

# International Community for Collaborative Content Creation

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## ABSTRACT

Through funding by the Advancing Informal STEM Learning (AISL) program of the US National Science Foundation, Pepperdine University's Graduate School of Education and Psychology formed the International Community for Collaborative Content Creation (IC4). This "Research in Service of Practice" project consists of participants from Brazil, Finland, India, Kenya, Namibia, and USA. It allows students ranging from upper elementary school through high school to collaborate across cultures and international borders on STEM-focused digital media artifacts to examine current issues in their community or the world. Using a hands-on approach, students are challenged to use their diverse backgrounds and technological resources available at their schools to co-develop innovative solutions and media through their collaborative research, learning, and thinking.

## DESCRIPTION

### Description of your setting

Through funding by the Advancing Informal STEM Learning (AISL) program of the US National Science Foundation, Pepperdine University's Graduate School of Education and Psychology formed and the coordination of Dr. Eric Hamilton (Pepperdine University), the International Community for Collaborative Content Creation (IC4) was formed. This "Research in Service of Practice" research project, consisting of participants from six countries including Brazil, Finland, India, Kenya, Namibia, and USA. It , allows students ranging from upper elementary school through high school to collaborate across cultures and international borders on STEM-focused digital media artifacts to examine current issues going on in their community or the world.

South Fayette School District is one of the USA-based IC4 sites. It is a suburban school district in a relatively middle to upper class community. It is a member of the League of Innovative Schools. The *Pittsburgh Business Times* ranks it as the top school district in the region. South Fayette School District is also the fastest growing school district in Pennsylvania, mainly due to the proximity to the city of Pittsburgh and the extraordinary educational opportunities afforded to the students, include ties to local design manufacturing companies.

The middle school IC4 students, grades 6-8, have been selected to participate in IC4 based upon their interest in Science, Technology, Engineering, Arts, Mathematics (STEAM) and media related activities. For instance, students may have been invited to participate in the project because they volunteered to be a part of media club, attended a summer STEAM camp, or because a teacher or fellow student recommended them to the program's teacher leaders. There are currently twenty students, eleven girls and nine boys, enrolled in the program at South Fayette. Eight of the students come from a minority background, and twelve are white/caucasian. South Fayette holds an annual Summer Institute providing professional development for teachers from other school districts across the country. Many of the sessions are student led, giving students a chance to demonstrate their knowledge while helping other districts with their technological advancements.

### Description of the educational experience

IC4 members are a part of an international network of fellow members in collaboratively developing media artifacts to address STEM (science, technology, engineering, math) subjects and other informational topics for learning. These artifacts can be created using a variety of platforms and materials. Students start by creating an introductory multimedia presentation about themselves and their interests, using the Microsoft Sway program. This helps them introduce themselves and begin to learn one of the presentation platforms that the IC4 community uses in every country. Members then progress through levels of collaboration and achievement (see Table 1) as they complete projects. "All new members start on Level 1 to build their own skills first. Experienced members may prefer to work on Level 1 as well. Returning IC4 members will usually be eligible for Level 2, but are not restricted to only Level 2 collaboration (they can do Level 1). Most members will remain at either Level 1 or Level 2. Exceptionally high achievers may want to work towards eligibility for Level 3; however this is reserved for only the most consistent, reliable individuals who have demonstrated exceptional leadership ability to regularly contribute and move the group forward independently and without reminders or involvement from the Pepperdine Research Team."<sup>[1]</sup>

**Table 1. Levels of Collaboration and Achievement**

**Levels of Collaboration and Achievement**

	<i>Description</i>	<i>Responsibilities</i>	<i>Goals</i>
<b>Level 3</b>	Student-led international team collaborative projects	<u>Participant (Team) Role</u> Determine group, project topic, timeline and roles, meetup facilitation, and provide final project to IC4 Research Team via info@ic4.site [No formal facilitator role]	Completion of Level 3 project plus 2 Leadership Badges  <b>[IC4 Diploma]</b>
			
<b>Level 2</b>	Facilitator-managed international team collaborative projects (collaborative projects with other sites from start to finish)	<u>Participant (Team) Role</u> Work in group on topic selection, project roles, timeline, and develop project together; use meet-ups to brainstorm, mid-point check-in and final project sharing <u>Facilitator Role</u> Determine/notify group, facilitate meet-ups, support/ consult group as needed	Completion of Level 2 project plus 2 Collaborator Badges
			
<b>Level 1</b>	Individual/single-site projects presented at global meet-ups (primarily with teacher support)	<u>Participant (Individual) Role</u> Select topic, develop a project, present at global meet-up, provide feedback and incorporate feedback into final project <u>Teacher Role</u> Technical guidance, advising & feedback	Completion of Level 1 project plus 2 Technical Badges

As students complete their projects, they may submit evidence to earn digital badges. “The IC4 digital badge program is a way to recognize collaboration, leadership and technical skills demonstrated by IC4 members. Badges are not competitive, and there are not a finite number of badges that are awarded. Badges foster an equal opportunity for achievement for all. Everyone has an equal chance of achieving any number of badges. There are three categories of badges IC4 members can earn: collaboration, leadership, and technical. Within each category, members can earn badges at rookie, intermediate, experienced, advanced, and expert levels.”<sup>[2]</sup> Submitted evidence is reviewed and ultimately rewarded by the IC4 Research Team based at Pepperdine as host institution. These digital badges are housed online using BadgeList.

Critique is a very important part of collaboration. As students develop projects, they can receive feedback from other members, through any of several means. The most prominent involves global meet-ups (see Figure 1)<sup>[3]</sup>, synchronous video conferences where participants from different sites interact to share and collaborate. Global meetups are great ways for students to introduce topic ideas, and share comments and suggestions with one another across sites. However, synchronous meetings are not always possible. Leaving feedback on one another’s Sways or on Slack (a media messaging platform) are ways to collaborate asynchronously. Giving and receiving constructive criticism throughout the design process is crucial in creating higher quality projects. Ultimately, completed projects are uploaded to Flipgrid where students can give final comments to one another and assess their learning.

The topics of the student-created projects vary based upon student interest and may reflect the strengths of the various sites. At South Fayette, there is a strong emphasis on computer programming and engineering within the STEAM curriculum, so it was a natural fit for many of our students to create projects teaching block based and text based code, 3D printing and design, as well as robotics. This year, we have a group of students at our site partnering with students and teachers in Brazil to learn how to program Arduinos (Figure 2). This is a relatively new skill for our students, but their enthusiasm for learning has prompted them to establish a weekly meeting schedule. In addition to technology innovation topics, students also look at the United Nations Sustainable Development Goals as a starting point for tackling real-world problems. IC4 participants have created Sway presentations aiming to raise awareness around poverty, gender equality, and quality education. When students have choice and interest in the topics they study, their engagement and motivation to learn increases.

As site teacher leaders of the IC4 club, we serve as facilitators supporting student generated multimedia projects related to STEAM/STEM topics. We hold weekly after school meetings for students to collaborate with one another within our site, or across partner sites around the country and world. We facilitate global meetups and provide expertise when appropriate. The work we do is unique and provides an additional opportunity for our students to create and collaborate with one another. As they do, the skills they learn will prepare them for future endeavors.

**Figure 1. Screen Capture of Global Meet-up with India and Kenya**



**Figure 2. Screen Capture of Global Meet-up with Brazil**



## CONCLUSION

### Results

IC4 is an ongoing, dynamic project which is pushing students to discover innovative and effective ways of problem-solving using makerspaces and various technologies. Each meeting, students develop more sophisticated problem-solving, feedback, and cross-cultural collaborative competence skills. Students often post videos of their projects, creating a sizable library of tutorials that can be accessed by others to learn about a new topic or skill.

The experience is extremely valuable to students; it uses intrinsic motivation to find real-world problems that meet student interests. After establishing their topic, the students utilize a plethora of resources to find a solution to the problem. Resources can include various forms of technology, makerspaces, and other students. They get to challenge the practices of the traditional classroom and break down barriers to

work remotely with diverse groups of people. Seeing the problem-solving process through the eyes of another culture allows each student to view a different perspective of how to solve problem issues..

Overall, this invaluable opportunity allows students to take their experiences and create new problem solving strategies and prepare for an ever-changing workforce whose form remains unpredictable. Students acquire competence in employing how to utilize all sixteen steps of the Habits of Mind <sup>[4]</sup> to think about various ways to solve a problem that has an unknown answer. They are integrating all seven of the Global Competences for the future published by UNESCO's International Bureau of Education <sup>[5]</sup>, and South Fayette's involvement will be featured in an international design and synthesis workshop NSF is funding in 2019 on learning environments of the future <sup>[6]</sup>.

This project is a learning experience, not only for the students, but also the adult facilitators. The club has evolved in structure without losing its purpose. Teacher leaders and the Pepperdine Research Team meet monthly to share updates from their individual sites and make suggestions for upcoming sessions and modifications to practices and procedures. One of the greatest challenges that we have overcome is communication. In order to solve this issue, the team set an expectation that student participants check in weekly, outside of their scheduled sessions. The standardized platforms for communication allow for submission of video, text, and files for feedback and collaboration. Technology such as, Email, Slack, and Zoom are the programs utilized for international communication.

While educators find value with the immediate practical benefits of participation in these clubs, IC4 is a research project looking at the potential of future learning environments. The Pepperdine research team is examining how peer-oriented, global collaboration in STEM-focused digital makerspaces enhances student learning and skills. So far, their research has shown a developing sense of community across sites that has led to stronger learning discussions.

### **Broader Value**

Through the use of makerspaces and digital learning communities, students are able to collaborate with teams all over the world in order to research and problem solve issues pertaining to their own unique interests. Student led projects provide a sense of ownership, which allows the student to find pride in their work and discover outcomes to projects based on their own learning style and thought process. Adding cultural diverse collaboration to the mix, allows the student to view the problem solving process through the eyes of someone else, taking into consideration ethnic, economic, and religious diversities.

The role of the teacher leaders shifts as students progress through the program. As new members join the group the teachers act as advisors, providing technical assistance and plenty of feedback. Once students have completed their first or second project, the role of the teacher moves to more of a consultant, where they provide support to the student teams and assist in scheduling and monitoring meetups. At this time, students begin to become more independent, developing their own ideas for projects, determining roles within their groups, and utilizing meetups to plan, check in, and present their projects. Ultimately, the role of the teacher leader is passed along to the student, where projects are initiated and completed with very little feedback and guidance from the teacher. At this time, students can demonstrate their independence and leadership skills.

Makerspaces create unique opportunities that are typically not found in the traditional classroom. It allows each student to use an inquiry based approach to research and design projects based on their individual needs. This can be completed in any school district, regardless of budget. All that is needed to start is a space that students feel comfortable to work in, some basic tools, and some recycled materials. As time passes and student interests grow, additional tools and materials can be purchased or donated based on project needs. Adding an international component adds depth to the experience by allowing students to learn about different cultures and look at problem solving from a different perspective.

## **BIOS**

### **Shad Wachter**

Shad Wachter has been teaching for 20 years with a background in music and technology. He received a Bachelor of Music Education Degree from West Virginia Wesleyan and a Masters of Education degree in the field of Educational Technology from Loyola College in Maryland. He started his teaching career as a music teacher and band director at Fallston Middle School in Maryland before moving to Pennsylvania to work at South Fayette School District first as a technology assistant, then a technology literacy teacher and STEAM teacher for grades three, four, and five. Shad continues to remain involved in the arts serving as the assistant director of the Performing Arts Club. He also sponsors the media club, computer programming club, and IC4. He serves as a mentor teacher and lead teacher for the elementary and intermediate special areas team. Shad enjoys working with students to develop technology skills that they will apply in their other classes and the real world. His students participate in project based learning experiences to become fluent in the use of technology. They practice keyboarding skills, learn basic programming concepts, and create multimedia presentations in a variety of formats. Additionally, Shad strives to instill in his students the importance of becoming good digital citizens. Shad has delivered technology staff development to teachers in the region and around the world. He presents annually at conferences such as ISTE, Scratch @MIT, Pennsylvania Educational Technology Exposition and Conference, Three Rivers Educational Technology Conference, and the South Fayette Summer STEAM Institute. Being a lifelong learner, he enjoys sharing experiences with educators and students. Shad is married to his college sweetheart and they have two amazing daughters.

## **AJ Mannarino**

AJ Mannarino has been teaching Technology Education in Pennsylvania for six years. He received his bachelor's degree in Technology Education and master's degree in Integrative STEM Education from California University of Pennsylvania. AJ creates opportunities for students to utilize technology in the classroom to solve real world problems in robotics, app development, manufacturing, 2D/3D design, and entrepreneurship. Outside of the classroom, he sponsors South Fayette's Robotics Club, the International Community for Collaborative Content Creation (IC4), as well as various other technology related opportunities for students. AJ demonstrates his passion for learning with the use of technology by presenting annually at various local and international conferences, including the International Society for Technology in Education Conference (ISTE), Three Rivers Educational Technology Conference (TRETTC), and the South Fayette Summer Institute. He also helped develop curriculum for Carnegie Mellon's Robotics Academy and has been a teacher leader for Pepperdine University's International Community for Collaborative Content Creation (IC4) research project. Additionally, he offered a professional development called Coding with Cops to teach Pittsburgh Police officers how to code for a community outreach program. AJ is an advocate for utilizing technology in the classroom and enjoys sharing his knowledge with others.

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