM Core Experience cohort to advertise to peers.

Application process and review

The SCE Project Management Team (PMT) will generate an application for prospective scholars. The process will allow applicants to demonstrate academic ability or STEM potential in a variety of ways.

Table 6. SCE application criteria and measures.

Criterion	Measure
Citizenship	Defined in S-STEM Solicitation NSF 22-527
Financial Need	Pell-eligible, determined by Financial Aid Office using FAFSA
GPA	New student, recent high school graduates: at least 3.0 HS GPA New student, non-traditional: exemption via personal statement Returning students: at least 3.0 FVCC GPA
College course work	<u>Math:</u> Students must be prepared to take at least College Algebra, either via placement testing or by passing appropriate developmental math courses with a B or higher. <u>Writing:</u> Students must be prepared to take at least College Writing, either via placement testing or passing developmental writing course with a B or higher.
Personal Statement	Describe your current interest in STEM and give a description of one of your futures in a STEM career. Do you feel like a scientist? If so, describe what makes you feel this way. If not, describe obstacles to this sentiment.

Assuming we are awarded the grant during the summer of 2022, the 2022-23 academic year will be preparatory and organizational. We will begin accepting applications during the Spring 2023 semester and through the summer. The project management team will review priority applicants the third week in May that met the May 1 deadline, announcing awards by June 1. Remaining scholarships will be awarded by the project management team two weeks before the beginning of Fall 2023 with awards announced during the week before the Fall 2023 semester begins. Applicants will be required to meet the citizenship, financial need, and college

course work requirements. However, to account for the high proportion of non-traditional students at FVCC, strong personal statements may override the GPA requirement.

Once admitted to the STEM Core Experience, students will be encouraged to

- 1) Enroll in and successfully complete the learning community courses including the Core Experience learning community course, mathematics, and English during their first semester.
- 2) Enroll in and successfully complete the STEM colloquium learning community course during their second semester.
- 3) Maintain at least half-time enrollment (6 credits per semester).
- 4) Maintain an overall GPA of 3.0 and a STEM GPA of 3.0 while in the program.
- 5) Meet at least once every two weeks with their faculty mentor.
- 6) Meet at least once a month with the mental health counselor.

If a student struggles to meet encouragements 1-4 above, the PMT and FVCC's Financial Aid Office will increase program interventions for the student and recommend more frequent mentorship and mental health meetings. The Financial Aid Office will work with the Student Support Center to provide a

roadmap for success. The Financial Aid Office and Student Support Center will work with the PMT to adapt the current award and probation process to the STEM Core Experience criteria. The PI will have access to data on cohorts to verify status and will contact the Financial Aid Office and Student Support Center after each semester to verify each student's status. If a student falls below the criteria, it will trigger a one-semester probationary period during which additional support will be provided to the student. If the student meets certain benchmarks, they will maintain the scholarship and program status for future semesters. If a student fails to meet these benchmarks, the project management team will select a replacement scholar during the next application cycle.

c. Retention and Graduation

With respect to retention and graduation, our historical pool of potential scholars fairs well in comparison to some readily available national averages. There is, however, room for growth. Table 7 below provides summary statistics for our potential applicant pool from the academic years 2017 through 2020.

Table 7. SCE potential scholar academic summary (FVCC IR, 2021; Jenkins and Fink, 2015; National Center for Education Statistics, 2021).

Year	Num. Scholars	Mean GPA	1-Year Ret. Rate	Grad. Rate	AS Deg.	Trans. Rate
2017	25	3.53	84%	60%	44%	64%
2018	33	3.54	64%	45%	39%	45%
2019	36	3.65	64%	11%	11%	22%
2020	36	3.50	NA	NA	NA	NA
Pool Mean	32.5	3.56	69%	51%	41%	53%
Nat'l Avg.	NA	NA	63%	28%	NA	25%

potential scholars maintained a high average GPA and a high average accumulation of credits, but still have low graduation, AS degree completion, and transfer rates. This demonstrates that many of our potential scholars are getting close to the finish line but are unable to cross it. The financial, identity-building, and socio-emotional support our program will provide scholars will increase their resilience and give them the final push they need to graduate, transfer, and eventually enter the STEM workforce.

Table 7 above compares our pool of potential scholars to some national statistics for 2-year, public, degree-granting institutions. On average, our scholars are outperforming the national benchmarks. This should be expected as the population we are sampling from only contains academically talented students. With this in mind, we set the following targets for the S-STEM scholars.

Table 8. SCE program success, retention, and graduation target rates.

	Mean GPA	1-Year Ret. Rate	Grad. Rate	AS Deg.	Trans. Rate
Target:	3.6+	100%	80%+	80%+	80%+

We would also hope that any student who

enrolls in the AS degree program and is awarded a scholarship will persist and matriculate with an AS degree. In other words, we hope the AS degree rate is equal to the graduation rate.

d. Activities and Infrastructure on Which the Current Project Builds Advising

FVCC has an intake advising model. General advisors meet with new students to provide intake and advising. Students with a declared discipline path transition to faculty advisors once their first semester

has begun. The S-STEM faculty mentoring model will build upon current FVCC advising by providing best practices mentorship training for STEM faculty.

Mental health counseling

FVCC currently offers free mental health counseling for all students enrolled in credit-based courses. There are few formal processes on campus to connect students with these resources and those that do exist are diagnostic in nature. In other words, students often already have a problem before they are referred to these services. One of the major aims of our project is to provide our students with preventative access to mental health and wellness counseling. In other words, our project connects students with these services before any problems develop or become too much of a burden.

COLS 107 Core Experience

FVCC will pilot a learning community for undecided students in Fall 2022. Students in the learning community will enroll in a common set of courses including College Success (COLS) 107. This new 1-credit student success course will focus on understanding the structure of general education, the requirements for successfully transferring to a four-year university, and skills necessary for academic success. The SCE project will adopt and adapt COLS 107 and the learning community model for our scholar cohorts.

STEM Colloquium

FVCC has a robust STEM colloquium that provides students and faculty an opportunity to engage with co-curricular STEM topics and with the region's STEM community at large. Colloquium speakers typically include FVCC STEM faculty, regional scientists working in industry or government, professors from universities around Montana, and FVCC students presenting the results of undergraduate research projects. During the second semester of an S-STEM scholar's first year, the scholar will take a 1-credit course centered around the STEM colloquium. This new course will strengthen the STEM community at FVCC and provide breadth and depth for our students' STEM identities.

e. S-STEM Student Support Services and Programs

Mentorship

The SCE at FVCC aims to increase persistence and retention for low-income STEM majors. Student identity and beliefs are better predictors of enrollment, persistence, and retention in STEM than academic success (Chelberg and Bosman, 2019; Godwin et al., 2016; Tonso et al., 2014). Mentorship, in both peer/near-peer and more traditional dyadic forms, are essential for developing and fostering student STEM identities and belief systems (Byars-Winston et al., 2019). The SCE will provide its scholars with both forms of mentorship through learning communities and through formal faculty mentorship. Each scholar will be paired with a STEM faculty member; the SCE will attempt to pair scholars with mentors similar to the scholar in terms of interests and identity to facilitate the development of a deep relationship. The mentorship dyads will meet at least once every two weeks for the duration of the scholarship. These one-on-one meetings will be flexible yet structured in a way that is tailored to each scholar's individual needs, goals, and interests. To ensure that the dyads are functioning for the scholars, the SCE will evaluate each mentor at the end of every semester. Mentors will be given commendations and recommendations to develop their mentorship skills and to improve the scholar's experience.

The SCE faculty mentorship program aims to foster the scholars' STEM identities in addition to providing more traditional mentorship support such as career guidance, skill development, and

sponsorship (Byars-Winston et al., 2019). Building a sense of belonging and cultivating a novel identity in the scholar requires strong personal connections and trust in the mentor. This trust can often be established more readily if the mentor and mentee share a collection of surface-level similarities (Byars-Winston et al., 2019). As such, the SCE will include in the scholarship application a collection of questions designed to identify the surface-level similarities the potential scholars are seeking in a mentor. Once the scholars have been selected, the SCE will do its best to match scholars and mentors according to these similarities.

The SCE may not perfectly pair scholars with similar faculty members. While it may be an impedance, it is not a genuine obstacle to the mentorship dyad developing a deep relationship. To help ensure that the faculty provide mentorship that is intentional and inclusive, the SCE will train each faculty mentor. Amber Paulson-Hofseth, FVCC's Director of Student Services (DSS), Janice Alexander, FVCC's Science & Engineering Division Chair, and Charles Katerba, an Assistant Professor of mathematics, will attend the 14th Annual Mentoring Conference at the University of New Mexico, hosted by UNM's Mentoring Institute in October 2022. These three will train the first cohort of faculty mentors using the knowledge gained at the conference, supplementing their training with resources from *The Science of Effective Mentorship in STEMM* (Byars-Winston et al., 2019). The training will include, but is not limited to, the role of the mentor as a facilitator, the role of identity in mentorship, strategies for inclusive and intentional mentorship, and successful mentor/mentee activities.

The SCE entails frequent meetings between the mentor and mentee, at least once every two weeks. This amount of contact time can lead to feelings of antipathy instead of trust if this time is not well spent (Cataldo, 2016). Thus, the SCE will train each faculty mentor on the use of various tools that help structure the mentoring relationship and create space in the relationship to "communicate expectations and request accountability" (Byars-Winston et al., 2019, pg. 107). Examples of such tools are mentorship maps, mentorship contracts, and individual development plans. These tools allow the mentor and mentee to tailor the relationship so that it best serves the mentee's personal and career goals. Mentors will write up a concise summary of the contract or tool that they decide to employ at the beginning of each term and share this summary with the DSS. At the end of each semester term, the mentors will meet with the DSS to check-in, evaluate their mentorship, and their mentee's progress according to the tool they have been employing.

In addition to the formal dyadic meetings, mentors and mentees will interact in more informal capacities in the learning communities. Mentors will attend the STEM colloquium and any of the learning community activities that take place before the colloquium. This will give scholars opportunities to interact with their mentors in a social capacity, providing further depth to their relationship. The scholars will also observe their mentors "in the wild" interacting with their peers. The learning communities give the mentors a chance to be ideal STEM role models for the scholars and to help construct a strong STEM community at FVCC.

The SCE will "establish and use structured feedback systems" to improve the mentor's abilities and the scholar's experience, per Recommendation 3 of *The Science of Effective Mentorship in STEMM* (Byars-Winston et al., 2019, pg. 187). The mentor's biannual self-evaluation with the DSS will be one prong of the SCE's ongoing mentorship evaluation. The SCE scholars will also evaluate their mentors each semester using a survey developed by the SCE based on the *Global Measure of Mentorship Practices Adapted for Use in Postsecondary STEMM Contexts* (Byars-Winston et al., 2019, pg. 137). The SCE will adapt the prompts so that they are appropriate for a rural community college. The Director of Student

Services will compile the scholars' responses for two purposes: to give each mentor individual feedback and to recognize common efficiencies and deficiencies among all SCE mentors. The DSS's findings will be incorporated into the next round of mentorship training.

Mental health and wellness coaching

There is a mental health crisis in rural Montana. The state has the highest suicide rate in the country and the 4th highest death rate from chronic liver disease and cirrhosis of the liver (National Center for Health Statistics, n.d.-a; NCHS, n.d.-b). The crisis has no boundary with respect to age, but its effects on young adults are unsettling. As an example, between June 2020 and October 2021, Kalispell, Montana witnessed nine suicides among high school students (Rein, 2021). Less than 50% of people in Montana with documented mental illness receive any form of treatment; the state ranks 39th in access to mental health services (rtor.org, n.d.). Students at FVCC are not insulated from this crisis. In fact, an internal Spring 2020 STEM student survey indicated that mental health is one of the SCE applicant pool's largest personal and professional obstacles (FVCC STEM, 2020).

To address this issue, FVCC offers free mental health counseling for any interested students. We suspect that the counseling services are underutilized, as they are in many rural areas and community colleges (Katz and Davison, 2014; Weinert and Long, 1987; Yorgason et al., 2010). Moreover, students only access the college's mental health services once a problem manifests itself in a sufficiently disruptive manner. The SCE project will attempt to reverse this process by encouraging SCE scholars to engage with our mental health counselor, Mandee Johnson, on a regular basis. Scholars will meet with Johnson in person at least once a month, with a possibility for more frequent virtual communication. The program will refer to these meetings as *wellness meetings* to destigmatize possible negative connotations associated with mental health help or counseling. Wellness meetings will focus on each student's individual needs, but may include stress management techniques, anxiety and depression mediation, strategies for adjusting to college and life changes, overcoming academic barriers to success, and cultivating a growth mindset. By maintaining close contact with SCE scholars, Johnson will provide students with tools, support, and strategies to mitigate and manage mental health crises before they become academically disruptive, thereby fostering academic persistence and resilience (Simpson-Kirkland, 1983).

There is an ever-growing body of literature that links mental health support with increased retention and graduation rates (Lee et al., 2009). The mechanisms underlying this link are perhaps not surprising: "poor mental health could decrease students' energy and concentration in school" which results in declining interest, engagement, and grades (Eisenberg et al., 2016, pg. 89). The SCE scholars' wellness meetings will include coaching to support resilience. The increase in resilience will allow the student "to maintain or recover good mental health in the face of adversity" (Eisenberg et al., 2016, pg. 88) and the resulting positive state of mental health will help the student maintain scholastic interest and engagement (Hartley, 2011). In section b. of this proposal, we saw that the hypothetical pool of SCE applicants from 2017 had earned, on average, 59 credits at FVCC, yet only 60% of the applicant pool graduated. This indicates a gap in resilience. Mandee Johnson's wellness meetings and coaching will foster resilience in SCE scholars and thus increase their graduation and transfer rates.

Johnson will be in close communication with each student's faculty mentor to discuss academic success and perceived sense of belonging while maintaining all appropriate counselor confidentiality boundaries. At the end of each term, SCE scholars will complete a mental health questionnaire developed by Johnson

and the project's external evaluator, MN Associates Inc., to measure students' well-being and sense of belonging. Johnson will then disaggregate these data and report them to the SCE project management team for analysis.

College Success (COLS) Class

The SCE aims to increase academic success and retention for academically talented STEM majors. Participation in learning communities has been shown to increase STEM course grades, GPA, sense of belonging, and academic integration (Solanki et al., 2019). STEM learning communities address psychosocial and academic development through factors such as self-regulation, STEM identity, metacognition, self-efficacy, and through interaction with peers and STEM faculty, staff, and professionals (Carrino and Gerace, 2016). Linking courses to form a learning community (Kern and Kingsbury, 2019) and offering a STEM skill-building course increased semester to semester persistence (Koch et al., 2018).

Each SCE cohort will participate in the Core Experience learning community during their first semester. Participants will be placed in the same section of college writing, WRIT 101, and COLS 107. In addition, a selection of standard entry level courses in mathematics and chemistry will be scheduled at a common time, along with other standard first-semester STEM courses, to maximize interaction with cohort peers.

COLS 107 will serve as the foundation course of the Core Experience learning community. This course will be team taught by the FVCC career advisor, student support staff, and a SCE STEM faculty mentor. Student learning outcomes include

- 1) Identify, locate, and effectively use essential college services and resources.
- 2) Describe the structure of the General Education curriculum and discuss its importance.
- 3) Define their purpose in pursuing a college education.
- 4) Demonstrate critical and creative thinking in written communication.
- 5) Identify strengths and understand how strengths can be best utilized in school and employment.
- 6) Outline the steps needed for successful transfer to a 4-year university.

COLS 107 for the SCE will integrate STEM career exploration with helping scholars better understand the structure of general education, the requirements for successfully transferring to a four-year university, and skills necessary for academic success. The course will include speakers from STEM industry and research. COLS 107 will be the first step in building a STEM identity and creating a community of STEM learners. This first-semester learning community is an important piece of increasing first- to second-semester STEM retention.

STEM Colloquium Class and Cohort Development

Building on the first semester Core Experience outcomes of fostering community, career exploration, and success skills, second-semester SCE scholars will participate in a 1-credit STEM colloquium course. The STEM colloquium course will maintain a direct link between cohort students, keeping them connected and deepening their shared experiences. This course is focused on exposing scholars to STEM professionals and their research; laying foundational skills in defining, framing and communicating scientific research; and the ethics of research. Studies have shown a high level of student satisfaction, higher scores on literature-based projects, comfort in pursuing undergraduate research, increased STEM identity, and easier STEM career decision making from STEM professional presentations and literature research courses (Kramer and Walston, 2019; Belser et al., 2018; King et al., 2020; Pan et al., 2021; Schneider et al., 2016).

The STEM colloquium class, taught by a SCE faculty mentor, will alternate between attending the STEM colloquium and addressing coursework that scaffolds foundational research skills. This new course will include both evaluative and participation-based components. The evaluative research skills curriculum includes the design of relevant speaker questions; the development of critical reading and thinking skills; the appreciation of the principles and methods used by the sciences to comprehend the natural world; the examination of the role of quantitative interpretations; the development of intellectual curiosity; the communication of scientific research; and an examination of the ethics of research. During STEM colloquium weeks, the scholars and their mentors will meet beforehand to discuss background information on the topic, strategies for understanding subject matter outside of one's area of expertise, and strategies for developing thoughtful, relevant questions for the speaker. These informal meetings provide a non-evaluative component strengthening our FVCC STEM community. The STEM colloquium course supports first- to second-year retention and persistence of SCE scholars.

f. Results from Prior NSF Support

NSF EAPSI Program: Dr. Charles Katerba (PI) received an NSF EAPSI award (#1713920, \$5400, 6/1/2017 - 5/31/2018), "EAPSI: An Investigation of Closed Surfaces in 3-manifolds via Character Varieties." The funding from this award allowed Katerba to travel to Sydney, Australia to begin a collaboration with Dr. Stephan Tillman and Dr. Alex Casella at the University of Sydney. This project was jointly funded by the Australian Academy of Science and resulted in one publication (listed below) along with an ongoing collaboration between Katerba, Casella, and Tillmann.

Intellectual merit: This project implemented a novel, algebraic approach to Culler-Shalen theory developed by Eric Chesebro to resolve two long-standing open questions in the field of low-dimensional topology. This approach may prove fertile for addressing further questions in the field.

Broader impacts: The EAPSI program introduced Katerba to many scientists, both domestic and international, and fostered his ability to collaborate and communicate effectively with scientists from diverse backgrounds. He also witnessed the effect that the presence or absence of a strong STEM community can have on scholars.

Publications produced under this award: Casella, Alex; Katerba, Charles; Tillmann, Stephan. "Ideal points of character varieties, algebraic non-integral representations, and undetected closed essential surfaces in 3-manifolds." *Proc. Amer. Math. Soc.* 148 (2020), no. 5, 2257–2271.

g. S-STEM Project Management Plan

PI Charles Katerba is an Assistant Professor of mathematics and statistics. He will be responsible for general project management. While this is not his first time as an NSF PI, this grant is much more substantial and of a different nature and scope from his previous funding. His roles in coordinating dual enrollment courses and serving on FVCC's data governance committee have prepared him for project management.

CoPI Janice Alexander is Division Chair of Science & Engineering and a Professor of chemistry and forensic science. She has served as CoPI on several NSF grants, a NASA EPSCoR grant, and an American Association of Community Colleges grant (all more than 5 years in the past). Janice has served as Chair and Councilor for the Montana Section of the American Chemical Society, as well as Chair of Institutional Effectiveness Peer Evaluation Teams for the Northwest Commission on Colleges and Universities. She will share general project management with PI Charles Katerba.

CoPI Amber Paulson-Hofseth is the Director of Student Services at FVCC. She will be integral in the training of faculty mentors and overall administration of the project. She will compile and organize the data collected from mentorship and wellness coaching.

Mandee Pancheri Johnson is the Mental Health Counselor and an advisor at FVCC. She will serve as the wellness coach for all SCE scholars and will help to generate surveys to assess mentorship and wellness coaching efficacy.

Faculty Mentors. The SCE has widespread support from the tenured and tenure-track STEM faculty at FVCC. In particular, the following faculty members have agreed to be SCE scholar mentors: Dr. Michael Severino (mathematics), Dr. Effat Rady (engineering), Dr. Heather Estrada (agricultural science), Dr. Anita Ho (geology/geography), Dr. Wendy Westbroek (microbiology), Dr. David Long (chemistry), Dr. Christina Relyea (natural resource science), Timothy Price (computer science/engineering), Jim Goudy (computer science), Laura Van de Kop (mathematics education), and Jim Boger (physics).

MN Associates, Inc. (MNA) is a consultant and an external evaluator of the SCE grant. They will complete a robust formative and summative evaluation of the grant that will provide timely feedback to the project team members (PI and CoPIs) to allow them to make programmatic changes as needed. MNA has extensive experience in evaluating NSF grants (47 to date) in 17 programs including six S-STEMs in Tracks 1-3 across the country. MNA will not only evaluate the SCE for its fidelity of planning and implementation across the grant years but will also measure student-level outcomes to study and measure the extent to which the SCE academic and co-curricular supports and interventions are improving the scholars' STEM identity, well-being, mental health and academic lives on campus and how those, in turn, are facilitating their retention and graduation as transfer students in various STEM careers.

h. Generation of Knowledge

Knowledge will be generated regarding the academic, social-emotional, and mental health/wellness supports that contribute to student persistence and retention, as well as how mentor/faculty trainings inform student success. The generation of knowledge will be guided by these questions:

- 1) In what ways do learning communities increase students' sense of belonging and identity in STEM?
- 2) In what ways does one-on-one faculty mentorship positively influence students' sense of belonging and identity in STEM?
- 3) Does wellness coaching increase a student's sense of well-being and resilience?
- 4) Does the SCE's holistic approach to student support(s) increase STEM graduation and retention rates?

These questions will be addressed using both primary (e.g., pre-post surveys and focus groups with the SCE scholars) and secondary data sources (institutional research data on retention and graduation). Due to a small sample size (3 cohorts, 10 students each for a total of 30 scholars), data analyses in the first 2 years will comprise descriptives/frequencies, correlations, and analyses of variance (ANOVA) and in the latter years, regression to measure "impacts and/or effects," if any. We are interested in measuring the relationships that may exist between the supports/interventions and scholars' outcomes—both cognitively (e.g., content knowledge, academic gains) and non-cognitively (e.g., affective behavioral changes such as sense of belonging, identity, well-being, and resilience among others). Validated surveys/tools (e.g., National Survey of Student Engagement, 2000; Tyler-Wood, 2010; Wilson, 2012) as well as those internally developed to better contextualize and assess SCE's core components, will be used throughout.

The NSSE survey is a national validated survey that has been in use since 2000 to measure college students' academic as well as co-curricular development on 20-items such as belonging, campus life, collaboration and engagement, interest, self-efficacy, and supports and resources (reliability alpha is 0.62 to 0.79). The **sTeM semantic survey** is a 25-item instrument that measures interest in science, technology, engineering and mathematics as well as interest in STEM careers more generally. The Career Interest Questionnaire is a 12-item instrument that measures interest in careers in broad science areas.

Data will be triangulated with SCE scholar focus groups and academic records, accessed each semester from FVCC IR, to delve deeper into the quality of academic as well as co-curricular supports and resources they are able to avail on campus and how those are affecting their academic pursuits. An IRB review will be completed before collecting any data.

i. Evaluation

MN Associates, Inc. (MNA), a small, woman-owned research and evaluation firm based in Northern Virginia with clients across the nation, will be engaged as the external evaluator of the SCE grant. MNA has been in business since 2004. Since its formation, the team has conducted business in 27 states, the District of Columbia and the US Virgin Islands and comprises four evaluators and an administrative staff. In addition to evaluating several NSF-funded grants—47 to date in 17 programs-- (e.g., AISL, Career, ATE, CREST, ECR CORE, INCLUDES/DDLP, ITEST, RET, NRT, HBCU UP, HSI-NSF, IUSE, MSP/STEM C, Noyce Scholarship, PREM, and six S-STEMs), the team has also completed evaluations for multiple DOL-funded TAACCCT grants in five states; teacher quality and preparation programs for several school districts, 2- and 4-year colleges and universities; and non-profit organizations. MNA's work is guided by the principles of American Evaluation Association (AEA). The formative and summative evaluation of PISC will be conducted by the MNA team led by Dr. Kavita Mittapalli.

The evaluation will be guided by a conceptual model based on elements of quality for evaluation approaches that are consistent with guidance provided by the Common Guidelines (USDE, 2013). Ongoing, external, iterative, critical oversight to this end will integrate the following components: 1) implementation monitoring of programmatic and research activities; 2) provision of timely, periodic feedback to inform improvement of those activities; and 3) summative reviews of the goals and quality of the work near its completion. Throughout the project period, MNA will employ a participatory, utilization-based, and collaborative approach, ensuring engagement and coordination between the advisory group and the researchers through all stages of the evaluation.

Evaluation data collection will include the following: 1) document and report reviews to systematically assess the project planning and development process(es), 2) review research data collection tools and provide feedback, 3) develop and administer surveys and conduct follow-up phone interviews with the PI, CoPIs, and other pertinent project staff, and 4) attend project meetings.

Throughout the project, MNA will compare the work-as-planned with the work-as-implemented across the grant years to determine the extent to which activities were planned and completed and expected outcomes were achieved. Stakeholder engagement will be assessed via online surveys to help gauge their level of participation, engagement, and overall satisfaction with SCE's goals and objectives, their roles and functions in the program and perceived achievement of said outcomes. Data will be triangulated using qualitative and quantitative methods to answer key questions to guide the evaluation process and presented in yearly formative feedback discussions. MNA will complete interim reports in years 1-5 and

provide a final evaluation report at the end of the grant period to support final performance reporting to NSF, ultimately addressing the following evaluation questions:

- 1) To what extent are components of the program design and research design consistent with expectations framed by the Common Guidelines for Education Research and Development?
- 2) With what quality and timeliness are research activities planned and implemented, relative to anticipated progress toward achievement of project goals?
- 3) What is the quality of outputs or products resulting from the research and development effort (e.g., program resources and intellectual properties, study designs, theoretical frameworks, and reports)?
- 4) What is the potential for broader impacts to be realized by the innovation being developed and studied (e.g., sustainability and scalability)?
- 5) What is the intellectual merit of the research and development effort, in terms of its contributions to understandings about learning?
- 6) In what ways is evaluation informing research and the program overall and vice versa?

The **formative evaluation** will focus on the implementation planning and process and provide just-in-time feedback to project staff. Essentially, during the first two years of the project, MNA will attend meetings and collect documents relating to implementation and “observe” project calls to better understand and assess the implementation process(es) and identify promising practices and challenges associated with it. MNA will produce and disseminate an annual survey to all pertinent project staff and faculty members. Analysis will focus on faculty and project staff perceptions of challenges and promising practices as well as offer a “snapshot” view of the planning and implementation processes. During the last three years of the project **summative evaluation**, survey questions will focus on faculty and staff members’ perceptions of the intended impact of the program on students, good/best practices, lessons learned, broader impact, scope of sustainability, and scalability.

j. Dissemination

The Project Management Team has a history of dissemination on campus, across Montana, and nationally. We will share our findings with local, regional and national audiences. Findings will be presented at campus in-service, through the campus Teaching and Learning Center, and published on the FVCC website. In addition, findings will be presented at the S-STEM Summit in Washington DC, at NORM (Northwest Regional Meeting of the American Chemical Society), and the Annual Meeting of the Pacific Northwest Section of the Mathematical Association of America. Locally, we will present our findings at the FVCC STEM colloquium and to the Flathead STEAM Alliance. Findings will be submitted for presentation nationally to the national American Chemical Society meeting, the Annual Mathematical Association of Two-Year Colleges national conference, and the American Association of Community Colleges Annual Meeting. In addition, an article will be submitted to the Journal of Chemical Education for publication.

k. Broader Impacts

Broader impacts include systemic impacts on the college community from staff/faculty training. In addition, this project will provide a model for local high schools and other colleges looking to support the mental health/wellness of students as part of a student success model. At a broader level, benefits include STEM student persistence and retention in rural college settings, stronger student workforce skills, and an increased number of STEM transfer students within the Montana University System. The project will contribute to the STEM workforce in northwest Montana that is projected to grow over the next decade.

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Effective 10/04/2021

NSF BIOGRAPHICAL SKETCH

OMB-3145-0058

NAME: Charles Katerba

POSITION TITLE & INSTITUTION: Assistant Professor at Flathead Valley Community College

A. PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.C.2.f.\(i\)\(a\)](#))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
Norther Arizona University	Flagstaff, AZ, USA	Mathematics	BS	2011
University of Montana	Missoula, MT, USA	Mathematics	MA	2013
University of Montana	Missoula, MT, USA	Mathematics	PhD	2017
Montana State University	Bozeman, MT, USA	Mathemataics	Post-doctoral training	2017-2019

B. APPOINTMENTS - (see [PAPPG Chapter II.C.2.f.\(i\)\(b\)](#))

From - To	Position Title, Organization and Location
2019 - Current	Assistant professor. Flathead Valley Community College. Kalispell, Montana.
2019	Visiting scholar - mathematics. University of Sydney. Sydney, New South Wales, Australia
2017 - 2019	Postdoctoral lecturer and scholar. Montana State University. Bozeman, Montana.
2017	NSF EAPSI Fellow visiting University of Sydney in Sydney, NSW and Monash University in Melbourne, VIC, Australia
2016	Visiting scholar - mathematics. Universite de Quebec a Montreal. Montreal, Quebec, Canada.

C. PRODUCTS - (see PAPPG Chapter II.C.2.f.(i)(c)) Products Most Closely Related to the Proposed Project

None.

Other Significant Products, Whether or Not Related to the Proposed Project

Casella, Alex; Katerba, Charles; Tillmann, Stephan Ideal points of character varieties, algebraic non-integral representations, and undetected closed essential surfaces in 3-manifolds. Proc. Amer. Math. Soc. 148 (2020), no. 5, 2257–2271.

Katerba, Charles. Modules, fields of definition, and the Culler-Shalen norm. Submitted for publication. Preprint available at <https://arxiv.org/abs/1805.04585>

D. SYNERGISTIC ACTIVITIES - (see PAPPG Chapter II.C.2.f.(i)(d))

Undergraduate research mentor at Flathead Valley Community College. Project title: Visualizing Kleinian Groups. Spring 2022.

Faculty representative on FVCC's Data Governance Committee. 2021-Present.

Glacier High School Ascent program efficacy analyst. Spring 2020 and Fall 2021.

Montana State University Department of Mathematical Sciences Directed Reading Program co-founder and mentor. 2018-2019.

Undergraduate research mentor at the University of Montana. 2016-2017.

Effective 10/04/2021

NSF BIOGRAPHICAL SKETCH

OMB-3145-0058

NAME: Janice Alexander

POSITION TITLE & INSTITUTION: Division Chair, Science & Engineering, Flathead Valley Community Coll

A. PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.C.2.f.\(i\)\(a\)](#))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
Michigan State University	Lansing, MI	Chemistry and Criminalistics	B.S.	1985
University of Virginia	Charlottesville, VA	Chemistry/Analytical Biochemistry	Ph.D.	1991
City of Hope Cancer Research Institute	Duarte, CA	Immunology/Molecular Biology		1991-1992

B. APPOINTMENTS - (see [PAPPG Chapter II.C.2.f.\(i\)\(b\)](#))

From - To	Position Title, Organization and Location
2021-current	Divison Chair, Science and Engineering, Flathead Valley Community College (FVCC), Kalispell, MT
2020-2021	Divison Chair, Mathematics and Science, Flathead Valley Community College (FVCC), Kalispell, MT
2012-current	Professor of Chemistry, Forensic Science, and Mathematics, FVCC, Kalispell, MT
2014	Visiting Scholar Chemistry and Forensic Science, University of Technology Sydney, Sydney, New South Wales, Australia
2013-2014	Science Department Chair, FVCC, Kalispell, MT
2010-2012	Co-Chair, Accreditation, FVCC, Kalispell, MT
2000-2003	Division Chair, Mathematics and Science, FVCC, Kalispell, MT
1997-2012	Tenured Instructor, Chemistry, Forensic Science, and Mathematics, Cell and Molecular Biology, FVCC, Kalispell, MT
1994-1997	Instructor, Chemistry, Forensic Science, Mathematics, Cell and Molecular Biology FVCC, Kalispell, MT
1992-1994	Assistant Professor, Chemistry, University of Wisconsin Center-Fox Valley, Menasha, WI
1991	Adjunct Faculty, Chemistry, Pasadena City College
1984	Intern, City of Albuquerque Crime Laboratory, Albuquerque, NM

C. PRODUCTS - (see PAPPG Chapter II.C.2.f.(i)(c)) Products Most Closely Related to the Proposed Project

Alexander, Janice. A Tool Box Approach for Student Success in Chemistry. Strategies Promoting Success of Two-Year College Students. Chapter 8, 2018, 133-142 ACS Symposium Series, Vol. 1280
DOI:10.1021/bk-2018-1280.ch008

Alexander, Janice and Julie Wenz. Serving Rural Northwestern Montana Through Online and Blended Chemistry Courses. Online Approaches to Chemical Education. Chapter 13, 2017, 165-177 ACS Symposium Series, Vol. 1261 DOI: 10.1021/bk-2017-1261.ch013

Alexander, Janice; Ashmore, Jason; Baker, Anthony and Scott Chadwick. NMR Spectroscopy in First-Year Chemistry at the University of Technology Sydney. NMR Spectroscopy in the Undergraduate Curriculum: First Year and Organic Chemistry Courses Volume 2, Chapter 2, 2016, 13-29 ACS Symposium Series, Vol. 1221 DOI: 10.1021/bk-2016-1221.ch002

Other Significant Products, Whether or Not Related to the Proposed Project

Alexander, Janice. "Fulfilling and Expanding the Mission of a Community College (1998) in Series on Service-Learning in the Disciplines; Environmental Studies Volume, (Ward, H. American Association of Higher Education)

D. SYNERGISTIC ACTIVITIES - (see PAPPG Chapter II.C.2.f.(i)(d))

Montana STEM Initiative Task Force 2011, Leadership Group 2012-2014

American Chemical Society, Montana Local Section, served in elected leadership positions 2007-2018.

NASA EPSCoR MSU subaward no. G217-12-4R1063: Improving Zinc-Air Productivity in Rechargeable Batteries (IZAP-R); PI, 2012 (Incorporating undergraduate research into the curriculum, collaborating with local industry)

NSF award no. DUE 0736662: NMR Spectroscopy: A Tool for Infusing Experiential Investigation into the Community College Chemistry Curriculum, Co-PI

NSF award no. DUE 9851025: FTIR: A Tool for Changing College and High School Chemistry Curricula to a Discovery Mode; Co-PI

Effective 10/04/2021

NSF BIOGRAPHICAL SKETCH

OMB-3145-0058

NAME: Amber Paulson

POSITION TITLE & INSTITUTION: Director of Student Services, Flathead Valley Community College

A. PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.C.2.f.\(i\)\(a\)](#))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
Colorado State University	Fort Collins, CO	English Literature and History	B.A.	2003
Colorado State University	Fort Collins, CO	English Literature and Women's Studies	M.A.	2005
Old Dominion University	Norfolk, VA	English Literature and Rhetoric Studies	Ph.D.	2020-current

B. APPOINTMENTS - (see [PAPPG Chapter II.C.2.f.\(i\)\(b\)](#))

From - To	Position Title, Organization and Location
2017-present	Director of Student Services, Flathead Valley Community College, Kalispell, MT
2015-2017	Director of the Learning Center, Flathead Valley Community College, Kalispell, MT
2016-present	Adjunct Instructor, Flathead Valley Community College, Kalispell, MT
2010-2015	Key Explore Lead Instructor, Colorado State University, CO
2007-2010	Academic Advisor, Colorado State University, CO
2008-2009	Adjunct Instructor, Colorado State University, CO
2005-2007	Humanities & Social Science Teacher, Mission Mountain School, Condon, MT

C. PRODUCTS - (see PAPPG Chapter II.C.2.f.(i)(c)) Products Most Closely Related to the Proposed Project

Other Significant Products, Whether or Not Related to the Proposed Project

D. SYNERGISTIC ACTIVITIES - (see PAPPG Chapter II.C.2.f.(i)(d))

2015: Colorado State University: 2015 Jack E. Cermak Advising Award

2013 Colorado State University: 2013 Division of Student Affairs Impact Award

2012, 2013, 2014: " Exploring & Changing Majors, " Colorado State University Campus Advisor

Training Present exploring majors resources and degree information to faculty and professional advisors across campus during the bi-annual advisor training program.

2013: "Create Your Story: The Narrative of an Undeclared Student Residential Learning Community " National Learning Communities Conference 2013: The Key Explore Community is focused on providing students who have not yet declared a major the opportunity to explore their options at Colorado State University.

**SUMMARY
PROPOSAL BUDGET**

YEAR 1

		FOR NSF USE ONLY			
ORGANIZATION	Flathead Valley Community College	PROPOSAL NO.		DURATION (months)	
		Proposed	Granted	AWARD NO.	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR					
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months			Funds Requested By proposer
		CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator		0.00	0.00	1.00	6,130
2. Janice Alexander - co-Principal Investigator		0.00	0.00	1.00	9,519
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	2.00	15,649
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (7) OTHER					3,500
TOTAL SALARIES AND WAGES (A + B)					19,149
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					3,575
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					22,724
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					6,890
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 0					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (0)					0
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					3,750
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					8,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					0
TOTAL OTHER DIRECT COSTS					11,750
H. TOTAL DIRECT COSTS (A THROUGH G)					41,364
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Other Personnel (Rate: 25.0000, Base: 3500) (Cont. on Comments Page)					
TOTAL INDIRECT COSTS (F&A)					4,787
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					46,151
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					46,151
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
ORG. REP. NAME* Charles Katerba		INDIRECT COST RATE VERIFICATION			
		Date Checked	Date Of Rate Sheet	Initials - ORG	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET COMMENTS - Year 1

**** I- Indirect Costs**

Senior Personnel (Rate: 25.0000, Base 15649)

**SUMMARY
PROPOSAL BUDGET**

YEAR 2

		FOR NSF USE ONLY			
ORGANIZATION		PROPOSAL NO.		DURATION (months)	
Flathead Valley Community College				Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AWARD NO.			
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months			Funds Requested By proposer
		CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator		0.00	0.00	1.00	6,252
2. Janice Alexander - co-Principal Investigator		0.00	0.00	1.00	9,710
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	2.00	15,962
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (7) OTHER					3,500
TOTAL SALARIES AND WAGES (A + B)					19,462
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					3,731
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					23,193
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					1,010
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 50,000					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (10)		TOTAL PARTICIPANT COSTS			50,000
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					2,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					14,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					100
TOTAL OTHER DIRECT COSTS					16,100
H. TOTAL DIRECT COSTS (A THROUGH G)					90,303
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Other Personnel (Rate: 25.0000, Base: 3500) (Cont. on Comments Page)					
TOTAL INDIRECT COSTS (F&A)					4,866
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					95,169
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					95,169
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba		Date Checked	Date Of Rate Sheet		Initials - ORG

SUMMARY PROPOSAL BUDGET COMMENTS - Year 2

**** I- Indirect Costs**

Senior Personnel (Rate: 25.0000, Base 15962)

**SUMMARY
PROPOSAL BUDGET**

YEAR 3

				FOR NSF USE ONLY			
				PROPOSAL NO.		DURATION (months)	
				Proposed		Granted	
ORGANIZATION				AWARD NO.			
Flathead Valley Community College							
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR							
Charles W Katerba							
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months			Funds Requested By proposer
				CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator				0.00	0.00	1.50	9,566
2. Janice Alexander - co-Principal Investigator				0.00	0.00	1.00	9,904
3.							
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.00	2.50	19,470
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL SCHOLARS				0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (7) OTHER							3,500
TOTAL SALARIES AND WAGES (A + B)							22,970
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							4,518
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							27,488
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)							3,480
2. INTERNATIONAL							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 100,000							
2. TRAVEL 0							
3. SUBSISTENCE 0							
4. OTHER 0							
TOTAL NUMBER OF PARTICIPANTS (20)				TOTAL PARTICIPANT COSTS			100,000
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							3,750
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							0
3. CONSULTANT SERVICES							14,000
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							200
TOTAL OTHER DIRECT COSTS							17,950
H. TOTAL DIRECT COSTS (A THROUGH G)							148,918
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Other Personnel (Rate: 25.0000, Base: 3500) (Cont. on Comments Page)							
TOTAL INDIRECT COSTS (F&A)							5,743
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							154,661
K. FEE							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							154,661
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba				FOR NSF USE ONLY			
				INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba				Date Checked	Date Of Rate Sheet		Initials - ORG

SUMMARY PROPOSAL BUDGET COMMENTS - Year 3

**** I- Indirect Costs**

Senior Personnel (Rate: 25.0000, Base 19470)

**SUMMARY
PROPOSAL BUDGET**

YEAR 4

		FOR NSF USE ONLY			
ORGANIZATION		PROPOSAL NO.		DURATION (months)	
Flathead Valley Community College				Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AWARD NO.			
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months			Funds Requested By proposer
		CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator		0.00	0.00	1.50	9,757
2. Janice Alexander - co-Principal Investigator		0.00	0.00	1.00	10,102
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	2.50	19,859
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (0) OTHER					0
TOTAL SALARIES AND WAGES (A + B)					19,859
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,006
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					23,865
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					1,049
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 150,000					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (30)		TOTAL PARTICIPANT COSTS			150,000
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					350
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					14,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					300
TOTAL OTHER DIRECT COSTS					14,650
H. TOTAL DIRECT COSTS (A THROUGH G)					189,564
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Senior Personnel (Rate: 25.0000, Base: 19859)					
TOTAL INDIRECT COSTS (F&A)					4,965
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					194,529
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					194,529
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba		Date Checked	Date Of Rate Sheet		Initials - ORG

**SUMMARY
PROPOSAL BUDGET**

YEAR 5

		FOR NSF USE ONLY			
ORGANIZATION		PROPOSAL NO.		DURATION (months)	
Flathead Valley Community College				Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AWARD NO.			
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months			Funds Requested By proposer
		CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator		0.00	0.00	1.50	9,952
2. Janice Alexander - co-Principal Investigator		0.00	0.00	1.00	10,304
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	2.50	20,256
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (0) OTHER					0
TOTAL SALARIES AND WAGES (A + B)					20,256
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					4,187
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					24,443
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					6,000
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 100,000					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (20)		TOTAL PARTICIPANT COSTS			100,000
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					350
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					14,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					200
TOTAL OTHER DIRECT COSTS					14,550
H. TOTAL DIRECT COSTS (A THROUGH G)					144,993
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Senior Personnel (Rate: 25.0000, Base: 20256)					
TOTAL INDIRECT COSTS (F&A)					5,064
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					150,057
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					150,057
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba		Date Checked	Date Of Rate Sheet		Initials - ORG

**SUMMARY
PROPOSAL BUDGET**

YEAR 6

		FOR NSF USE ONLY			
ORGANIZATION		PROPOSAL NO.		DURATION (months)	
Flathead Valley Community College				Proposed	Granted
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AWARD NO.			
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months			Funds Requested By proposer
		CAL	ACAD	SUMR	Funds granted by NSF (if different)
1. Charles W Katerba - Principal Investigator		0.00	0.00	1.50	10,151
2. Janice Alexander - co-Principal Investigator		0.00	0.00	1.50	15,765
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	3.00	25,916
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (0) OTHER					0
TOTAL SALARIES AND WAGES (A + B)					25,916
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					5,487
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					31,403
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					7,100
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 50,000					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (10)		TOTAL PARTICIPANT COSTS			50,000
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					350
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					14,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					100
TOTAL OTHER DIRECT COSTS					14,450
H. TOTAL DIRECT COSTS (A THROUGH G)					102,953
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Senior Personnel (Rate: 25.0000, Base: 25916)					
TOTAL INDIRECT COSTS (F&A)					6,479
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					109,432
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					109,432
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba		Date Checked	Date Of Rate Sheet		Initials - ORG

**SUMMARY
PROPOSAL BUDGET**

Cumulative

ORGANIZATION		FOR NSF USE ONLY			
		PROPOSAL NO.	DURATION (months)		
Flathead Valley Community College		Proposed	Granted		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR		AWARD NO.			
Charles W Katerba					
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
		CAL	ACAD		
1. Charles W Katerba - Principal Investigator		0.00	0.00	8.00	51,808
2. Janice Alexander - co-Principal Investigator		0.00	0.00	6.50	65,304
3.					
4.					
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)		0.00	0.00	0.00	0
7. (2) TOTAL SENIOR PERSONNEL (1 - 6)		0.00	0.00	14.50	117,112
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL SCHOLARS		0.00	0.00	0.00	0
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)		0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS					0
4. (0) UNDERGRADUATE STUDENTS					0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0
6. (21) OTHER					10,500
TOTAL SALARIES AND WAGES (A + B)					127,612
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					25,504
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					153,116
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT					0
E. TRAVEL 1. DOMESTIC (INCL. U.S. POSSESSIONS)					25,529
2. INTERNATIONAL					0
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ 450,000					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (90)					450,000
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES					10,550
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0
3. CONSULTANT SERVICES					78,000
4. COMPUTER SERVICES					0
5. SUBAWARDS					0
6. OTHER					900
TOTAL OTHER DIRECT COSTS					89,450
H. TOTAL DIRECT COSTS (A THROUGH G)					718,095
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)					31,904
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					749,999
K. FEE					0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					749,999
M. COST SHARING PROPOSED LEVEL \$ 0		AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Charles W Katerba		FOR NSF USE ONLY			
		INDIRECT COST RATE VERIFICATION			
ORG. REP. NAME* Charles Katerba		Date Checked	Date Of Rate Sheet	Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification

A. Senior Personnel

FVCC faculty are on 9-month contracts. All salaries are commensurate with the current faculty collective bargaining agreement (CBA). As per FVCC definition, a year is defined as a 12-month period running from July 1-June 30. A 2% yearly salary increase is factored into the budget.

PI, Charles Katerba: Funds are requested for the equivalent of 1.0 person-month salary during the summer for years 1-2 of the project and 1.5 person-months salary for Years 3-6 of the grant to provide the PI time necessary to carry out the tasks to fulfill the goals and objectives as described in the Project Description. The 9-month academic year contract salary for the PI is \$55,166.80. One month of summer support in Year 1 is \$6,130.

The cumulative total for the six years of the project is: \$51,809.

CoPI, Janice Alexander: Funds are requested for the equivalent of 1.0 person-month salary during the summer for Years 1-5 of the grant and 1.5 person-months salary for Year 6 of the grant to provide the coPI time necessary to carry out the tasks to fulfill the goals and objectives as described in the Project Description. The 9-month academic year contract salary for the coPI is \$85,673.34. One month of summer support in Year 1 is \$9,519.

The cumulative total for the six years of the project is: \$65,304.

B. Other Personnel

Faculty Stipends - Mentor Training: Funds are requested in Years 1, 2, and 3 for 5 faculty plus the PI and coPI to participate in a 1.5-day mentor training program. Each faculty member will receive a stipend of \$500.

C. Fringe Benefits

Fringe benefits for full-time faculty at FVCC are set per the union CBA. Teachers Retirement System (TRS) benefits typically increase 0.5% per year. Benefits include TRS, unemployment, workers compensation, Medicare, 403B. The rate is 18.67% for Year 1 with an additional 0.5% per year added on. Fringe benefits are calculated for both senior personnel salary and other personnel stipends.

D. Equipment

No funds are requested for equipment.

E. Travel

Funds are requested in Year 1 for the PI and coPIs to attend the 14th Annual Mentoring Conference of the University of New Mexico Mentoring Institute October 24th-28th, 2022.

\$6,890

Funds are requested in Years 2, 4 and 6 for PI Charles Katerba to attend the S-STEM Summit in Washington D. C

Year 2: \$1,010

Year 4: \$1,049

Year 6: \$1,100

Funds are requested in Years 3, 5, and 6 for members of the PI team to attend and present at conferences, for example the national American Chemical Society (ACS) meeting and the Annual Mathematics Association of Two-Year Colleges national conference.

Year 3: \$3,481

Year 5: \$6,000

Year 6: \$6,000

Airfare from Kalispell, Montana is significantly higher than from more urban areas.

F. Participant Support Costs

Scholarships for SCE Scholars: Scholarships are requested for 3 cohorts of 10 students, for three years of attendance. This calculation is an average; thus, the plan will be flexible to provide actual scholarships matching unmet need higher or lower than the average. No scholar will receive more than \$10,000 each academic year. Scholarships will begin in Year 2 of the grant.

Year 2: \$50,000

Year 3: \$100,000

Year 4: \$150,000

Year 5: \$100,000

Year 6: \$50,000

G. Other Direct Costs

G.1 Materials and Supplies

Funds are requested for a S-STEM Scholar recruitment effort including mailings to high school students across Montana, as well as a social media campaign. With cohorts starting in Years 2, 3, and 4 of the project, \$2,000 per year are requested for Years 1, 2, and 3 for recruitment and survey materials and supplies. A social media campaign is \$500, and the remainder will be for the postage, printing, paper costs of mailings and surveys. \$350 is requested for years 4, 5, and 6 for materials and supplies for surveys and school mailings.

Funds are requested to create a recruitment video for the SCE project to be displayed on the FVCC website and shown in high schools across Montana by FVCC Recruitment Coordinator Cole Dykhuizen. A video will be created in Year 1, then updated in Year 3 once scholar's stories can be added. The video costs will be \$1750 in both Year 1 and Year 3.

G.3 Consultant Services

Consultant/Contractual Services: MN Associates, Inc. (MNA) will coordinate and execute the project's external evaluation. They will be paid \$8,000 in Year 1 of the grant and \$14,000 each year for Years 2 through 6 of the project.

G.6 Other

Funds are requested to provide survey incentives to scholars for a yearly survey. Students will be given a \$10 campus gift card.

\$10 incentive/student/survey

Year 2: 10 students x 1 survey x \$10 = \$100

Year 3: 20 students x 1 survey x \$10 = \$200

Year 4: 30 students x 1 survey x \$10 = \$300

Year 5: 20 students x 1 survey x \$10 = \$200

Year 6: 10 students x 1 survey x \$10 = \$100

H. Total Direct Costs

The annual sum of the direct costs, sections A. through G., are

Year 1: \$41,364

Year 2: \$90,303

Year 3: \$148,918

Year 4: \$189,564

Year 5: \$144,993

Year 6: \$102,953

I. Indirect Costs

FVCC's federally mandated indirect cost rate is 25.0 % of compensation (senior personnel and other personnel), excluding fringe benefits. Applying this to the monetary values in sections A. and B. gives the following total indirect costs each year:

Year 1: \$4,787

Year 2: \$4,866

Year 3: \$5,743

Year 4: \$4,965

Year 5: \$5,064

Year 6: \$6,479

J. Total Direct and Indirect Costs

The annual sums of the direct and indirect costs are:

Year 1: \$46,151

Year 2: \$95,169

Year 3: \$154,661

Year 4: \$194,529

Year 5: \$150,057

Year 6: \$109,432

*PI/co-PI/Senior Personnel Name: Janice Alexander

***Required fields**

Note: NSF has provided 15 project/proposal and 10 in-kind contribution entries for users to populate. Please leave any unused entries blank.

Project/Proposal Section:

Current and Pending Support includes all resources made available to an individual in support of and/or related to all of his/her research efforts, regardless of whether or not they have monetary value.^[1] Information must be provided about all current and pending support, including this project, for ongoing projects, and for any proposals currently under consideration from whatever source, irrespective of whether such support is provided through the proposing organization or is provided directly to the individual. This includes, for example, Federal, State, local, foreign, public or private foundations, non-profit organizations, industrial or other commercial organizations, or internal funds allocated toward specific projects. Concurrent submission of a proposal to other organizations will not prejudice its review by NSF, if disclosed.^[2]

[1] If the time commitment or dollar value is not readily ascertainable, reasonable estimates should be provided.

[2] The Biological Sciences Directorate exception to this policy is delineated in PAPPG Chapter II.D.2.

Projects/Proposals

1.*Project/Proposal Title : S-STEM: The STEM Core Experience

*Status of Support : Current Pending Submission Planned Transfer of Support

Proposal/Award Number (if available): 8197398

*Source of Support: National Science Foundation

*Primary Place of Performance : Flathead Valley Community College

Project/Proposal Start Date (MM/YYYY) (if available) : 07/2022

Project/Proposal End Date (MM/YYYY) (if available) : 06/2028

*Total Award Amount (including Indirect Costs): \$ 749,999

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2022	2.00	4. 2025	2.00
2. 2023	2.00	5. 2026	2.50
3. 2024	2.00		

*Overall Objectives : The STEM Core Experience will support low-income, high-talent STEM students at Flathead Valley Community College (FVCC). The project will provide financial support through needs-based scholarship. Scholars will receive mental health and wellness support from FVCC's trained clinician. The project will foster the scholars' sense of belonging and identity in STEM through the development of learning communities and faculty mentorship. These interventions will increase retention and persistence.

*Statement of Potential Overlap : This project is proposed herein.

*PI/co-PI/Senior Personnel Name: Charles Katerba

***Required fields**

Note: NSF has provided 15 project/proposal and 10 in-kind contribution entries for users to populate. Please leave any unused entries blank.

Project/Proposal Section:

Current and Pending Support includes all resources made available to an individual in support of and/or related to all of his/her research efforts, regardless of whether or not they have monetary value.^[1] Information must be provided about all current and pending support, including this project, for ongoing projects, and for any proposals currently under consideration from whatever source, irrespective of whether such support is provided through the proposing organization or is provided directly to the individual. This includes, for example, Federal, State, local, foreign, public or private foundations, non-profit organizations, industrial or other commercial organizations, or internal funds allocated toward specific projects. Concurrent submission of a proposal to other organizations will not prejudice its review by NSF, if disclosed.^[2]

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*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2022	2.00	4. 2025	2.50
2. 2023	2.50	5. 2026	2.50
3. 2024	2.50		

*Overall Objectives : The STEM Core Experience will support low-income, high-talent STEM students at Flathead Valley Community College (FVCC). The project will provide financial support through needs-based scholarship. Scholars will receive mental health and wellness support from FVCC's trained clinician. The project will foster the scholars' sense of belonging and identity in STEM through the development of learning communities and faculty mentorship. These interventions will increase retention and persistence.

*Statement of Potential Overlap : This project is proposed herein.

*PI/co-PI/Senior Personnel Name: Amber Paulson-Hofseth

***Required fields**

Note: NSF has provided 15 project/proposal and 10 in-kind contribution entries for users to populate. Please leave any unused entries blank.

Project/Proposal Section:

Current and Pending Support includes all resources made available to an individual in support of and/or related to all of his/her research efforts, regardless of whether or not they have monetary value.^[1] Information must be provided about all current and pending support, including this project, for ongoing projects, and for any proposals currently under consideration from whatever source, irrespective of whether such support is provided through the proposing organization or is provided directly to the individual. This includes, for example, Federal, State, local, foreign, public or private foundations, non-profit organizations, industrial or other commercial organizations, or internal funds allocated toward specific projects. Concurrent submission of a proposal to other organizations will not prejudice its review by NSF, if disclosed.^[2]

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*Total Award Amount (including Indirect Costs): \$ 749,999

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2022	0.50	4. 2025	0.50
2. 2023	0.50	5. 2026	0.50
3. 2024	0.50		

*Overall Objectives : The STEM Core Experience will support low-income, high-talent STEM students at Flathead Valley Community College (FVCC). The project will provide financial support through needs-based scholarship. Scholars will receive mental health and wellness support from FVCC's trained clinician. The project will foster the scholars' sense of belonging and identity in STEM through the development of learning communities and faculty mentorship. These interventions will increase retention and persistence.

*Statement of Potential Overlap : This project is proposed herein.

Facilities, Equipment, and Other Resources

Personnel Resources

Senior Personnel

PI Dr. Charles Katerba is an Assistant Professor of mathematics. He will serve as the primary manager of all aspects of this project. He will lead monthly Project Management Team (PMT) meetings, coordinate faculty mentor training, lead the PMT in the application review and scholar selection process, and help to pair faculty mentors with STEM Core Experience (SCE) scholars. Katerba will serve as the primary point of contact with MN Associates Inc. (MNA), the project's external evaluator, and will communicate and share data with them. He will also mentor SCE scholars throughout the duration of the project.

CoPI Dr. Janice Alexander is a Professor of Chemistry and the chair of the Science and Engineering Division at FVCC. She will assist Katerba with all aspects of general project management. She will attend and take minutes at all PMT meetings, help facilitate mentor trainings, participate in the PMT application review and scholar selection process, and assist in mentor/mentee pairing. Alexander will help organize the COLS course and organize common course meeting times to help develop learning communities. She will also mentor SCE scholars throughout the project.

CoPI Amber Paulson-Hofseth is the Director of Student Services at FVCC. Paulson-Hofseth will help manage and facilitate faculty mentorship and mental health/wellness coaching for the SCE. She will help train faculty mentors and hold evaluative check-ins with each mentor at the end of every semester. Paulson-Hofseth will compile survey data from mentors and scholars to help evaluate the efficacy of the SCE's interventions. Paulson-Hofseth will serve the STEM administrator role on the PMT.

MN Associates, Inc. (MNA), led by Dr. Kavita Mittapalli, will serve as the external evaluator of this project. They will attend the monthly PMT meetings, providing commendations and recommendations. MNA will assist the PMT with knowledge generation, as outlined in the Project Description. Throughout the program, they will provide formative and summative evaluations to the PMT to help the SCE make programmatic changes as needed.

Mandee Pancheri Johnson is the mental health counselor at FVCC. Her primary role will be to meet with each SCE scholar at least once a month for wellness coaching and mental health support. Johnson will also assist in the selection of scholars and in the pairing of faculty mentors with SCE scholars. She will work with MNA to develop scholar surveys to help evaluate the efficacy of mentorship and mental health/wellness counseling. She will report this data to her direct supervisor, Paulson-Hofseth.

Other Project Personnel

Crystal Morris is the Director of Financial Aid at FVCC. She will work with the PMT on SCE scholar selection and on determining each scholar's unmet financial need. She will also assist scholars with the scholarship process and oversee the administration and distribution of the S-STEM scholarships.

Cole Dykhuizen is a Student Recruitment Coordinator at FVCC. He will work collaboratively with the SCE PMT to develop and distribute recruitment materials for the SCE. He will provide quarterly reports to the PMT on recruitment efforts and efficacy.

Tom Ritzdorf is the Vice Board Chair of the Flathead STEAM Alliance. He will work with Dykhuizen and the PMT to incorporate the SCE into STEAM Alliance activities and vice versa. Ritzdorf will also help connect the SCE PMT with STEM career and industry personnel in the region.

Faculty Mentors

In addition to Dr. Katerba (PI) and Dr. Alexander (CoPI), the following tenured or tenure-track STEM faculty have committed to serving as faculty mentors for SCE scholars: Dr. Michael Severino (mathematics), Dr. Effat Rady (engineering), Dr. Heather Estrada (agricultural science), Dr. Anita Ho (geology/geography), Dr. Wendy Westbroek (microbiology), Dr. David Long (chemistry), Dr. Christina Relyea (natural resource science), Timothy Price (computer science/engineering), Jim Goudy (computer science), Laura Van de Kop (mathematics), and Jim Boger (physics).

STEM Colloquium

Professor Jim Boger and Assistant Professor Timothy Price coordinate and run FVCC's STEM colloquium, which will serve as a cornerstone for community and identity building for the SCE scholars. Boger and Price recruit regional, state-wide, and nationally recognized STEM professionals to present their research to STEM students and faculty.

Facilities and Equipment

STEM Tutoring Center

FVCC has a robust STEM Tutoring Center (STC) open at least 5 days a week to any student at no cost. The STC encourages students to use the space as a gathering place for study, so SCE scholars will be able to extend their learning community to more informal settings in the STC. Of course, the STC will also provide tutoring for any scholar who needs it.

Laboratories

The Science/Engineering and Math Divisions at FVCC are all located in Ross Hall. In this building, students will have access to biology/microbiology, physics, engineering, chemistry, botany, and geology labs that all contain high quality equipment. SCE scholars will use these facilities in their coursework and, possibly, in undergraduate research.

Computer access

FVCC has many desktop computers available for student use. Ross Hall has various computer labs for STEM students and numerous classrooms are equipped with desktops loaded with essential STEM software (e.g., MATLAB, CAD, R, etc.). Students may also check Chromebooks out from FVCC's Media Services department to gain computer access from home.

Data Management Plan

Types of data

The STEM Core experience (SCE) project will generate numerical and categorical data about each scholar to assess program efficacy. The project will also generate statistical analyses of this data. The data will be generated through two primary means: institutional database queries and surveys. The queries will be requested, approved, and then executed by Flathead Valley Community College's IR team; these queries will provide data to help measure SCE scholar's persistence, retention, graduation, and transfer rates. CoPI Amber Paulson and mental health specialist Mandee Johnson will work with our external evaluator, MN Associates Inc. (MNA), to generate surveys that help measure the efficacy of the program's interventions, as outlined in the Project Description. All data will be kept anonymous and confidential, using randomized keys to pair data when necessary to maintain confidentiality. FVCC will abide by all FERPA regulations regarding student privacy while collecting, analyzing, and disseminating project data. An IRB review will be completed before collecting any data.

Data format and storage

Query/survey data and the results of statistical analyses will be stored as either Excel or CSV files in two separate locations: 1) a Google Drive folder and 2) a server local to FVCC managed by FVCC's Information Technology Department (IT). We will use the Google Drive folder to facilitate data transmission between the Project Management Team at FVCC and our external evaluator MNA. This folder will only be accessible by the PMT. The PMT will also back up the data on the local server. Data stored on the server will only be accessible to the PMT from the college. The PMT will back up the Google Drive folder on the local server at least once a month.

Upon completion of the project, the PMT will review all data collected. They will determine what data may have long-term value for the faculty and administration at FVCC. This data will be stored for at least 5 years after the completion of the project on the server mentioned above.

Data governance

FVCC's data governance committee has worked with IT to streamline the data request process. A request for SCE project data from anyone outside of the PMT will be made to the IT department. IT will then consult with the PMT to reach a decision on the data request. The PMT and IT will follow the data access guidelines set forth by FVCC's data governance committee. Electronic copies of any requested data will be shared with the requesters. Upon completion of the project, SCE data requests will be handled by IT.

Dissemination

The PIs will disseminate the results of the SCE during the project and at its conclusion. During the project, they will share results with the faculty and administration at campus in-service meetings, through the campus' Teaching and Learning Center, and at the FVCC STEM colloquium. The PIs will also present the SCE findings at regional and national chemistry and mathematics conferences. On a national scale, the PIs will either give a presentation or prepare a poster for the S-STEM Summit in Washington DC. The PIs may also submit an article to the Journal of Chemical Education for publication.

Project Details

Name of institution	Flathead Valley Community College
Anticipated number of unique scholars	30
Anticipated average annual amount of each scholarship	\$5,000
Anticipated number of years of scholarship support per scholar	3

Name of degree on diploma awarded to scholars:
Associate of Science (A.S.)

STEM Career Projections



Demand for STEM Workers Nationwide

According to the U.S. Bureau of Labor Statistics, STEM careers are expected to grow 8% by 2029, which is more than double the expected 3.7% growth for all occupations.^[1]

Demand for STEM Workers in Montana

Careers in the STEM field are among the fastest growing, as well as highest paying, occupations in Montana. The average wage for STEM professions across the state is \$70,000, which is almost double Montana's median wage of \$37,860.

The two STEM disciplines with the highest number of positions opening each year are math, 2,980 positions, and computer science, 2,610 positions. The professional, scientific and technical services industry is expected to be "one of the fastest growing industries over the next ten years", and this industry is one of the highest paying in the state.^[2]

Figure 1 highlights the STEM jobs with their projected openings over the 2020-2030 period specific to the Northwest Montana region, where FVCC is located.

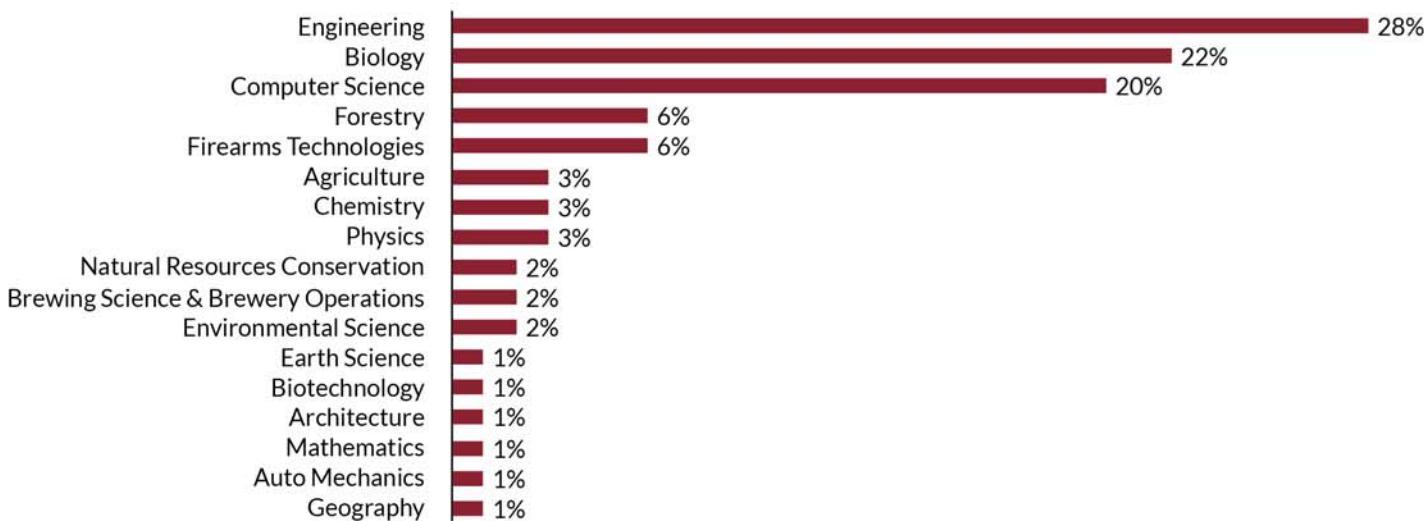
Figure 1: Northwest MT Jobs in the STEM field with the Most Projected Job Openings, 2020-2030				
	Occupation	Minimum Education	Annual Openings	2020 MT Annual Median Wage
1	Civil Engineers	Bachelor's	24	\$76,520
2	Biological Technicians	Bachelor's	21	\$34,920
3	Biological Scientists, All Other	Bachelor's	19	\$70,420
4	Computer and Information Systems Managers	Bachelor's	18	\$107,050
5	Zoologists and Wildlife Biologists	Bachelor's	16	\$65,270
6	Mechanical Engineers	Bachelor's	15	\$72,430
7	Conservation Scientists	Bachelor's	14	\$70,330
8	Foresters	Bachelor's	13	\$57,790
9	Architects, Except Landscape and Naval	Bachelor's	13	\$66,090
10	Surveyors	Bachelor's	10	\$66,130
11	Microbiologists	Bachelor's	10	\$92,780
12	Electrical Engineers	Bachelor's	10	\$82,340
13	Civil Engineering Technicians	Associate's	7	\$40,000
14	Environmental Scientists and Specialists	Bachelor's	6	\$61,610
15	Industrial Engineers	Bachelor's	5	\$101,730
16	Chemical Technicians	Associate's	5	\$56,070
17	Environmental Engineering Technicians	Associate's	4	\$47,460
18	Physical Scientists, All Other	Bachelor's	4	\$66,980
19	Soil and Plant Scientists	Bachelor's	4	\$61,720
20	Forensic Science Technicians	Bachelor's	4	\$65,290
21	Chemists	Bachelor's	4	\$63,930
22	Hydrologists	Bachelor's	4	\$73,300
23	Electrical and Electronics Engineering Technicians	Associate's	4	\$70,000
24	Engineers, All Other	Bachelor's	3	\$84,040

Source: Montana Department of Labor and Industry Employment Projections, 2020-2030. Excludes occupations from health, management, business and finance, sales, and education/library occupations groups.

Student Interest

Students at FVCC who are pursuing an Associate of Science degree have the option to declare an academic focus. The STEM-specific academic programs chosen by FVCC students over the last three academic years are detailed below. Computer science, engineering, and biology are the top chosen programs, which correspond to the positions with the most projected openings.

Declared Academic Programs of AS Degree-Seeking Students



[1] Alan Zilberman and Lindsey Ice, "Why computer occupations are behind strong STEM employment growth in the 2019-29 decade," Beyond the Numbers: Employment & Unemployment, vol. 10, no. 1 (U.S. Bureau of Labor Statistics, January 2021), <https://www.bls.gov/opub/btn/volume-10/why-computer-occupations-are-behind-strong-stem-employment-growth.htm>.

[2] Nick Holom and Rob Marvin, "Projections 2020-2030," Montana Employment Projections 2020-2030 (Montana Department of Labor & Industry), https://lmi.mt.gov/_docs/Publications/LMI-Pubs/Labor-Market-Projections2018-28.pdf.

February 8,2022

National Science Foundation

Dear NSF Reviewers,

On behalf of financial aid office at Flathead Valley Community College, we enthusiastically support the college's NSF S-Stem Grant proposal. More importantly, we understand the grant guidelines and requirements and will ensure that those guidelines and requirements are adhered to as outlined below.

First, the financial aid department will verify that all grant participants meet and maintain financial eligibility. Specifically, the department will confirm that each grant participant completed the Free Application of Federal Student Aid (FAFSA) each year, validate Pell eligibility, and attest that each scholarship recipient meets the minimum GPA requirement of 2.75 and is enrolled in at least 6 credits.

Each participant will be low-income. FVCC defines low-income as students eligible for a Pell grant as determined by the FAFSA. Currently, to be classified as low-income, all grant participants enrolled in 12 or more credits must have an EFC of 5846 or less. Participants enrolled part-time (6-8 credits) will have an EFC of 5200 or less.

Furthermore, the Financial Aid Office will award the S-STEM scholarship as a "last dollar scholarship" after all other grants and scholarships for which the participant qualifies have been awarded.

Each participant will be reviewed for unmet need using the following calculation excluding student loans and work study:

Cost of Attendance (COA) - Estimated Family Contribution (EFC) - grants and scholarships = Unmet need.

The cost of attendance is based on the total amount it will cost a student to attend FVCC, including tuition and fees, room (on- or off-campus) and board, allowances for books supplies, transportation, and other miscellaneous expenses. Note, the financial aid office will not include student loans or work study funds when determining each participant's unmet need. Additionally, the S-STEM scholarships will not exceed \$10,000 per year per participant. However, based on previous calculations, we anticipate the average annual scholarship per participant to be \$5,000.

In closing, we look forward to partnering with our campus colleagues and supporting the S-STEM project as described in the proposal. From our experience and research, we know that our students who receive a scholarship are more likely to persist than those students without financial support. We eagerly await the opportunity to further support our STEM students.

Sincerely,

Crystal Morris
Director of Financial Aid



MNA

MN Associates, Inc.
www.mnassociatesinc.com

Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

Thank you,

Kavita Mittapalli, Ph.D.
CEO, MN Associates, Inc.

Effective 10/04/2021

NSF BIOGRAPHICAL SKETCH

OMB-3145-0058

NAME: Kavita Mittapalli

POSITION TITLE & INSTITUTION: CEO, MN Associates, Inc.

A. PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.C.2.f.\(i\)\(a\)](#))

INSTITUTION	LOCATION	MAJOR/AREA OF STUDY	DEGREE (if applicable)	YEAR (YYYY)
Banaras Hindu University	Varanasi, India	Agricultural Sciences	B.S	1997
George Mason University	Fairfax, VA	Applied Sociology	M.A.	2002
George Mason University	Fairfax, VA	Research Design and Methodology	Ph.D.	2008

B. APPOINTMENTS - (see [PAPPG Chapter II.C.2.f.\(i\)\(b\)](#))

From - To	Position Title, Organization and Location
December 2004-present	CEO MN Associates, Inc. Washington D.C.
November 2002-November 2004	Research Assistant RMC Research Corporation Arlington, VA
January 2000-October 2002	Research Assistant NCCEP Washington D.C.

C. PRODUCTS - (see PAPPG Chapter II.C.2.f.(i)(c) Products Most Closely Related to the Proposed Project

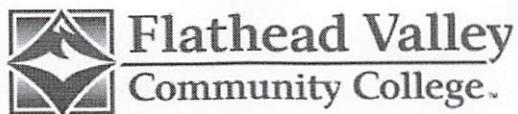
1. Mittapalli, K., (2013-15). Formative and Summative evaluation reports – NSF funded ATE grant for Hagerstown Community College (MD), Microscopy Technical Lab (MtH). Award No. 1205050
2. Mittapalli, K., de las Alas, N., & Banerjee, A. (2012-18). Formative and Summative evaluation reports – NSF funded MSP/STEM C STEM Achievement in Baltimore Elementary Schools (SABES) Math and Science Partnership (MSP) NSF grant to Johns Hopkins University and Baltimore City Public Schools. Award No. 1237992
3. Mittapalli, K. (2010-16). Formative and Summative evaluation reports for NSF-funded Noyce Scholarship, Math for America, DC (MfA, DC), Carnegie Institute of Washington, DC Public and Public Charter Schools, and American University, DC.
4. Mittapalli, K., & Banerjee, A. (2014-17). Formative and Summative evaluation reports, OTC, MO
5. de las Alas, N., & Mittapalli, K. (2015-20). Formative and Summative evaluation reports- NSF funded Noyce TEAMS for Appalachian State University, Boone, NC.

Other Significant Products, Whether or Not Related to the Proposed Project

N/A

D. SYNERGISTIC ACTIVITIES - (see PAPPG Chapter II.C.2.f.(i)(d))

1. Summer grant writing workshops in 2018 and 2019 at Dillard University, LA
2. In June 2018, MNA engaged the leadership and staff at the Idaho State Legislative Officers in the State Accountability and Performance Department in a 1.5 days long training on research methods and analytical techniques. The interactive workshop was well received based on the post-survey findings.
3. MNA has collaborated with non-profit organizations in building their internal evaluation capacity. In 2019, the team completed a 1-week workshop for the staff and community leaders at the Child First Authority in Baltimore, MD to help develop their Theory of Action, Performance Measures, and Logic Model for 25 community schools spread across the City.
4. Kavita Mittapalli served as a STEM event judge in 2019 at George Mason University.



Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as a faculty mentor as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

Mike Severino, Associate Professor, Mathematics

Tim Price, Assistant Professor, STEM

Jim Goudy, Associate Professor, Computer Science

Anita Ho, Associate Professor, Geology

Heather Estrada, Associate Professor, Agriculture

David Long, Associate Professor, Chemistry

Christina Relyea, Professor, Natural Resources

Laura VanDeKop, Professor, Mathematics

Wendy Westbroek, Associate Professor, Biology

Effat Rady, Professor, Engineering



Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as a faculty mentor as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

A handwritten signature in blue ink that reads "Jim Boger". The signature is fluid and cursive, with "Jim" on top and "Boger" below it, both starting with a capital letter.

Jim Boger, Professor, Physics



Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description for the Facilities, Equipment and Other Resources section of the proposal.

Sincerely,

A handwritten signature in blue ink that reads "Mandee Johnson, LCSW".

Mandee Johnson, LCSW
Mental Health Counselor
Flathead Valley Community College



Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

Sincerely,

Amy Stewart
STEAM Alliance Board Chair
admin@steamalliance.org

steamalliance.org
PO Box 801
Kalispell, MT 59901



Dear NSF reviewers,

If the proposal submitted by Dr. Charles Katerba is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment and Other Resources section of the proposal.

A handwritten signature in black ink, appearing to read "C. Clouse".

Chris Clouse, PhD

Vice President of Academic and Student Affairs