Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

2019 IITG Tier 1 Round 8 Application - Up to $10,000 (in-kind match optional)

Prof Dan L MacIsaac

SCIE462 Buffalo State
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Buffalo, NY 14222

macisadl@buffalostate.edu
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M: 716 909 2233

Application Form

Project Summary

Proposed Project Title*

Enter the project title; if awarded, it will be published as written on the website. Be aware that external audiences appreciate descriptions that "go light" on technical "jargon."

Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Project Abstract*

Provide a brief (less than 150 words) abstract of your project (Again, if awarded, this description will be used on the web, please avoid jargon.)

We will develop and distribute an OER drop-in course module for a semester-long course project that can be adopted into any STEM content or methods course for preservice teachers. The project will typically be worth 10-15% of the course credit and require about 20 hours/student of work outside of scheduled class time, including a class presentation of a <5min "final working draft" video during the last week of classes. Student produced videos are produced with standard consumer smartphones and tablets (IPads etc), and low-cost or free software. The project will require several graded milestone deliverables including a proposal, literature search, storyboard, rough draft video presentation and a final reflective overview paper due at final exam. Examples, assignments, grading rubrics, and project guidance videos and documents will be prepared and made available via the SUNY digital commons. Our sample module in intended for BlackBoard, but with minimal modification the module content could be adapted to any Learning Management System.

One Sentence Description*

Provide a VERY brief, one-sentence description (50 words). If awarded, it will be published as written on the website to entice external audiences to "dive deeper."

A redistributable OER package supporting a smartphone / tablet student video content (think rough draft YouTube STEM video) project for STEM methods and content courses for preservice teachers with examples, assignments, rubrics and project guidance videos and documents.

Amount Requested (limit of $10,000)*

Please copy the amount of funding sought from the **Grand Total of REQUESTED funds** (green box) on the budget worksheet. In-kind contributions should be reflected in the campus match column (yellow box), but **not included** in the amount requested. (*Note: in-kind funds are not required for Tier One, but many applicants choose to reflect a campus match.*)

$10,000.00

SUNY Campus*

Please select your home campus from the drop-down menu:

Buffalo State College

Contact Information for Person Submitting Application

Salutation (Applicant - T1)*
Please Select:

Prof.

First Name (Applicant - T1)*
Daniel

Last Name (Applicant - T1)*
MacIsaac

Role or Professional Title (Applicant - T1)*
Please enter your role, e.g., "Director, Sponsored Programs" "Administrative Assistant" "Associate Professor" "Clinical Professor"

Associate Professor of Physics

Campus Email Address (Applicant - T1)*
macisadl@buffalostate.edu

Primary Phone Number (Applicant - T1)*
Please provide the best number to reach you during normal business hours

7168783802

Alternate Phone Number (Applicant - T1)
Please provide an alternate or mobile number where you can be reached

7169092233

(If different from Primary Applicant) Enter Contact Information for the Faculty or Staff Responsible for the Project

Salutation (Principal Investigator or Project Lead if different from above) T1*
Please Select:

First Name (Principal Investigator or Project Lead) T1*
Last Name (Principal Investigator or Project Lead) T1*
Campus Email Address (Principal Investigator or Project Lead) T1*
Primary Phone Number (Principal Investigator or Project Lead) T1*

Please enter best number to reach principal investigator or project lead during normal business hours.

Alternate Phone Number - Mobile or Lab (Principal Investigator or Project Lead) T1

Please enter alternate contact number (mobile, home office, lab, etc.)

General Guidance regarding the IITG Online Application Form:

Character Countdown functions the same as "Twitter." Some overhead has been built in to compensate for cutting and pasting text from different types of word processors.

File Upload Size is displayed. Please use common file formats (PDF, Word, Excel). If you need to delete or replace an uploaded file, click on **Save as Draft** at the bottom of the page. Then delete and re-upload the correct file.

WARNING: It's a good idea to "save as draft" periodically at the bottom of the form, but **DO NOT "submit" until you are satisfied the application is complete.**

Principal Investigator (PI) or Project Lead Biographical Sketch*

Please upload a brief (one page) biographical sketch. If more detail is necessary, you may link to a CV or Resume with richer detail.
A brief bio should include:

- Primary campus role,
- General position responsibilities, and
- Highlights that illustrate competence in leading the proposed project.

MacIsaac_1pIITG_BIO.pdf

Project Collaborators

Please list all Co-PI's, collaborators and key stakeholders. These names will appear on the project website if your project is selected for funding. For each person, you must include:

- Name
- Title (e.g., Associate Professor, Instructional Designer, etc.)
- Affiliation (school, department name or external partner)
- Brief paragraph explaining why this person is key to your project.

If you choose to upload information about multiple collaborators, please consolidate into a single document.

(Text Calculator = 2 pages /1,000 words)

IITG2019MacIsaacPersonnel.pdf

Endorsement of Campus Support*

Please certify that you have reviewed this proposal with a **named senior level campus officer.** The conversation with your senior leader will vary by campus, but typically the person is a campus provost, vice president, dean or department chair responsible for authorizing any in-kind resource match.

If your proposal **involves technology (IT) resources**, please include a letter of support from your CIO or designee, to certify that your senior IT officer has reviewed and supports the commitment.

You may upload a document or provide text below that includes names/titles of the responsible parties.

(Text Calculator = 1 page / 500 words)

Optional Letter(s) of Support

You may upload an optional letter of support. (If you have multiple letters of support, please combine them into a single document for upload.)

   Draft Merged Letters of Support.docx

Project Information

In order to make your IITG project more discoverable via website browsing, please review and select from the theme(s)* below, up to three categories that best describe your project. If your project clearly fits within a single theme, please indicate "no further selection" for your second and third choice. (To download and print full size CAIT Matrix* click HERE)

Assessment, Understanding, Monitoring Student Progress	Connected Learning Models	Discipline Specific Pedagogy	Faculty Development
• Adaptive Learning Technologies • Competency Based Education (CBE) • Course Evaluation • E-Portfolios • Integrated Planning & Advising Sevices (IPAS) • Learning Analytics • Micro Credentialing (e.g. Badging) • Outcomes Assessment • Peer Assessment • Prior Learning Assessment (PLA) • Scalable Assessment	• Active Learning • Collaborative Learning Technologies • Faculty/Librarian Collaboration • Team-Based Learning • Virtual Learning Communities	• Adult & Continuing Education • Developmental Education • Gateway Courses • General Education • Humanities • Professional Education • Social Sciences • STEM • Teacher Education • Workforce Development	• COTS (Competencies for Online Teaching Success) • Faculty Development Programming • Faculty Digital Literacy • Organizational Models of Faculty • Rewards/Incentives/Tenure/Promotion • Sharing Best Practices • SoTL (Scholarship of Teaching & Learning)

Instructional Design	Instructional Technologies	Learning Environments	Organizational Issues: Teaching & Learning
• Course Design/Development/ Re-Design • Feedback • Gamification (Design) • Hybrid/Flipped/Blended Learning • Interaction • Online Education • Personalized Learning • Student Engagement • Student Learning Support • Supplemental Instruction • Universal Design	• 3D Printing • Artificial Intelligence • BYOD • Clickers (Classroom Response Systems) • Cloud-Based Teaching & Learning Environments • E-Readers • Games (Hardware/Software) • Immersive Environment (Virtual Reality) • Lecture Capture Technologies • LMS • Mobile • Open Educational Resources (OER) • Open Source Programs and Apps • Podcasting • Video Production • Virtual Assistance • Wearable Technologies • Web/Video Conferencing	• Augmented Reality • Big Data • Immersive Environment (Facility) • Intervention & Retention Strategies • Learning Space (Facility) • Makerspace	• Augmented Reality • Design Thinking • Innovative Organizational Partnerships • Institutional Licensing Program • Learning Organization/Community (Integration Faculty/Staff) • Strategic Planning • Student Publishing • Student Support (Financial Aid, Career Planning...)

*Collective for Academic Innovation for Technology - a collaboration among SUNY, Penn State, Shippensburg, U. Mass and U. Maryland System.

Primary Theme Choice (Tier 1)*

If your theme fits within a single category, please indicate "No further selection" for your second and third choice.

Instructional Technologies > OER (Open Education Resources)

Second Theme Choice (Tier 1)

Second choice - If your project fits in more than one category, you may choose a second theme or indicate "No Further Selection" for your second and third choice.

Instructional Design > Student Engagement

Third Theme Choice - (Tier 1)

Third choice - If your project fits in more than one category, you may choose a third theme or indicate "No Further Selection"

Discipline Specific Pedagogy > Teacher Education

Please provide **three** intended learning outcomes for your grant project. If you prefer, you may frame learning outcomes as "project outcomes".
*Each learning outcome should be **less than 200 words***

First learning (or project) objective (Tier 1)*

OER product

We will prepare and disseminate a "drop-in" or "plug and play" online OER module for use in STEM and STEM teaching methods courses for pre-service and in-service teachers. These teachers must develop familiarity with instructional technology and elementary media production and use in their own instruction, and as part of their certification process they must all produce videos for their NYSED mandated EdTPA certification assessment. The digital module will include sample final and production videos, assignments, worksheets, rubrics, an essay, student and teacher instructions and assessments for student and instructor use. It will be loaded up to the SUNY Digital Commons, and we anticipate it will be widely used across SUNY.

Second learning (or project) objective (Tier 1)*

Student engagement

Our students using these OER materials will learn how to plan simple video projects and to use simple video equipment (smartphones and iPads) to make short "rough cut" or "proof of concept" STEM videos for instructional uses. These videos will be accompanied by supporting documents like proposals, literature searches, storyboards and reflective critiques. Video content will be the STEM content they themselves are learning and teaching, in a format like a <5min YouTube science video. These student products themselves are NOT intended for public distribution but rather are internal documentation of an iterative process of learning. Think about the student producing STEM student lab or book reports: these videos are video reports, and students learn content in small groups by debating, framing, developing, planning, discussing and enacting video storyboards, scripts and presentations. Students must refine their own thinking about the STEM content via video communication. Groups of students producing videos and especially their supporting artifacts are the measurable outcome here.

Third learning (or project) objective (Tier 1)*

Pedagogy - Teacher Preparation

Teacher must be able to think and communicate clearly and appropriately to a wide variety of students with differing backgrounds and needs. These presentation and communication skills are essential to STEM teachers, and will be practiced and developed in this STEM group video project. Much scaffolded attention is directed towards framing the critical ideas to be presented, how to present it and how to assess the presentations. These elementary video making and planning skills are also required of all pre-service NYS teachers, who must create digital files of their own teaching practices within a their required EdTPA (Education Teacher Performance Assessment) necessary to earn initial NYSED teacher certification in any field. Groups of students producing videos and supporting artifacts are the measurable outcome here.

Innovative Instruction Project Narrative*

Based upon the criteria described for a **Tier One** IITG project in the 2019 IITG RFP, please upload a description of how your proposed project will meet the program objectives. (Please note: there is a separate section for a budget narrative and worksheet.)

If you indicated that these funds are to be used as a planning grant, the narrative and assessment plan must indicate how this investment will translate to "shovel ready" outcomes with future funds.

Please upload a document describing your project proposal (no more than 2 pages).

IITG2019MacIsaacProjectDescription.pdf

Project Timeline Estimates and Return on Effort Invested*

Please upload a one page (or less) document that provides the following:

- A sketch of your project timeline (general information re: Summer 19 planning (include IRB if needed), Fall 19 objectives, Spring '20 objectives.

- A brief sentence or two on how you envision return on the investment of time, energy and resources. You may wish to describe to the reviewers:
    - Career development,
    - Departmental benefits,
    - Campus benefits, and
    - SUNY benefits.

Even if you've addressed some of these issues in the narrative, this information may assist reviewers in assessing how the proposed project will benefit different levels of stakeholders.

IITG2019MacIsaacTimeline.docx

Budget & Administrative Contact Support

Budget Narrative (T1)*

Please upload a budget narrative document describing how the funds will be utilized if awarded (1 page or less). Note: Although in-kind resources are **not required** for a Tier One application, **please indicate any campus resources** that will used to realize the vision of this application.

IITG2019MacIsaacBudNarr.docx

Project Budget (T1)*

Download, complete, and upload the IITG Budget Worksheethere. The budget narrative will "tell the story" but please use the "Brief Rationale for Line Item" (last column) to provide key words that clearly reinforce and connect the line expenditure to the narrative. Please note - **you MUST use this budget worksheet.** No substitutions will be accepted.

IITG-Budget-templateMacIsaac2019.xlsx

Certification of Budget Deadline Understanding*

SUNY IITG awards are part of University Wide campus allocations maintained in Albany. If your project is selected for funding, you must adhere to State procurement and all local campus policies and procedures. **Any funds not expended or encumbered by June 30, 2020, will not be "rolled over" or available the following year.** All campuses should have encumbrances cleared, and all funds expended no later than August 15, 2020.

Please enter "I agree" in the box below to signify that you and all collaborators understand that any funds awarded must be expended by the end of the state budget fiscal year (June 30, 2020).

I agree

Administrative Support*

Please enter the name of a central or departmental staff contact who will assist with state purchase requests. The person named must be familiar with the SUNY University Wide accounting processes and must know who to contact at your local campus business office regarding U-Wide funding questions.

Ms Cynthia (Cindy) Wong

Administrative Support Email*

Please enter the email address of the administrative support contact named above.

trzaskca@buffalostate.edu

Chief Academic Officer*

Please enter the name of your Chief Academic Officer (or designee) who should receive notification in the event an award is made.

Melissa Miszkiewicz

Email Address: Chief Academic Officer*

Please provide the email address for your Chief Academic Officer (or designee).

miszkimj@buffalostate.edu

Contact Name: Research or Grants Administration Officer

If your campus requires you to coordinate with a sponsored programs office or central director or vice president of research, please provide the contact name. (Note: not all campuses require coordination with central research personnel. If your campus requires notification of another administrator such as a dean or director - provide that instead.)

Email Address: Research or Grants Administration Officer

Enter email address for the research administrator named above

Assessment and Communication Plan

Assessment & Communication Plan Narrative*

Please upload a document describing how you intend to assess your project outcome(s). This should include how you intend to seek & share evidence of impact this project (if funded) will have on student/faculty learning.
If awarded, you must present project outcomes at a future CIT Conference. Please provide a brief paragraph regarding any additional venues you may share outcomes (peer reviewed journal, campus site, conference(s), open access journal, etc.)

(No more than 1 page).

IITG2019MacIsaacAssessment.docx

File Attachment Summary

Applicant File Uploads

- MacIsaac_1pIITG_BIO.pdf
- IITG2019MacIsaacPersonnel.pdf
- Draft Merged Letters of Support.docx
- IITG2019MacIsaacProjectDescription.pdf
- IITG2019MacIsaacTimeline.docx
- IITG2019MacIsaacBudNarr.docx
- IITG-Budget-templateMacIsaac2019.xlsx
- IITG2019MacIsaacAssessment.docx

DANIEL LAWRENCE MacIsaac one page IITG Bio

a. Professional Preparation

Mount Allison University, Sackville, New Brunswick, Canada	Physics	B.Sc./1984
Mount Allison University, Sackville, New Brunswick, Canada	Secondary Mathematics and Science Teaching	B.Ed./1986
University of British Columbia, Vancouver, BC Canada	Science Education	M.A./1991
Purdue University, West Lafayette, IN	Physics	M.S./1994
Purdue University, West Lafayette, IN	Physics Education:	Ph.D./1994

b. Select Post 2005 Appointments

08/2018- present **Interim Chair,** Department of Earth Sciences and Science Education, SUNY Buffalo State College.

06/2017-07/2018 **Gastwissenschaftler** (Visiting Scientist), Institut für Physikdidaktik, Faculty of Mathematics and Natural Science, Universität zu Köln, Cologne, Germany.

08/2005-present **Associate Professor of Physics**, Department of Physics, SUNY Buffalo State, Buffalo, NY. Graduate programs coordinator. Tenured faculty teaching graduate physics education courses and undergraduate physics courses. Scholarship in learning physics and physics teacher preparation.

01/2011-present **Adjunct Associate Professor of Physics**, Department of Physics, SUNY University at Buffalo, Buffalo, NY. Unsalaried courtesy appointment to Carnegie R1 institution to support collaboration in scholarship.

One book, nineteen refereed publications, 164 unrefereed papers, reports, & columns, 205 academic presentations, 65 external and 22 internal grant proposals. Three relevant works:

1. Abbott, D.S., Roberts, A.J., **MacIsaac, D.L.,** Falconer, K.A., Genz, F., Hoffmann, S., Bresges, A. & Weber, J. (2019, April). Adding student video projects to physics courses. The Physics Teacher, 57(4), 204-208. ***This publication was an outcome of a 2015 IITG project.***
2. W. Wu, **D.L. MacIsaac** and A. Roberts, Project-Based Learning in the US. Guangxi Education (J of Guangxi Zhuang Autonomous Region). 2015.9. 60-63, September 2015.
3. **D.L. MacIsaac** and K.A. Falconer, "Reform your teaching via the Reform Teaching Observation Protocol (RTOP)", *The Physics Teacher* 2002, 40(8), 479-486

***National Science Foundation* and *NASA* funded investigator** on six funded projects totaling over $14M since 2002 in the areas of in-service STEM (Science Technology Engineering and Math) professional teacher development for high needs schools, pre-service and in-service physics teacher preparation programs for traditional and career-changing candidates, researching STEM teacher practices and effectiveness, promoting STEM and STEM teaching majors via scholarships and institutional support, assessment and development of curricular resources for STEM teaching, etc.

***Websights* column editor** for the AAPT journal *The Physics Teacher* since 2002 (140+ monthly columns). *The Physics Teacher* is the world's leading English language professional publication for professional physics educators. Assistant Editor, Science Teachers Association of NYS *STANYS Science Teachers' Bulletin*.

Steering Committee for Western NY Physics Teacher's Alliance (WNYPTA) meeting monthly at Buffalo State, also active in state (STANYS, NYSED Master Teachers, NYSS-AAPT) and national (AAPT – American Association of Physics Teachers) organizations via presentations, committee-work etc. *Immediate Past Chair of the AAPT National Committee on Teacher Preparation (CTP*). *Fellow of the AAPT*. 2016 recipient of the *Homer L. Dodge Citation for Distinguished Service to the AAPT. Summer 2019 International Visiting Fellow* of Education University Heidelberg (Germany).

Personnel: MacIsaac IITG2019 proposal:
   Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Dr. Dan MacIsaac, Associate Professor of Physics, Department of Physics, and
Interim Chair, Department of Earth Sciences and Science Education, SUNY Buffalo State

Dr. MacIsaac will be PI. He has been PI on a successful 2015 IITG project, and has been PI or co-I on many NSF supported projects at Buffalo State. He regularly teaches both introductory physics for preservice and in-service teachers, and graduate courses for physics teachers combining physics pedagogy and content. He will be supervising and lead author of the materials and require the use of these experiments in his own classes (PHY520, 522, 620 and 622) during the project. He will also write the IRB and administer the project. He will NOT be paid for this project.

Dr. David S Abbott, Instructional Support Specialist, Department of Physics, Buffalo State

Dr. Abbott will be co-I. He has a PhD in Physics Education, supports instruction of all PHY courses at Buffalo State, teaches PHY103 and itinerantly PHY104. He maintains all department instructional equipment and often co-teaches or leads lab activities with instructors. Curriculum development and course pre and post testing for introductory courses (including intro mechanics) are in his job description. He also supports undergraduate and graduate physics students completing projects. He will work with MacIsaac and Gearhart to develop materials, and with the pre- and post- testing and data interpretation. He will also load the laboratory handouts, instructions and video data files to the SUNY Digital Commons. He will also NOT be paid for this project.

Mr. Bradley Gearhart, M.S.Ed., Buffalo Public Schools and Adjunct Instructor, Dept. of Physics, Buffalo State

Mr. Gearhart has an M.S. Ed. in Physics Education, and is a NY State Master Teacher Fellow. He teaches physics full time in the Buffalo Public Schools district Hutchinson Central Technical High School, and is an adjunct instructor for the Buffalo State Department of Physics. He regularly includes student video production assignments in his regular classroom instruction, and has collaborated with Abbott and MacIsaac for years, including on publications. He will be the main author and investigator for this project. As an adjunct, he will be paid for this project.

Mr. Dave Doty, M.S.Ed., Cattaraugus-Little Valley High School Physics Instructor, and Adjunct Instructor, Dept. of Physics and Dept. of Earth Sciences and Science Education, Buffalo State

Ms. Meg Helmes, M.S.Ed., Lancaster Public Schools and Adjunct Instructor, Dept of Physics and Dept. of Earth Sciences and Science Education, Buffalo State

Mr. Bryan Meyers, M.S.Ed., Buffalo Public Schools and Adjunct Instructor, Dept. of Earth Sciences and Science Education, Buffalo State

Doty and Helmes are **NY State Master Teacher Fellow Emeriti**, and together with Meyers they teach STEM and STEM methods courses to preservice and in-service teachers both in person and online as adjuncts. These courses include PHY104, SCI313, and SCI664 amongst others. They will be paid honoraria for their participation in this project, and will collect student feedback and provide their own feedback for evaluation. All have worked with the PI on pedagogical development projects.

A to be recruited **student** (preferably an undergraduate or graduate student in STEM education or STEM) to assist with the project administration, particularly during Spring semester 2020. This student will assist with project video development, administration and simple clerical / grading tasks to free instructor and investigator time for project activity.

Note the bulk of project funds will be paid to a SUNY adjunct investigator and a SUNY student; with some honoraria to other SUNY adjuncts. The PI and Co-I are full-time SUNY and will volunteer their time. Remaining funds will be spent for travel, poster production and printing and equipment.

February 26, 2019

Dear Sir or Madam:

I am pleased to write in support of the proposal submitted by Dr. Dan MacIsaac and his colleagues entitled **Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module**. Dr. MacIsaac is well qualified to coordinate and lead this effort, and his team from the School of Natural and Social Sciences is equally well prepared to conduct the project. This IITG proposal is comprehensive, with emphasis first on full time and adjunct faculty development to enable them to acquire experience creating, assessing, and refining STEM content student video projects for preservice teachers that will be made available to SUNY and worldwide STEM teacher educators via creative commons license.

A second outcome is that PHY104, PHY520, PHY522, PHY620, PHY622 and SCI313 and SCI664 students who are preservice teachers at Buffalo State will learn to use ubiquitous cell phone and tablet technology to create STEM content videos, refining how they think about and communicate science and mathematics. Teachers will learn both technology and clearer thinking about their subjects. An important long-term goal is to equip school teachers with the skills to engage learners and involve them in rigorous STEM activities.

The School of Natural and Social Sciences is strongly supportive of the scholarship of teaching and learning. The proposal by Dr. MacIsaac and his colleagues is an excellent example of IITG's vision to "support, monitor and embrace research on pedagogical practices to continually improve the instructional practices of SUNY faculty." I give it my full endorsement and support.

Sincerely, Kelly M. Frothingham, Ph.D.

Associate Dean
School of Natural and Social Sciences

February 26, 2019

Dear Sir or Madam:

I am writing to express my for Dr. Dan MacIsaac's ***Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module*** project to the **SUNY2019 Innovations in Instructional Technology Grant** competition.

This project builds on Buffalo State Physics commitment to quality teacher preparation programs by developing interventions that could be used in our teacher-focused undergraduate and graduate classes like PHY104, PHY5xx and PHY6xx, as well as in teacher-focused classes in science education SCIxxx offered by the Department of Earth Science and Science Education.

The investigative team includes Drs. MacIsaac and Abbott of Physics and a collection of adjunct faculty who are also local area physics and science teachers and alumni of the Physics Department, including Mr. Brad Gearhart, Mr. Dave Doty, Ms. Meg Helmes and Mr. Bryan Meyers.

The Physics Department is committed to housing, and providing iPad and related equipment access to this project as best possible as long as these activities do not disrupt regular instruction.

Sincerely,

Dr. Dermot Coffey
Chair of Physics

MacIsaac IITG2019 Project Description:
Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Background and Prior IITG Funded Outcomes:

In 2015-16 we were awarded an IITG grant for developing OER video physics lab materials where introductory physics lab students could use video capture via iPads to record moving apparatus (balls, carts of tracks, pendula etc). The tablets were then used to digitize this motion, fit model equations to the data and analyze the physics underlying the motion. We produced a number of introductory video physics lab worksheets which were and are popular with our students and have been steadily downloaded from the SUNY Digital Commons ever since.

As part of that project we undertook a tertiary level "stretch" goal -- to try to entice small groups of introductory physics students to make their own <5minute videos about more general physics content (think student level video reports or YouTube videos of physics content). This was much more challenging and not well framed in 2015, as it was an exploratory goal suggested by colleagues in Germany. After a great deal of experimentation we developed a few rubrics and a storyline for a semester-long project for physics students culminating in video presentations at the end of the semester. This was sufficiently creative that we wrote a paper which just now is going into press:

> **Abbott, D.S.,** Roberts, A.J., **MacIsaac, D.L.,** Falconer, K.A., Genz, F., Hoffmann, S., Bresges, A. & Weber, J. (2019, April). ***Adding student video projects to physics courses.*** The Physics Teacher, 57(4), 204-208. http://physicsed.buffalostate.edu/pubs/TPT/TPTApr19Video/MacIsaacVideoMSv2galley.pdf

Since 2015, the NY State Department of Education now **requires** that to obtain teacher certification **all** preservice teacher certification candidates must produce video files of themselves teaching, create associated supporting documents to these videos and submit these digital video portfolios for external assessment in a process known as the EdTPA:

https://www.edtpa.com/PageView.aspx?f=GEN_NewYork.html .

Also in the four years since 2015, student use of smartphones and tablets to watch extended video and to record and share brief snippets of their own video has become ubiquitous, and the supporting software ever more powerful and friendly. However, vanishingly few teachers use student generated video in their classes, and guidelines and supporting documents for their course implementation really don't yet exist, though we have a start for physics pedagogy in our new publication.

Our proposal: Teach teachers to make short "rough cut" STEM videos via an OER module

We currently have a project process for introductory physics students to make videos about physics, and we want to extend that to all STEM disciplines including Biology, Chemistry and Earth Science, Mathematics and Engineering. Further we want to incorporate STEM pedagogy for multiple ages: we want our students to learn to make videos that are content appropriate to a wide variety of children from K-12. We are interested in process, not product – we expect that none to vanishingly few of these videos will ever be seen outside the college course experience. Like student lab reports, student lessons plans, microteaching and EdTPA portfolios these videos will be "rough cut" student work, documenting how students approximate and refine better processes for

framing, analyzing, discussing, presenting and communicating their ideas. A few videos might wind up in student portfolios, but most will be learned from and scrapped after analysis.

Our audience would be SUNY-wide, though focused on courses for STEM teachers, our OER module would be appropriate for any future teacher (e.g. all NY K-6 teachers are teachers of science). But we have to support their SUNY faculty instructors, including technophobes and busy underpaid adjuncts. Hence a ready-to-go module.

Our Product: An easily embedded OER module ready to "Drop In" or "Plug and Play" in STEM and STEM methods courses for teachers

To help support the many SUNY-wide instructors of STEM courses for teachers and STEM teaching methods courses, we plan to do the project planning for the instructors in a complete, ubiquitous package and disseminate it as a BlackBoard module. Our module will contain an example student video, videos about making videos, timelines that can be dropped into syllabi and calendars, a timeline of deliverables with associated examples and rubrics that can be shared with students, blank storyboard forms, checklists, grading guidelines and examples and an instructor's briefing. We hope to include much guidance in the instructors' briefing from our own experience and working with three other adjunct faculty who teach course for preservice STEM teachers but who don't currently use video projects. And the lead adjunct author of these materials can include some insights from his personal in-class experiences having his own HS students in turn do these kind of projects.

Our topical examples will make use of using trans-disciplinary topics like Energy; identified as a "crosscutting concept" across STEM disciplines within the Next Generation Science Standards and New York State Science Learning Standards

http://www.nysed.gov/curriculum-instruction/science-learning-standards

Our Inspiration: A Video from PHY104 for preservice elementary education teachers

We were inspired in proposing this by a particular video product of one team of our pre-service teachers, these extraordinary individuals received supplementary coaching and support, and after the course they provided permission to share their video. So we have a crude initial working example of a video to work from as a starting point, though it is not yet tuned for NGSS/NYSSLS and student assessment, and like all student work it contains flaws. But it is an approximate example and a waypoint upon our path and we'd like to share their "Electric Water" video with you to end our project description:

http://tinyurl.com/watgen

Timeline and ROI for MacIsaac IITG2019 proposal:
   Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Summer 2019: Award announced early May prior to CIT
   Project Buffalo State IRB written and filed (Macisaac)
   Skeleton draft handouts started (Gearhart, MacIsaac and Abbott)
   Prototype module skeleton tested in PHY622 (live; MacIsaac) with physics teachers

Fall 2019: Intended funds release early Sept
   All equipment ordered; Gearhart paid 1/3 funds, honorarium to Doty
   October: Initial poster presented to Faculty/Staff Research and Creativity Forum day at Buffalo State
   First drafts of module tested in PHY104 (live in person; Doty) and PHY520 (online; MacIsaac) with pre- and
      post-testing and user/learner observations
   December: First draft module uploaded to SUNY Digital Commons (Abbott).
   Student assistant recruited and identified

Spring 2020
   Honoraria to Helmes & Meyer; Gearhart second 1/3 paid; student hired and paid hourly wages
   Second edition of module tested in PHY104, SCI313 and SCI664 (live; Doty, Helmes & Meyer)) and PHY522
      (online) pre and post testing and user/learner observations. (Gearhart & MacIsaac)
   May: Final draft module uploaded to SUNY Digital Commons (Abbott).
   May: CIT Conference presentation (travel; Gearhart)
   May: Gearhart paid off; all final orders made

Summer 2020: Close of funds date: June 30, 2020
   Final module used in PHY620 with teachers (July-Aug; MacIsaac); SUNY Digital Commons upload finalized
      (Abbott)
   Draft article for *Journal of Science Teacher Education (JSTE)* roughed out

Afterwards:
   October 2020: Final poster presented to Faculty/Staff Research and Creativity Forum day at Buffalo State
   Reports submitted (Gearhart / MacIsaac); all artifacts uploaded to SUNY Digital Commons (Abbott)
   Article for *Journal of Science Teacher Education (JSTE)* prepared and submitted (all)

Products & Return on Investment:
A "drop-in" or "plug and play" online OER module for use in STEM and STEM teaching methods courses for
      pre-service and in-service teachers. These teachers must develop familiarity with instructional
      technology and elementary media production and use in their own instruction, and as part of their
      certification process they must all produce videos for their NYSED mandated EdTPA certification
      assessment. The module will include sample final and production videos, assignments, worksheets,
      rubrics, an essay, student and teach instructions and assessments for student and instructor use. It will
      be loaded up to the *SUNY Digital Commons*, and we anticipate it will be used across SUNY.
A manuscript submitted to a peer reviewed journal on the development of this OER resource and its' impact
      on the teachers who developed videos.
Conference presentations, posters and advertising of Scholarship of Teaching and Learning activity via SUNY
      and NY STEM and teacher preparation events and organizations as per budget.

In 2015, MacIsaac and Abbott participated in the development of a related IITG project that produced digital
video labs for introductory physics courses, including *a series of widely-downloaded introductory physics
laboratory instruction sheets. They also published a forthcoming paper*:
   Abbott, D.S., Roberts, A.J., **MacIsaac, D.L.,** Falconer, K.A., Genz, F., Hoffmann, S., Bresges, A. & Weber, J.
   (2019, April). Adding student video projects to physics courses. The Physics Teacher, 57(4), 204-208.
This publication was an outcome of a 2015 IITG project, and we expect it to make a impact on the field of
STEM teaching. It has already made an impact on our own instruction and informed the instruction of our
peers.

Budget Narrative for MacIsaac IITG2019 proposal:
   Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Our budget narrative is fairly straightforward as the budget is quite self explanatory:

- SUNY Fulltime faculty and staff are volunteering their time, for the publication opportunities
- Gearhart is lead adjunct and researcher; paid at his teachers' union suggested rate of $50/hour
- Doty, Helmes and Meyer are participating adjuncts; paid an honorarium for their participation of $500 each for (approximately 10 hours of their time at the above rate)
- An undetermined student will be paid a living wage of $15/hour for approximately 145 hours, or at most 10 hours/week
- Travel is to the CIT conference for presentation as mandatory by IITG
- Posters are required for conference presentations
- iPads are for the student and development team

SUNY Buffalo State College library has an iPad loaning program for education students and preservice teachers, and both the Department of Physics and Earth Science and Science Education also have small class sets of iPads, microphones, headphones etc. overseen by the project investigators. These department collections are also intended for student sign-out use with courses.

However, signing out equipment is actually pretty rare for our students as smartphones are powerful enough to do most all the video collection and processing required, and most teams of students will have one or more students already using tablets. Students prefer to use and develop further expertise on their own personal; devices (BYOD) for the most part. Our existing campus BlackBoard LMS, together with Google mail accounts held by students have proven more than adequate to disseminate our course materials and to swap and display video projects. We anticipate no unusual IT resource use beyond what is already provided and in regular campus use for this project

Innovative Instruction Technology Grant Application
Proposed Project Budget

Complete grey-shaded cells only; be sure budget narrative fully describes planned expenses and campus match.

** Campus Match: examples are included in RFP with Tier 2 (25%) and Tier 3 (50%) award descriptions.

Refer to this IITG FAQ for more budget details: http://commons.suny.edu/iitg/budget-questions/#bqfn1

Line Item	Description	Type: Faculty, Staff or Student	Effort (Est. FTE or hours)	IITG Grant Funding Request	Campus Match**
					Required for Tier 2 & 3
Personal Service/Personnel (indicate name, role & campus if known)					
1.	Mr Bradley Gearhart, SUNY adjunct instructor & FT public school teacher HOURLY	faculty	75.0	3,400	0
2.	Mr Dave Doty, SUNY adjunct instructor and FT public school teacher HOURLY HONOR	faculty	10.0	500	0
3.	Ms Meg Helmes, SUNY adjunct faculty & FT public school teacher HOURLY HONORAF	faculty	10.0	500	0
4.	Mr. Bryan Meyer, SUNY adjunct faculty and FT public school teacher HOURLY HONOR	faculty	10.0	500	0
5.	Un-named student (preferably pre-service STEM education major) HOURLY	student	145.0	2,200	0
6.			0.0	0	0
7.			0.0	0	0
8.			0.0	0	0
9.			0.0	0	0
10.			0.0	0	0
11.			0.0	0	0
12.			0.0	0	0
13.			0.0	0	0
Community Colleges Only: Fringe Benefit Expense (may be funding request OR campus match)				0	0
Subtotal, Personnel Expense				**$7,100**	**$0**

Other-than-Personal Service/Personnel (OTPS)

Line Item	Description	Purpose	IITG Grant Funding Request	Campus Match
Supplies & Materials Items:		**Purpose** (if not obvious)	*$0*	*$0*
14.			0	0
15.			0	0
16.			0	0
17.			0	0
18.			0	0
Travel (list trips; OK to group trips for like purpose)		**Purpose** (if not obvious)	*$1,000*	*$0*
19.	1 trip to CIT conference in May 2020 to present on this project outcomes		1,000	0
20.			0	0
21.			0	0
22.			0	0
23.			0	0
Services (provide vendor name if known):		**Purpose** (if not obvious)	*$150*	*$0*
19.	3 posters for presentation at campus research and creativity and CIT events		150	0
20.			0	0
21.			0	0
22.			0	0
23.			0	0
24.			*0*	*0*
25.			*0*	*0*
26.			*0*	*0*
Equipment (hardware, software & other equipment here):		**Purpose** (if not obvious)	*$1,750*	*$0*
27.	1 iPad 128 GB with applecare	*student worker machine*	500	0
28.	1 iPad Pro 11" 256GB with applecare	*Investigator/Sr personnel share*	1,000	0
29.	small tripods, microphones and cases for above		250	0
30.			0	0
31.			0	0
Subtotal, OTPS Expense			**$2,900**	**$0**

| **GRAND TOTAL** | | | **$10,000** | **$0** |

MacIsaac IITG2019 Assessment and Communication Plan:
Student STEM Content Video Projects for Preservice Teachers: A Drop-in Course Module

Much of this kind of pedagogical R&D uses Design Based Research or Action Research protocols and qualitative case study methods. We will be guided by what few rubrics and instruments (as of this writing) exist for student videos, and lean heavily on language and ideas and vocabulary underlying the EdTPA literature base whenever possible, as we want to migrate our students' language to that standard terminology. We expect to collect informal survey commentary data from instructors and students, to conduct focus groups after courses end and grades are turned in and to incorporate those insights into subsequent versions of the materials across three semesters, with most of the effort placed in Spring of 2020.

We will keep record of instructor questions, requests and suggested interventions as the semester progresses, and maintain a monitored online discussion and help board for the video projects in BlackBoard.

And finally, we will observe the student user experience via direct observation, videos and field notes, and conduct opportunistic focus groups with self-selected student users and collect their thoughts, comments and suggestions for refinement of the activities.

MacIsaac, Abbott and Gearhart will produce a short assessment report, poster and publication article on the relevant findings, with comments for instructors wishing to adopt these projects in their own classroom for both the instructors' briefing and a publication manuscript, likely to the _Journal of Science Teacher Education_ https://theaste.org/publications/jste/ .

We will report our findings and advertise our materials at internal Buffalo State scholarship events, nearby regional conferences like STANYS in Rochester and the annual CIT conference as discussed in the project budget.

In addition to the JSTE manuscript, we anticipate there will be much interest in downloading the materials from SUNY Digital Commons (as we have seen from a previous IITG project). We will advertise the materials in the _STANYS Science Teacher's Bulletin_ and at the (local to us) STANYS conference and opportunistically at conferences associated with STEM teacher preparation professional associations like the NE section of the ASTE https://sites.google.com/site/astene2014/ , via SUNY internal newsletters and listservs associated with STEM teacher preparation and leadership in NYS.