

Interdisciplinary Research (IDR) Origination Awards: Cover Page

STEAM Education as a Catalyst for STEM and Artistic Achievement among Native Youth

Principal Investigator(s)

Name (PI listed first)	Department	College
Mark Graham	Art	Fine Arts and Communications
Tara Carpenter Estrada	Art	Fine Arts and Communications
Paul Adams	Design	Fine Arts and Communications
Michael P. Taylor	English	Humanities
James Swenson	Comparative Arts and Letters	Humanities
Steven Shumway	Technology and Engineering	Engineering

Track Two

Abstract

STEAM education is a viable way to integrate the arts into STEM subjects and to create opportunities for interdisciplinary inquiry and collaboration. This project will develop and evaluate STEAM education programs among Native students who are part of the American Indian Services' (AIS) PREP Program. PREP is an educational preparatory program for Native Americans in which students experience three summers of STEM instruction designed to prepare them for higher education. Our project is designed to create sustainable partnerships between AIS and BYU faculty focused on STEAM education. The aims of the IDR grant are to (1) develop an interdisciplinary research collaboration and AIS partnership that are focused on effective arts integration within the AIS PREP program and (2) develop intercultural competence among pre-service educators, who will be the art integration and arts education instructors for the program.

In order to establish a credible program and gather evidence for our external grant proposals, the IDR grant will fund our pilot study during the summer of 2022, the subsequent evaluation of the project and the expanded iteration of this project in 2023. This initial phase will design and implement STEAM curriculum and assess Native students' experiences in a sustained investigation of STEM subjects through arts integration. Our goals are to create a model for effective STEAM education programs among Native students and explore how designing and implementing a cross-cultural arts integration program might develop intercultural competence among BYU pre-service teachers. We will also be conducting research on the affordances and limitation of STEAM education among underserved indigenous communities, schools, and students. A key to success of the project is the support of the IDR grant, which will be used to develop sustainable educational, artistic, and research partnerships with Native teachers, scholars, students, and leaders and to fund pilot projects exploring STEAM education.

Summary of Plans for External Funding

We will apply for smaller grants from the **National Art Education Foundation** and **The Indigenous Communities Fellowship Challenge** (with our AIS partners), designed to support integration of culturally grounded solutions to Native educational challenges after the first pilot is finished and evaluated. Larger grant proposals include: (1) **The NSF Education and Human Resources Core Research/Discovery Research PreK-12** to enhance teaching and learning in STEM subjects by K-12 students through research and educational innovation. (2) **NSF Facilitating Research at Primarily Undergraduate Institutions** (3) **Spencer Foundation Small Research Grants** (5) **National Endowment for the Arts** Transdisciplinary arts research support for innovation and earning (these are often matching grants). These funding agencies support transdisciplinary research, especially in underserved communities with research focused on equity, diversity, and inclusion. **The IDR funded pilot studies will provide credible evidence and experience to support our grant proposals. We have existing support from the Art Department for grants that require matching funds.**

I. The Need for STEAM Education and Cross-Cultural Education Opportunities

The problem: There is a need for culturally responsive arts integration in STEM programs in Native communities. Our **proposed solution** is to create interdisciplinary, cross-cultural partnerships in order to develop STEAM education programs for Native community PREP students. This project also creates opportunities for future educators (BYU students) to design culturally responsive curriculum, engage in mentored research, and experience teaching in diverse communities to prepare them to become reflective and competent teachers and researchers.

Culturally responsive teachers can more effectively connect the content of instruction to the interests and lives of their students because they have a deeper understanding of the historical and cultural contexts of their students' lives. Creating quality, culturally relevant educational opportunities among indigenous youth is a critically important but challenging task because of the existing conditions in many of these communities, which is often exacerbated by their geographical remoteness and cultural marginalization. An essential ingredient in developing intercultural competence is immersive experiential field experience. This project is designed to provide these experiences, create sustainable partnerships with Native communities, and investigate the affordances and limitations of STEAM education. **Collaboration.** This project brings together an interdisciplinary team of BYU faculty and AIS leaders and educators to develop innovative educational programs, scholarship, and creative work. Effective STEAM education requires collaboration between artists, and educators in art, design, and STEM disciplines.

According to American Indian Services, living conditions on many Indian reservations are comparable to third-world countries. Employment rates, educational attainment, and income are among the lowest in the nation. The American Indian Services (AIS) PREP program is designed to give middle school students enhanced STEM educational opportunities. AIS serves communities throughout the country, but particularly in the Intermountain West. We have developed a partnership with AIS that includes Chauma Jansen, Director of American Indian Services. We have been invited by the AIS Gallup site coordinators to develop an arts integrated program in the Gallup, NM site, which includes students from Navaho, Zuni, and Hopi tribes. **The aims of the IDR grant** are to create an interdisciplinary research partnership focused on effective arts integration and to develop intercultural competence among BYU pre-service educators. In practice, this will involve creating sustainable models of STEAM education within the existing PREP program. Since BYU pre-service art educators will be the instructors, our second aim is to develop teachers who are able to design responsive curricula and learning experiences for diverse populations of students.

II. Background: STEAM Education, Arts Integration, and Design Thinking

The emphasis on STEM disciplines in many schools has caused advocates for art education to propose the addition of the arts to the study of science, technology, engineering, and mathematics, transforming STEM into STEAM. A STEAM curriculum allows arts educators and their disciplinary counterparts to think about curriculum in a collaborative way in areas where science, technology, engineering, arts, and mathematics intersect.

STEAM education uses the methods of science, technology, engineering, mathematics, and the arts to guide student inquiry and design curricula content. STEAM education is an effective strategy to develop 21-century skills of skills of collaboration, creativity, and communication, and innovation (Allina, 2018; Katz-Buonincontro, 2018; Graham, 2021, 2022; Maeda, 2013; Sousa & Pilecki, 2018; Watson, 2016). STEAM has the potential to immerse students in a diversity of knowledge across the domains of science, technology, engineering, arts, and mathematics with an emphasis on connections between making and learning (Knochel, 2018). Arts integration is a practice of purposefully connecting ideas and skills from the arts with other subjects to open new ways of experiencing, representing, or gaining knowledge (Graham, 2022; Marshall, 2019; Peppler & Wohlwend, 2018).

STEAM education can develop skills and dispositions such as creativity, communication, problem solving, and improved academic engagement. Hybrid disciplinary approaches that include the arts can make learning more dynamic and meaningful by adding new perspectives on knowing. Engaging with the arts can promote the development of social and emotional intelligence including fostering the ability to empathize

with the experiences of others (Allina, 2018; Arts Education Partnership, 2018; Cattrell, 2017; Farrington et al., 2012; Frey et al., 2019; Jacobs, 2010; Horvath & Marshall; Knochel, 2018; Leimbach & Armstrong, 2018; Maddena et al., 2013; Maeda, 2013; Marshall, 2019; Pink, 2006; Pomeroy, 2012), Radziwill et al., 2015; Rollins, 2016; Workman, 2017).

Design Thinking

A significant trend in art, design, and engineering education is interdisciplinary collaboration using the construct of design thinking (Cross, 2011; Lahey, 2017). Design thinking is a process emphasizing observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, testing of prototypes and analysis of outcomes. This is a collaborative strategy for defining problems, devising solutions, building and testing prototypes, and refining solutions (Henriksen, 2017). Design thinking is used in business, education, engineering, and design to develop innovative solutions to complex problems. It can also provide a structure for teachers to develop the creative and interdisciplinary practices associated with STEAM education (Henriksen, 2017; Knochel, 2018).

Research Studies of Arts-Integration and Current Status of Research

Research for STEAM education is largely focused on the efficacy of arts integration. In 2017, the American Institutes for Research completed a comprehensive review of evidence-based strategies for arts integration that could qualify for funding under the Every Student Succeeds Act (ESSA). According to this report, 44 studies of arts-integration interventions met the definition of one of the four tiers of evidence under the ESSA Tiers of Evidence provisions (Ludwig et al., 2017). This meta-analysis is significant because in the United States, there has been an emphasis on “evidence-based research” for the funding of educational initiatives such as STEAM education.

Evidence of the effects of arts integration on student outcomes exists at all four ESSA evidence tiers. However, most arts-integration interventions are supported by Tier 4 evidence only (Ludwig, et al., 2017). This suggests that the value of arts integration in STEAM education programs needs additional research. According to a meta-analysis of the research, the average effect found in the 27 well-designed studies examined was statistically significant but modest in magnitude. This analysis noted a correlation between arts involvement and academic achievement and showed positive outcomes in a variety of school-related areas that correlated to involvement in the arts (Catterall, 2017; Sousa & Pilecki, 2018).

Culturally Responsive Teaching

A critical challenge for educators is how to teach and include diverse voices within the curriculum. It is a disturbing fact that many students feel left out and lose interest in school, in part, because they feel no connection to their own culture within school (Kraehe & Herman, 2020; Guthrie & Kraehe, 2015). At issue is a vexing challenge that many teachers and pre-service education students face; how to authentically engage with students from cultures that are different from their own background, within schools that often emphasize a Eurocentric curriculum. A key factor linked to student success is having culturally responsive curricula and culturally competent educators (Chalmers, 2002; Gay, 2000).

Place Based Education

Developing STEAM education programs for indigenous communities requires designing curricula and teaching that is responsive to students’ culture, community, beliefs, spiritual practices, artistry, and world views. A key theoretical construct for these types of educational programs is critical place-based education, which makes local culture, community, histories, and ecology important parts of the curriculum (Schulte, 2021). Place-based educators emphasize content that has reference to local traditions, communities, and ecosystems (Graham, 2007, 2017; Gruenwald & Smith, 2008). Critical place-based education connects curriculum and teaching to students’ lives by helping students become attentive to the ecology, natural history, and cultural history of the places where they live.

American Indian Services PREP Program

American Indian Services is a non-profit public charity whose mission is to provide scholarships and educational programs to Native Americans while ensuring that their cultural values are preserved. We will be working with the American Indian Services Pre-Freshman Program that challenges students in the 7th, 8th, and 9th grades by immersing them in the science, technology, engineering, and math for 6 weeks during the summer. Our project will add to this existing program an equally rigorous immersive experience in the visual arts where art will be integrated with existing STEM curriculum creating a STEAM educational experience. This project supports the aims of the PREP program including helping indigenous youth become

academically successful while at the same time honoring their cultural traditions, experiences, and personal funds of knowledge.

III. Project Goals

1. Create partnerships with teachers, educational leaders, indigenous scholars, and American Indian Services to design and implement STEAM educational programs for PREP students.
2. Explore the educational outcomes of a STEAM arts curriculum for PREP students and educators.
3. Develop strategies and experiences to cultivate intercultural competence among pre-service educators.
4. Create mentored research/experiential learning opportunities for graduate and undergraduate students.

IV. Interdisciplinary Team

Collaborator	Background	Role
Mark Graham (PI) Art/Art Education.	Dr. Graham is an expert on STEAM education, experiential learning, and arts integration (Estrada & Graham, in press, Graham 2021, 2020). He is an internationally known children's book illustrator and is experienced working with secondary students and teacher education, including culturally responsive education (Graham, 2022, Graham, 2019).	Supervision collaborative research and teaching, research design, and establishing partnerships with American Indian Services and community partners.
Tara Carpenter Estrada Art/Art Education	Tara is a ceramic and mixed media artist with established research in arts integration (Carpenter-Estrada & Graham, in press) with expertise in art education student practicum experiences.	Coordinate the design of the arts integration course and train undergraduate pre-service participants.
Paul Adams Photography	Paul Adams is an internationally known photographer who has worked with indigenous people throughout North America where he documented and interviewed the last native speaker of disappearing languages.	Paul will provide cultural background, photography expertise, and photo documentation.
James Swenson Art History	James Swenson is an art historian whose expertise is photography, Intermountain history and culture, and indigenous education in the United States. He has done extensive research with the Dine' people including the history of the arts in the Intermountain Indian School (King, Swenson, & Taylor, 2021).	Provide expertise on indigenous art and schooling, which forms an important background for our both the project and related research.
Michael Taylor English	Dr. Taylor is co-author with James Swenson of a book documenting indigenous art and the history of art education in the Intermountain Indian School (King, Swenson, & Taylor, 2021). His expertise is in North American indigenous studies, with a focus on building relationships with Indigenous communities, educators, and scholars.	Guide and advise our work on site and with American Indian Services, with whom he has long standing relationships.
Steve Shumway Technology and Engineering	Dr. Shumway has extensive experience designing K-12 technology and arts integrated projects including successful STEM professional development with local schools and districts including a McKay School of Education collaboration with K-12 educators "The Art of Engineering" which demonstrated the importance of art in engineering and how art can inform engineering design.	Dr. Shumway is the STEM education expert and consultant on the project.

V. Methodology

Research is a site of contestation among indigenous communities given the colonialist history of knowledge and research (Denzin, & Lincoln, 2008; Smith, 2008). A key goal of this project is developing

research partners in the communities we are working with in order to develop methodologies that are sensitive to indigenous knowledge, voices, and experiences. The participation of our partners is critical to the generation of research questions and developing research protocols. Indigenous ontology and epistemology are based on relationships. A fundamental aspect of our research is the premise that knowledge is relational and culturally situated. Relational accountability requires us to form reciprocal and respectful relationships within the community where we are doing research (Wilson, 2008). The challenge in designing the program and its evaluation is to create effective, culturally responsive educational experiences at the intersections of culture, science, and art (Lai, 2013; Prévost, 2013). We will use participant observations, interviews with individuals, focus group discussions and student creative work as sources of data. Student's creative work showcases their imagination but also what they know and can do with what they know (Penuel, 2022).

VI. Expected Project Outcomes

1. Develop sustainable partnerships with American Indian Services, schools, artists, educators, and researchers in the Gallup, NM location.
2. Design STEAM courses that are appropriately challenging and culturally responsive to middle school indigenous students.
3. Students in the PREP program will develop a range of artistic dispositions and 21st century skills related to their interdisciplinary study.
4. BYU undergraduate students will design culturally appropriate integrated curriculum and develop teaching skills that are culturally responsive to the indigenous students they will be teaching.
5. BYU students will gain understanding of indigenous research methodologies and become acquainted with how research works in school settings through mentored research opportunities.

6. Scholarship and Creative Work Deliverables

- a. Using the expertise of the faculty team we will submit 6 external proposals. This will include funding for at least 2 large projects and four or more medium and small projects.
- b. Scholarly articles. We will submit our work in *Studies in Art Education*, *Art Education*, *International Journal of Education in Art*, *Arts Education Policy Review*, *Educational Researcher*, *Journal of Education for Teaching*, and *Teaching and Teaching Education*.
- c. Experiential learning. Our pilot studies will include 24 undergraduates and 3 graduate students with additional opportunities for research and experiential learning in subsequent years

VII. Project Timeline and Expected Milestones

May 2022	IRB Approval for Pilot Study
March-April 2022	Visit research sites, meet with on-site instructors and leaders to develop research questions and protocols, explore local resources, and arts integration possibilities.
June 15-22	PREP students, instructors, and leaders will visit University art studios/museums
June 24-August 10, 2022	BYU faculty and art education pre-service students will expand literature review, plan and implement STEAM instruction, design research protocols, and gather data.
August to December 2022	Faculty team will evaluate program data in consultation with AIS partners, develop plans for future arts integration programs in 2023 and determine future research needs.
August-Nov 2022	Using results from pilot study, apply for NAEF external grants and Indigenous Communities Fellowship Challenge grants.
January-May 2023	Working with AIS partners plan 2023 STEAM projects
July-August 2023	Implement expanded programs and gather data based on revised research protocols.
Aug 2023-Jan 2024	Apply for external funding from NEA, NSF, and Spencer grants.

Budget

Year 1: Pilot Study (2022)

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| • Graduate student wages for up to 200 hours. | \$3,000 |
| • Undergraduate student research wages for up to 400 hours | \$4,800 |
| • Travel to research sites (April 2022) | \$1,300 |
| • Hosting and Supplies AIS leaders and students at BYU (June) | \$300 |
| • Travel to research sites: 12 students 4 faculty (June-July) | \$1,200 |
| • Accommodations, food for students and faculty (15 days) | \$6,500 |
| • Art supplies and materials | \$1,200 |
| • Hosting of partners on research sites (NM) | \$ 200 |
| • Local travel to significant art sites near the community | \$400. |

Preparing Grant Applications and Publications (2022)

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|---|--------|
| • Initial editing and formatting to style guide | \$600 |
| • Copy editing | \$300. |

Total: **\$20,000**

Year 2: Pilot Study Phase 2 (2023, details will be similar to 2022) **\$18,000**

2nd Phase: Preparing Grant Applications and Publications **\$2,000**

Total **\$20,000**

Other funding

- Art Department Experiential Learning Funds
- Art Department Endowment Grants

Budget Narrative

We currently have two graduate students (one Native American) who are prepared to be hired onto the project. We have two undergraduate students prepared to be hired onto the project and a robust cohort of undergraduate students who have committed to being part of the practicum course, which includes enrollment in ArtEd 378, K-12 Classroom Management, 3D Methods, and Community Arts Practicum.

- A significant item on the budget is student wages. We view collaboration with students as a major force-multiplier and way to for students to gain research experience. The graduate students involved are teachers, which gives them additional experience in working with curriculum development and mentoring undergraduate students. Involving students in practicum experiential curriculum design, research, and teaching projects will provide essential learning experiences for students. The PI team has a strong record of successful integration of undergraduate and graduate students in various types of research, art, and professional activity, including research on arts integration and STEAM education.
- Travel to the site prior to beginning the project is essential for developing relationships with the community and educators we will be working with as well as refining research questions and research protocols that are sensitive to important local cultural issues. A significant part of the research and related work must take place on site, in Gallup, New Mexico.
- The site (Gallup, NM) for the pilot was chosen by AIS because of the vibrant local arts community and because of its isolation relative to other sites. Our AIS partners felt that this was one of the more underserved populations within their jurisdiction.

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Plans for External Funding

Grant Program	Proposal	Amount	Deadline	Lead PI
National Art Education Foundation (NAEF)	Project and Research Support for STEAM arts integration	\$21,000 (2 years)	Oct 31, 2023, 2024	Graham
NSF Education and Human Resources Core Research Discovery Research K-12	Project and Research Support for STEAM arts integration to support STEM education	\$400,000	October 2022, 2023	Graham
NSF Facilitating Research at Primarily Undergraduate Institutions	Research Support for STEAM arts integration and undergraduate research	\$300,000	Jan 2022, 2023	Graham, Carpenter-Estrada
Spencer Foundation Small Research Grants	Research support for education research project for the improvement of education	\$50,000	April and Oct 2022, 2023	Graham-Carpenter-Estrada
The Indigenous Communities Fellowship	Research support for educational innovations in indigenous communities	\$10,000	February 2022, 2023	Graham and AIS
National Endowment for the Arts (NEA)	Transdisciplinary arts research support for innovation/learning	\$50,000 (matching)	March 28, 2022, 2023	Graham, Adams

1. National Art Education Foundation Grants (\$10,500) grants support art education programs and research. The PI for the proposed project is the recipient of two previous NAEF grants. We will apply for NAEF grants in October 2023 and again in October 2024 **based on the IDR supported program.**

2. NSF Education and Human Resources Core Research (\$400,000/3-5years). The ECR program supports research that contributes to the general, explanatory knowledge that underlies STEM education in the research areas of: STEM Learning and Learning Environments and Broadening Participation in STEM fields. The ECR program supports a wide range of fundamental STEM education research activities, aimed at learners of all groups and ages in formal and informal settings. We will apply for \$400,000 to support the research project for 3 to 5 years **based on the evidence from our EDR pilot studies.**

3. NSF Facilitating Research at Primarily Undergraduate Institutions (\$300,000) provides funding for faculty members at predominantly undergraduate institutions (PUIs). RUI proposals support faculty in research in their professional field(s), builds capacity for research at their home institution, and supports the integration of research and undergraduate education, which is a key element of our project.

4. Spencer Foundation Small Research Grants: The Small Research Grants on Education Program supports education research projects that will contribute to the improvement of education, with budgets up to \$50,000 for projects ranging from one to five years that span a wide range of topics and disciplines that innovatively investigate questions central to education **including STEAM, diversity, equity, and inclusion.**

5. The Indigenous Communities Fellowship (\$10,000) serves to provide Native innovators with the support and resources they need to advance their work designed to support integration of culturally grounded solutions to Native educational challenges. **The IDR will provide evidence for these grants.**

6. National Endowment for the Arts Research Grants in the Arts funds research studies that investigate the value and/or impact of the arts, including Research Lab programs. Matching/cost share grants of \$10,000 to \$100,000 are awarded. The NEA Research Labs program offers grant funding for longer-term research agendas. This includes multiple research studies and activities that build and inform the field throughout the life of an NEA Research Lab. Each NEA Research Lab will design a transdisciplinary research agenda, conduct project activities to execute that agenda, and prepare and disseminate reports and other products or services that will contribute substantively to a wider understanding of one of three areas of special interest to the NEA. **The IDR supported pilot will provide a credible track record and institutional partnership for a Research Lab Grant.**

Biographical Sketch 1.

Mark Allen Graham
Professor, Brigham Young University

A. Professional Preparation

Teachers College of Columbia University, New York, NY Ed.D. 2002. Curriculum and Teaching.
New York University, New York, NY Master of Business Administration, 1986.
University of Utah Bachelor of Fine Arts, 1978

B. Professional Appointments

2005-Present **Brigham Young University, Provo, Utah Professor, College of Fine Arts**
2002-2004 **Washington State University, Pullman, Assistant Professor, College of Education**
1992-2002 **Port Washington Public Schools, Port Washington, New York**
Art Department Chairman and District Coordinator of Visual Arts

C. Products Most Closely Related to the Proposed Project

Carpenter-Estrada, T. & Graham, M. A., (in press). **Teacher Collaboration and Elementary Arts Integration: Policy and Possibility.** *Arts Education Policy Review*.

Graham, M. A. & Carpenter-Estrada, T. (2021). **Integrated Learning in Elementary Education: Promising Possibilities.** *Childhood Education Innovations*, November/December 2021.

Graham, M. A. (2021). **The Disciplinary Borderlands of Art Education: Art and STEAM Education.** *Infancia y Aprendizaje, / Journal for the Study of Education and Development*. 44(4).

Graham, M. A. (2020). **Deconstructing the Bright Future of STEAM and Design Thinking.** *Art Education* 73(3), 6-12.

Graham, M. A. (2019). Design Thinking, Arts-Based Research, and Ethnography. *Decipher Conference Proceedings* 2018. Ann Arbor: Michigan Publishing.

Graham, M. A. & Neves, M. (2018). **Place-Based Practice: Landscape and Artistic Identity in an Elementary Art Classroom.** *Art Education* 71 (4).

Omasta, M. Graham, M.A. Milling, S. L Murray, E. , Jensen, A. & Siebert, J. J. (2021) **Social emotional learning and the national core arts standards: a cross-disciplinary analysis of policy and practices** *Art Education Policy Review* 122 (3).

Graham, M. A. (2021). **Mentoring as Adventure.** *The Chronicle of Mentoring & Coaching*, University of New Mexico.

Graham, M. A. and Andrus, M. (2017). **Research as Method: A Maoli Based Art Education.** In K Staikidis & C. Ballangee-Morris, (Eds.) *Transforming our Practices: Indigenous Art, Pedagogies, and Philosophies*. National Art Education Association.

Graham, M. A. (2015). **Ecological Inquires in a Relational World.** In K. M. Miraglia & C. Smilan (Eds.) *Inquiry in Action*. National Art Education Association.

Graham, M.A. (2013). **Ideas about Nature: Wilderness, Sustainability, and Sacred Places.** *The International Journal of Arts Education* 11 (1).

Graham, M. A. (2011). **The Art of Collecting, Material Culture, and Place-based Education.** In P. Bolin & D. Blandy (Eds.). *Matter matters*. National Art Education Association.

Graham, M. A. (2007). **Art, Ecology, and Art Education: Locating Art Education in a Critical Place Based Pedagogy.** *Studies in Art Education*, 48 (4).

Graham, M. A. (2007). **Exploring Special Places: Connecting Secondary Art Students to Their Long Island Community.** *Art Education*, 60(3).

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

- Graham, M. A. & Goldsberry, C. (in press). *Theory and Provocations for the Artist Teacher: Reimagining the Art Classroom* Intellect.
- Graham, M. A. (in press). **Deconstructing the Advanced Placement in Studio Art Portfolio.** In C. Smilan & R. Siegesmund (Eds.). *Authentic assessment for reflective practice by teachers and students.* National Art Education Association.
- Graham, M. A., Goldsberry, C. & Calvert I. (in press). Anyone can make a Religious Object: Undoing spirituality and contemporary art. *Journal of Contemporary Religion.*
- Graham, M. A. (2022). **Deconstructing Narratives about Artistic Mastery.** *Journal of Cultural Research in Art Education.* Editor Joni Boyd Acuff
- Graham, M. A. & Buehler, F. (2021). **Figure Drawing and Alternative Narratives of Artistic Mastery.** *Drawing Research Theory Practice* 6(1).
- Graham, M. A. & Lewis, R. (2020). **Mindfulness, Self-Inquiry, and Artmaking.** *British Journal of Educational Studies.*

Creative Activities: Illustrated Books

Coloring Book Illustration for **RxART**, a nonprofit organization whose mission is to help children heal through visual art.

The Hem of Enlightenment Graham, M. A. and Goldsberry, C. 2017

A Field Guide to Insects of the Mohave Graham, M. A., Bennion, J. Nelson, R., 2016.

The Fringe of Nirvana Graham, M. A. & Goldsworthy, C. , 2016

The Dream Jar, illustration for *Cricket Magazine, November*, Carus Publishing, 2013

Christmas Fudge, illustration for *Spider Nov/Dec.*, Carus Publishing, 2012

Charlie Anderson, Margaret McElderry, NY, licensed to Teaching Strategies Inc. primary and pre-school education program, in English and Spanish editions, 2010.

Naughty Cherie by Joyce Carol Oates, published by Harper Collins, 2008.

I Am a Dancer by Pat Lowrey Collins, published by Millbrook Press, 2008.

Pajama Light by Gale Jacobs, published by Dutton Children's Books, 2006.

Where is Little Reynard, by Joyce Carol Oates, published by Harper Collins, 2003.

Grants and Awards

Fulbright Specialist Grant: Fulbright Specialist Designation, 2019-2023

Fulbright Award: South Asia Regional Research Program, 2019-2021.

Frontier Fellowship: Utah Arts Council 2019-2020.

La Laycock Grant for Creative Collaboration: Nepal 2020

Laycock Grant for Creative Collaboration: Northern Scotland 2019

CITES Grant, McKay School of Education: A Study of Integrated Arts Learning in Utah Public Schools.

Redd Center for Western Studies Grant: Green River Project 2019-2020

NAEF Foundation Grant 2015-2016: A study of Secondary Design Programs.

Co-Director of Two Field Studies in India and Nepal, 2015-2017: Laycock and BYU Mentoring Grants

Manuel Barkan Memorial Award of the National Art Education Association 2008.

Biographical Sketch 2.

Tara Carpenter Estrada
Assistant Professor, Brigham Young University

A. Professional Preparation

University of Utah, Fine Arts, MFA, 2012

B. Professional Appointments

Assistant Teaching Professor: Brigham Young University Provo, UT, August 2015-Present

Visiting Assistant Professor: Full time 3-year appointment, Brigham Young University Provo, UT August 2012-July 2015

C. Products

i. Products Most Closely Related to the Proposed Project

Publications:

Carpenter-Estrada, T. & Graham, M. A., (in press). **Teacher Collaboration and Elementary Arts Integration: Policy and Possibility.** *Arts Education Policy Review*.

Graham, M. A. & Carpenter-Estrada, T. (2021). **Integrated Learning in Elementary Education: Promising Possibilities.** *Childhood Education Innovations*, November/December 2021.

Estrada, Tara Carpenter and May, Brittany Nixon (2019). **Building Bridges with Bach: Syntegration of Music and Visual Art**, *General Music Today*, Volume 32, Issue 3

Carpenter, Tara and Johnson, Jayme (2018). **Making connections: collaborative arts integration planning for powerful lessons**, *Art Education*, Volume 71, Issue 4

Graham, Mark Allen and Estrada, Tara Carpenter (2019). **Contemporary artist/teacher meets a mid-century classroom: Practice, theory and becoming an art teacher**, *Visual Inquiry*, 8, Issue 1.

Program Director for BYU Jumpstart(ART), 2015-present

Coordinate and organize continuing education classes, mentor BYU students as they teach art to K-12 students on campus.

CITES (Center for the Improvement of Teacher Education and Schooling) grant research, 2018-2020 As the PI, with a team that included two other faculty (Mark Graham and Corinna Peterken) and four research assistants, we were funded \$20,200 to run a large-scale study of arts integration in the Beverly Taylor Sorenson Arts Program in 5 school districts.

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

Gallery Exhibitions:

Gather, Curated regional exhibition that focused on the power of gathering women in conversation, Art Access Gallery, Salt Lake City, UT, April 2019

Be it Ever So Humble, Curated group exhibition focused on issues of home and family, Utah Cultural Celebration Center, West Valley City, UT, January-March 2017

Finding Balance, Curated small group show focused on balancing the demands placed on women, Art Access Gallery, Salt Lake City, UT, February-March 2015

A Woman's Work is Never Done, Juried National exhibition focused on issues of women/artists, New Port Richey, FL 2007

Selected International and National Juried Conference Presentations

Foundations in Art: Theory and Education Conference, Online 2021, Presentation: A Non-major's view of Art Classes

Care/Giving, series of four prints and an essay focused on caring for women published in the Journal of the Motherhood Initiative (a peer-reviewed scholarly journal), Volume 11, Number 1, July 2020

Presentations:

An Artist and A Mother, Faith and Works Lecture, Brigham Young University, February 2017 As part of this project, I worked with film students to video interview several artists/mothers about their experiences. . The lecture and interviews are available publicly on YouTube.

InSEA World Congress, Vancouver, CA 2019

Presentation: Art vs. Craft: A False Dichotomy

National Art Education Association Convention, Seattle, WA 2018

Presentation: The Challenges and Possibilities of Student teaching: What Makes Great Student Teachers and Mentors

National Art Education Association Convention, New York, NY 2017

Presentation: Many Schools, Many Stories: Insights from Classrooms in Nepal and India

National Council on Education for the Ceramic Arts, Portland, OR 2017

Presentation: Concept in the Classroom

Publications

Estrada, Tara Carpenter (2019), **Art vs. Craft: A False Dichotomy**, Making: Proceedings of the InSEA 2019 World Congress

Selected International and National Juried Exhibitions

Catharsis, Juried International Exhibition, Online Exhibition hosted by the Teaching Artist Podcast, February 2021

Shear Madness, Juried Collage Exhibition, Northville Art House, MI, January 2021

Adorned, Juried National Exhibition, Clay Center of New Orleans, LA, September 2019

Twin Cups: National Ceramics Exhibition, Juried national exhibition, Missouri Western State University Clay Guild, St. Joseph, MO, February 2019

Amuse Yeux, Juried national exhibition, Foothills Art Center, Golden, CO, June-August 2018

NAEA (National Art Education Association) Exhibition, Juried group exhibition, NAEA Studio and Gallery, Alexandria, VA, October 2017-April 2018

Fire and Earth, Juried national group exhibition, Del Ray Artisans Gallery, Alexandria, VA, Sept.-October 2016

D. Synergistic activities

Arts Education Policy Review Board, Visual Art Representative, 2020-Present

InSEA(International Society for Education through the Arts) Conference proposal reviewer, 2018

UAEA (Utah Art Education Association) Board member, Higher Education Representative, 2018-Present

Co-Director of Two Field Studies in India and Nepal, 2016-2017

Biographical Sketch 3.

James Swenson

Associate Professor, Brigham Young University, Art History

A. Professional Preparation

Ph.D. University of Arizona 2009 History of Photography and Art History

M.A. Brigham Young University 2000 Art History and Curatorial Studies

B.A. Brigham Young University 1998 Art History and Curatorial Studies

B. Professional Appointments

2008 – Present Associate Professor, Art History, Brigham Young University

2007 Visiting Professor, Art History, Brigham Young University

2005-2007 Associate Instructor, Art History, University of Utah

2006, 2008 Adjunct Instructor, Centro Studi Città di Orvieto, Italy

2004-2007 Adjunct Professor, Art History, University of Arizona

C. Products Most Closely Related to the Proposed Project

Scholarly Publications: Books

Returning Home Intermountain: Exploring the Art and Poetry of the Intermountain Indian School, Co-Author with Michael Taylor and Farina King (2021).

In A Rugged Land: Ansel Adams and Dorothea Lange's Three Mormon Towns Collaboration, 1953- 1954 (Salt Lake City: University of Utah Press, 2018). Recipient of six awards.

Picturing Migrants: The Grapes of Wrath and New Deal Photography (Norman: University of Oklahoma Press, in association with the Charles M. Russell Center Series on Art and Photography of the American West [Volume 18], 2015).

Book Chapters, Essays, and Articles

Co-editor and introduction to Weaving the Unexpected: Navajo Pictorials from the Lucke Collection, Museum of Art, Brigham Young University, 2015.

"Ragged Places and Rugged Men: Photography, the American West, and Masculine Mettle," in Across the West and Toward the North: Norwegian and American Landscape Photography, eds. Shannon Egan and Marthe Fjellestad (in press).

"New Cartographics: Photography and the Artistic Mapping of the American West, 1969-1979." In "The Cartographic Imagination: Art, Literature and Mapping In Postwar America," edited by Monica Manolescu and Will Norman. European Journal of American Culture 39, no. 1 (March 2020): 83-104.

"Bound for the Fair: Chief Joseph, Quanah Parker, and Geronimo and the St. Louis World's Fair, 1904." American Indian Quarterly 43, no. 4 (Fall 2019): 439-470.

"Capitol Reef's Most Famous Photograph: Minor White's Moencopi Stratus, 1962."
"In A Capitol Reef Reader, ed. Stephen Trimble (University of Utah Press, 2019): 277- 284.

"Utah : 800: Christine Armbruster's Photo-essay and the Continuing Documentation of Small-Town Utah, 2010-2016," Utah Historical Quarterly 86, no. 4 (Fall 2018): 350- 365.

"Reflections in the Water: An Exploration of the Uses of C.R. Savage's 1875 Photograph of the Mass Shivwit Baptism," Journal of Mormon History 43, no. 3 (July, 2017): 96- 121. * Recipient of the LeRoy S. Axland Best Utah History Article Award, Utah Historical Society, 2018.

“Maynard Dixon and the Forgotten Man,” in *Locating American Art, Finding Art’s Meaning in Museums Colonial Period to Present*, ed. Cynthia Fowler (Brookline, VT: Ashgate, 2016), 139-152.

“Imaging the Colorado Plateau: A Brief History,” *Sojourns* (Fall 2015): 14-25.

“Dorothea Lange’s Portrait of Utah’s Great Depression,” *Utah Historical Quarterly* 70 no.1 (Winter 2002): 39-62. * Morris S. Rosenblatt Award for Best General Interest Article, Utah Historical Society

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

“Life comes to Arches: Josef Muench’s 1954 Photograph of Delicate Arch, Utah.” (in press, *Arches National Park Reader*, University of Utah Press).

“A Strategy of Truth: Andreas Feininger and the Creation of Propaganda for the Office of War Information (OWI), 1942.” *History of Photography* 43, no. 1 (2019): 84-109.

“Behind the Scene: Zachary Proctor’s Paintings of the Railmen.” *Utah Historical Quarterly* 88, no. 3 (Summer 2020): 219-226.

“The Frontier in Paris: Artists from the American West in the French Capitol, 1890- 1900.” *TransAtlantica: Revue d’Études Américaines/American Studies Journal* 2: 2017 (Summer 2019).

<https://journals.openedition.org/transatlantica/10747>

“Lindstrom: In Context,” in *The Art of Gaell Lindstrom: Painter of Life and Land in Utah and Beyond* (Seattle: Chatwin Books, 2019), 2-18.

“Copper for Victory: Andreas Feininger’s 1942 Photographs of Utah’s Bingham Canyon Mine and Trains,” *Railroad Heritage* (Summer 2014): 16-25.

“Focusing on the Migrant: The Contextualization of Dorothea Lange’s Photographs of the John Steinbeck Committee, 1938,” in *Ambivalent American: The Political Companion to John Steinbeck*, eds. Cyrus Ernesto Zirakzadeh and Simon Stow (Lexington: University Press of Kentucky, 2013), 191-226. 4

“Passing Through: Arthur Rothstein’s Photographic Account of Utah, March 1940” *Utah Historical Quarterly* 74 no. 1 (Winter 2006): 66-79.

Exhibition Catalogs, & Essays

Light Will Always Endure: Contextualizing Vanishing Voices,” in Paul Adams + Jordan Layton / *Vanishing Voices* ex. cat., Granary Arts, Ephraim, Utah. (January 2021).

“In Place: Ruminations on Photographs by Vicky Sambunaris,” in *Far-Out: The West ReSeen*, Photography of Victoria Sambunaris ex. cat. (Provo: Brigham Young University Museum of Art, 2020).

Grants and Awards

2020 The David W. & Beatrice C. Evans Biography Award for *In a Rugged Land: Ansel Adams, Dorothea Lange and the Three Mormon Towns Collaboration, 1953-1954*. Mountain West Center for Regional Studies, Utah State University.

2020 Humanities+ Public Humanities Award (for *Returning Home Intermountain Project*). College of Humanities, Brigham Young University.

2020 Finalist, Reading the West Book Award for Visual Non-fiction for *In a Rugged Land: Ansel Adams, Dorothea Lange and the Three Mormon Towns Collaboration, 1953-1954*.

2019 Joan Paterson Kerr Book Award for best illustrated book on the history of the American West, for *In a Rugged Land: Ansel Adams, Dorothea Lange and the Three Mormon Towns Collaboration, 1953-1954*. Western History Association.

Biographical Sketch 4.

Paul Adams

Professor, Brigham Young University

A. Professional Preparation

M.F.A. Photography, Utah State University '96

B.F.A. Photography, Brigham Young University '94

B. Professional Appointments

Brigham Young University, Professor. '03 – present

Tameside College, Ashton-Under-Lyne, England,

Fulbright Exchange Instructor. '02 - '03

Florida Keys Community College, Assistant Professor. '97-2003

Utah State University, Adjunct Instructor. '96-'97

C. Products Most Closely Related to the Proposed Project

International Juried Shows:

- 2021 *LensCulture Portrait Awards 2021* 38 Finalist (19 countries and 5 continents).
- 2021 *Photo Review 2020* Woodmere Art Museum Philadelphia, PA.
- 2021 *52nd Dallas Show*. The Dallas Society of Visual Communications.
- 2021 *Black and White*. BROOKLYN, NY
- 2021 *Communication Arts 62nd Photography Annual Competition*, Communication Arts Magazine.
- 2021 *American Photography 37* AI-AP, American Illustration American Photography
- 2021 *In Conversation With The Land* Center For Fine Art Photography Fort Collins, CO
- 2020 *Communication Arts 61st Photography Annual Competition* Communication Arts Magazine
- 2020 *IPA – International Photography Awards* New York, New York (**Honorable Mention**).
- 2020 *Texas Photographic Society 29th Annual International*. The Center for Contemporary Arts, Abilene, Texas
- 2020 *Black & White 2020* New York Center For Photographic Arts
- 2019 *Royal Photographic Society International Photo Exhibition* RPS House, Bristol England
- 2019 *PCNW 22nd Juried Photography Exhibition* Photographic Center Northwest
- 2018 *2018 International Juried Exhibition* Center for Photographic Arts
- 2015 *Moscow International Foto Awards* FotoLoft Gallery
- 2015 *London International Creative Competition*. London, England (Honorable Mention).
- 2013 *International Kontinent Awards* Izmir, Turkey (**Second Place Award for Fine Art Projects**).
- 2012 *155th International Print Exhibition 2012* Royal Photographic Society
- 2011 *2011 Communication Arts Photography Competition*, Communication Arts Magazine.

NATIONAL JURIED SHOWS

- 2020 *Artist Who Teach 2020* Ellington-White Gallery Fayetteville, NC
- 2019 *The Outwin Boochever Portrait Competition*. The National Portrait Gallery, Smithsonian Museum Washington D.C.
- 2018 *American Landscapes Exhibition* Maryland Federation of Art Circle Gallery, Annapolis, MD
- 2015 *2015 West of the Mississippi Juried Show* Clymer Museum Ellensburg, WA

Grants and Awards

- 2020 Emmeline B. Wells Grant, Brigham Young University
2016 Charles Redd Center for Western Studies, Research Award
2003 Fulbright Teacher Exchange – England

Publications:

- 2021 *Emergence Magazine*
2020 *Communication Arts Magazine*
2018 *PDN Fine Art Photography Issue* August
2011 *2011 Communication Arts / Photography Annual*

Permanent Collections

Chattahoochee Valley Art Museum LaGrange, GA
The Illinois Institute of Art Chicago, IL
State of Utah, Utah Arts Council Salt Lake City, UT
Brigham Young University Museum of Art Provo, UT
University of Northern Iowa Cedar Falls, Iowa
Norra Eccles Harrison Museum of Art Logan, UT
Robert Weinreb Tenba Corporation New York, New York
Lamar Dodd Art Center LaGrange, GA

Biographical Sketche 5.

Michael Taylor

Assistant Professor, Brigham Young University

A. Professional Preparation

2012–2016	PhD, English, University of British Columbia
2010–2012	MA, American Studies, Ruprecht-Karls-Universität Heidelberg
2006–2010	BA, English, German Studies, Brigham Young University

B. Professional Appointments

2016–present	Assistant Professor, Brigham Young University
2015	Instructor of Record, University of British Columbia, Institute for Gender, Race, Sexuality, and Social Justice

C. Products Most Closely Related to the Proposed Project

Books

- | | |
|------|--|
| 2021 | <i>Returning Home: Diné Creative Works from the Intermountain Indian School</i> , U of Arizona Press, co-written with Dr. Farina King and Dr. James Swensen, Fall 2021. |
| 2021 | “Re-Constituting Indigenous Solidarity: Tracing Co-National Networks through the Writings of Gertrude and Raymond Bonnin.” <i>Native American and Indigenous Studies</i> , Fall 2021. |
| | “‘Indians MUST Organize’: Reconstituting Indigenous Modernity through the Writings of the National Council of American Indians,” <i>Modernism/modernity</i> , Winter 2021. |
| 2020 | “‘Indian Kids Can’t Write Sonnets’: Re-membering The Poetry of Henry Tinnhorn from the Intermountain Indian School.” <i>American Quarterly</i> , vol. 72, no. 1 (2020): 25–53. (co-written with BA student, Terence Wride) |
| 2016 | “Not Primitive Enough to Be Considered Modern: Ethnographers, Editors, and the Indigenous Poets of <i>The American Indian Magazine</i> .” <i>Studies in American Indian Literature</i> vol. 28, no. 1 (2016): 45–72. |

Peer-Reviewed Chapters

- | | |
|------|--|
| 2021 | “Petitioning Allotment: Collectivist Stories of Indigenous Solidarity.” <i>Allotment Stories: Narrating Indigenous Land Relations under Settler Siege</i> , edited by Daniel Heath Justice and Jean M. O’Brien, U of Minnesota Press, Fall 2021. |
|------|--|

2019	"In the Literature of the Lamanites: (Un)settling Mormonism in the Literary Record of Native North America, 1830–1930." <i>Essays on American Indian and Mormon History</i> , edited by P. Jane Hafen and Brenden Rensink, U of Utah Press, 2019.
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Grants and Awards

2020	Honorable Mention, American Literature Society's 1921 Prize, awarded annually for the best article in any field of American literature
2020–2023	Butler Young Scholar Award, Charles Redd Center, Brigham Young U.
2017	American Studies Professor of the Year, Brigham Young University Interdisciplinary Studies Grant, Charles Redd Center

University

2018–present	Associate Director, American Indian Studies, College of Family, Home, & Social Sciences
2017–present	Facilitator, BYU Indigenous Studies, Interdisciplinary Learning Group

Community

2019–present	Founding Director, Indigenous Initiatives Internship
Program 2018–present	Volunteer, BYU Native American Alumni Chapter
2017–present	Volunteer, Provo City School District and Nebo School District Title VI, American Indian Education

Biographical Sketch 6.

Steven L. Shumway Ph.D.
Professor, Brigham Young University

A. Professional Preparation

Ph.D., Utah State University, Education- Curriculum and Instruction (1999)

M.S., Utah State University, Industrial Technology and Education (1993)

B.S., Brigham Young University, Industrial Education (1987)

B. Professional Appointments

Professor, Brigham Young University (2016 - present): Technology and Engineering Education Program, School of Technology, Fulton College of Engineering and Technology

Associate Professor, Brigham Young University (2006 - 2016): Technology and Engineering Education Program, School of Technology, Fulton College of Engineering and Technology

Assistant Professor, Brigham Young University (1999 - 2006): Technology and Engineering Education Program, School of Technology, Fulton College of Engineering and Technology

Instructor (Electronics/Technology), Hillcrest High School – Jordan School District, Midvale, UT (1987 - 1993)

C. Products Most Closely Related to the Proposed Project

Scholarly Publications

Rich, P., Jones, E., Shumway, S., Miner, A., Anderson, N., (Under Review) Elementary School Engineering: Measuring Teachers' Beliefs and Self-Efficacy in Elementary Engineering (BSEEE-T), *Journal of Engineering Education*. American Society for Engineering Education

Bell, M., Shumway, S., & Wright, G. (2020). An Investigation of the Impact of a Flipped Classroom Instructional Approach on High School Students' Content Knowledge and Attitude Toward the Learning Environment. *Advances in Social Sciences Research Journal*, 7(5), 338-349

Bartholomew, S., Mahoney, M., Warner, S., Lecorchick, D., Shumway, S. (2020). Our Curriculum: What Exactly do We Teach in TEE?, *Technology and Engineering Teacher*, International Technology and Engineering Education Association, Reston, VA. 79 (5), 1-8

Rytting, M., Wright, G., Shumway, S., Jensen, J. (2019). Comparison of Simulation and Hands-on Labs in Helping High School Students Learn Physics Concepts, *International Journal of Education*, Macrothink Institute, Las Vegas, Nevada

Wright, G., Shumway, S. (2018). Engineering attitudes: an investigation of the effect of literature on student attitudes toward engineering, *International Journal of Technology and Design Education*, (July), 1-13.

Siebert, D, Draper, R. J., Grierson, S., Barney, D., Broomhead, P., Jensen, A. P., Nokes, J. D., Shumway, S., & Wimmer, J. J. (2016). Characteristics of Literacy Instruction that Supports Reform in Content-area Classrooms. *Journal of Adolescent & Adult Literacy*, 60 (1). 25-33.

Rose, M.A., Shumway, S., Carter, V., Brown, J. (2015). Identifying Characteristics of Technology and Engineering Teachers Striving for Excellence Using a Modified Delphi. *Journal of Technology Education*, 26 (2), 2-21.

Bartholomew, S., Wright, G.A., Shumway, S.L., Terry, R.E. (2012). Analysis of five instructional methods for teaching Sketchpad to junior high students. *Journal of Technology Education*, 24 (1).

Draper, R.J., Adair, M., Broomhead, P., Gray, S., Grierson, S., Hendrickson, S., Jensen, A., Nokes, J., Shumway, S., Siebert, D., Wright, G. (2011). Seeking renewal, finding community: Participatory action research in teacher education, *Teacher Development*, 15 (1), 1-18. Routledge Journals: Abingdon, Oxfordshire, UK.

K-12 Professional Development Projects

Shumway, S, (2021). *Integrated STEM curriculum development*: Professional development for elementary school teachers. Desert Canyons Elementary, Washington County School District, St George, UT. Sept. 30 – October 1.

Shumway, S. (2021). Integrated STEM Curriculum for Middle School Exploring Technology Courses. Professional Development for middle school Science, Math and Technology and Engineering Teachers. Granite School District; July 12-14, Sept. 16, Sept. 23, Granite Technical Institute, Salt Lake City.

Shumway, S, (2021). Engineering Content for Elementary-Level STEM Endorsements: Utah State Board of Education. Professional Development conducted for the Utah State Board of Education through National Science Teachers Association (NSTA) in conjunction with BYU Physics Education,

Shumway, S. (2020). Integrated STEM Curriculum for Middle School Exploring Technology Courses. Professional Development for middle school science, Math and Technology and Engineering Teachers. Granite School District; August 4-5, Granite Technical Institute, Salt Lake.

Shumway, S, (2020). *Integrated STEM curriculum development*: Professional development for elementary school teachers. Provo School District: Virtual Sessions Grades k-5, June.

Shumway, S, (2019). *Integrated STEM curriculum development*: Professional development for elementary school teachers. Washington County School District, St George, UT. Washington Co. School District Office, August 19-21.

Grants and Awards

2013-2015 (Co-PI). *Advancing Informal STEM Learning Through Alternate Reality Games*: National Science Foundation: Award # 1323787 for a total of \$1,250,000. Full-Scale Development: Collaborative Research Advancing Informal STEM Learning Through Scientific Alternate Reality Games (ARG). This is a collaborative NSF grant with the University of Maryland. The University of Maryland grant is for \$684,000 with Kari Kraus as PI and the BYU grant Co-PI and the BYU grant is for \$1,250,000 with Derek Hansen as PI and Steve Shumway as Co-PI.

2004-2009. (Co-Director of Brigham Young University Site): *National Center for Engineering and Technology Education* (NCETE). The center was funded for \$10,000,000 by the National Science Foundation in 2004 under NSF program award 0426421 <http://ncete.org/flash/index.php>
The funded research portion of my faculty profile, BYU's allocation on this grant was approximately \$150,000 for 6 years.

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

Shumway, S & Wright, G. (2010). (Re)Imagining Literacies for Technology Classrooms. In R.J. Draper (Ed). *(Re)Imagining Content-Area Literacy Instruction*, (Chapter 6). New York: Teacher College Press-Columbia University.

Current and Pending Support (for each team member)

1. The Art Department has committed experiential learning funds for undergraduate and graduate students to work on this project. The Art Department has also obtained donor funding for the project. These funds are particularly important as we seek grants that require matching funding.
2. Dr. Graham has a Fulbright Specialist Grant from the US State Department to develop STEAM programs in Nepal. He also has a Laycock Interdisciplinary grant from the College of Fine Arts and Communication to support mentored student research for the Nepal project.
3. Professor Carpenter-Estrada is PI of a track 2 IDR Grant.
4. Professor Taylor is in the 2nd year of a 3-year Butler Young Scholar Award, Charles Redd Center, for study of culture of the Intermountain West.