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Table of Contents

How should we prepare students to address the challenges of our time?

— Jonathan Isham

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Abstract

Project-based and problem-based learning can help to fulfill John Dewey's vision of education as the primary engine for social change. Based on the author's experience in teaching undergraduates and training fellow educators, this paper details eight qualities of students who have learned in well-taught project- and problem-based learning courses, including a recent class in social entrepreneurship at Ashesi University in Ghana. Together, these qualities can lay the groundwork for lives of meaning and purpose among students dedicated to addressing the challenges of our times.

Keywords

project-based learning; problem-based learning; service learning; social entrepreneurship; Ghana.

How should we prepare students to address the challenges of our time?

Introduction

John Dewey's case for education—"I believe that education is the fundamental method of social progress and reform" (Dewey, 1897)—resounds in our troubled times. In his heated back-and-forth in the 1930s with Robert Maynard Hutchins, Dewey laid the groundwork for experiential learning, broadly defined (Heldke, 2005). Had Hutchins prevailed in the public sphere, St. John's College—with its well-known great books curriculum—would be the most prevalent higher education model for teaching and learning. Instead, 80 years after the Dewey-Hutchins debate, over 1000 colleges and universities place service learning, community engagement, and/or social entrepreneurship at the center of their mission (Campus Compact, n.d.).

Project- and problem-based learning in higher education, modeled after innovative training in medical schools in the 1950s and 1960s (Allen, Donham, & Bernhardt, 2011), are logical extensions to Dewey's vision. Project-based learning is characterized by a problem that, by curricular design, yields a final student led-product (Helle, Tynjälä, & Olkinuora, 2006), while the priority for problem-based learning is studying the complex, realistic problem itself (Allen et al., 2011). Advocates of these approaches—two sides of the same experiential-learning coin (Larmer, 2015)—claim that their students learn life skills, including time management, organization, public speaking, as well as problem solving: the ability to test ideas against life's complexities and realities (Wurdinger, 2016).

Are these advocates right? Do they overestimate the impact of project- and problem-based learning? How can we know? This issue of Currents is designed to help educators address these and related questions. And it could not be more timely. These days many critics have higher education in their sights (Arum & Roska, 2011; Kaplan, 2018). Colleges and universities, they claim, have not responded to the cultural cross-currents and technological whirlwind of our age. We educators, critics charge, are stymied by irrelevant curricula, dusty worldviews, skewed incentives, accelerating costs, and political correctness.

Yet we know that higher education has faced critics in previous eras (Bloom, 1988): it's still here; it's still thriving. And in part, the strong state of play on our campuses is thanks to significant changes in what we teach and how our students learn: project- and problem-based learning address the critics head on. These approaches help students to take on actual social challenges in communities that are adjacent to and/or affiliated with campuses; challenges related to lack of access to social services, poorly performing institutions, the stubborn persistence of poverty, and environmental degradation. At their best, project- and problem-based learning are relevant, consistent with institutional incentives, and cost-effective. And by eschewing academic jargon, they can promote pragmatic learning that transcends our cultural wars.

This special issue offers a current snapshot of these two related approaches. The articles here comprise a range of examples on what's working, what's not, and what should be changed as project- and problem-based learning continue to evolve. Were higher education's current critics to peruse these articles, they'd likely conclude that our colleges and universities are doing just fine. Or better yet, they'd see that many higher education faculty are succeeding in new ways, in part because they have embraced forms of experiential learning that are soundly grounded in theory and, above all, designed to take on the many challenges of our age (Davidson, 2017).

In this introductory essay, I share reflections on best practices for project- and problem-based learning (PBL). These reflections, as I discuss below, are based on my two decades as a faculty member at Middlebury College, where I have tested various modes of experiential learning. Modeling William Cronon's sublime essay on the liberal arts (Cronon, 1998), I offer eight qualities of students who have learned in well-taught PBL courses. With these qualities, our students will be more likely to accelerate social progress and reform over their lifetimes.

Background

For a newly hired professor, aspiring to what the best college teachers do (Bain, 2004) takes hard work, trial-and-error, and the forbearance of patient students. After two years at Middlebury College, a leading liberal-arts college known for its commitment to teaching excellence, my teaching was up and down: every semester, a handful of great classroom days alongside too many pedagogical train wrecks (as student evaluations made all too clear!).

To improve, I first turned to service learning. In my "Introductory Microeconomics" course in Fall 2001, students led 12 modest projects for two local NGOs: for example, a study on the tradeoffs associated with local parking spots for the Middlebury Business Association; a plan to increase donations for our local United Way. The course soon had more energy and greater student satisfaction than in previous all-textbook iterations. Project-based learning, at a small scale, paid off.

By 2005, I raised the stakes. In a new four-week class, "Building the New Climate Movement," students explored the challenges of creating a new social movement for the greatest challenge of our time. Their partners included the Environmental Defense Fund

and Ben & Jerry's (soon we had Fossil Fuel ice cream!). More notably, the students helped to lead a three-day conference, "What Works? New Strategies for a Melting Planet," which attracted dozens of established and new environmental leaders (Isham & Waage, 2007) and was featured on the front page of The New York Times (Barringer, 2005). Problem-based learning, with the greatest possible ambitions, was at the heart of a once-in-a-lifetime experience for students who have gone on to, well, build a new climate movement (Pollack, 2014).

Over the last decade, I've trained dozens of fellow professors in PBL best practices for Campus Compact (Campus Compact, n.d.) and collaborated with colleagues affiliated with Ashoka U, the leading organization (Forbes, 2013) dedicated to the proposition that social entrepreneurship—a process by which people identify a stable but unjust social equilibrium and harness "inspiration, creativity, direct action, courage, and fortitude" to create a new, more just social equilibrium (Martin & Osberg, 2007)—can enhance learning in higher education (Isham, 2015). Middlebury's Innovation Hub, which I co-founded, annually supports dozens of students who are learning about the mechanics of pragmatic social change. Every June, we host a hundred or so educators who are building social entrepreneurship programs on their own campuses. In collaboration with many other educators worldwide, we've helped grow a network of leaders committed to a model of social change that has project- and problem-based learning at its core.

Eight qualities of PBL students

So what should happen when students take well-designed, well-executed PBL courses? I believe that such courses should help students learn to reflect, to connect, to analyze, and to engage, four critical proficiencies for a life of social change. To achieve these outcomes, I believe that college and university faculty should help their students to develop eight qualities of the mind and heart, eight lifelong skills for changemakers. I list these qualities here, in a sequence that roughly corresponds to the sequence of introducing them into a full-credit, college-level PBL course. For such a course, I offer specific classroom exercises that PBL instructors can use and adapt to their needs. To illustrate, I use an example from a social entrepreneurship course that I taught in Spring 2016 as a Fulbright Scholar at Ashesi University in Ghana, which – with its emphasis on teaching students to solve real-world problems -- is at the forefront of the 'new education' (Davidson, 2017). It was therefore an ideal setting to introduce this new course—detailed below—and to bring together best PBL practices.

1. PBL students slow down

In reaction to the kinetic pace of our students' lives, many PBL instructors have embraced techniques related to mindfulness and, more broadly, "slow learning" (Isham, 2015; Berg and Seeber, 2017). The proposition here is simple: that learning is difficult at too fast a pace, with too much on the syllabus, too many assignments, and not enough reflection. "Slower" classrooms, in which students are more present and self-aware, promote richer, more careful problem solving. In such a classroom, for example, the instructor will embrace the long silence that sometimes follows a challenging question. In those quiet, sometimes awkward moments, students begin to learn the power of reflection, contemplation, and mindfulness.

At the start of each "slow" class meeting, a straightforward breathing exercise can promote mindfulness in learning. Ask students to put aside their electronics and notebooks, sit upright and comfortably, close their eyes (or have a soft gaze to the center of the room), and then breath in silence and with deliberation. Over the several minutes of this exercise, the instructor can quietly offer prompts related to the ongoing PBL work in the classroom (e.g., "Reflect on a joy in your life; now reflect on a joy in the life of one of our community partners").

2. PBL students empathize

Empathy—the ability to understand and take in the lives of others—must be at the heart of PBL courses. According to Bill Drayton, the founder of the social entrepreneurship movement, teaching empathy in K-12 as well as in higher education is the cornerstone for building solutions to this century's challenges (Brooks, 2018). Leading practitioners in this field have designed training programs around skills designed to build empathy: reading classic texts on love and compassion; studying the lives of others; and—most importantly—spending time listening to and living with members of diverse communities (Novogratz, 2010).

Gordon Bloom, a leading figure in social entrepreneurship education (Bloom, 2008), begins each of his courses with an exercise designed to build empathy in the classroom. The instructor asks the students to organize into groups of three and then leads them in an exercise in which each student, in turn, is asked "What matters to you?" by another student while the third student observes. Each student has two minutes to answer that question and only that question, followed by a one-minute debrief about the conversation among the three students. The entire exercise, including the opening instructions, three three-minute rounds, and a classroom-wide debrief, takes 25 minutes or less.

I have used this exercise with dozens of different groups, from nine grade-school students to 80 retirees, and it always works! Participants are moved by the opportunity to share about themselves (often with strangers), to listen deeply, and to celebrate what unites them. This exercise is an efficient, powerful classroom tool to build empathy in a PBL classroom and help students to understand empathy's vast power.[1]

3. PBL students reflect on their identity and agency

"What is, for me, a life of meaning? A life of purpose?" Every college student should revisit these questions regularly during their undergraduate years, laying the groundwork for a lifetime of self-discovery (Kronmann, 2007). These questions are particularly essential for PBL students as they learn how to effect social change. Before they try to improve the lives of others, they must work to know themselves, to ask challenging questions about their multiple identities ("Who am I?) and agency ("What can I do?"). For it is only through self-discovery that one can then begin to make sense of the concerns, cares, and aspirations of others. Put another way: at any given moment, the world does not need hundreds more self-proclaimed do-gooders; the world will always need young people who understand that the path to helping others begins with discovering the essence of themselves.

In my PBL classes, I challenge students to reflect on their identity and agency early in the semester. We discuss Whitman's famous observation about self ("Do I contradict myself? Very well, then I contradict myself. I am large, I contain multitudes.") and the iconic 1968 photos of striking sanitation workers in Memphis ("I AM A MAN"), among other sources. On our campuses these days, students are well aware of the concept of identity: they appreciate the opportunity to explore, in a classroom setting, the power and complex meanings of self.

4. PBL students appreciate complexity

Slow down the classroom; establish the importance of empathy; promote self-reflection. Only after these steps should PBL students begin to study the course-specific project or problem.

Here's the background on what we studied in the Ashesi course and the project that the students subsequently led. In Ghana (and elsewhere in Sub-Saharan Africa), a persistent unjust outcome is the low quality of primary-school education. Over the last two decades, primary-school enrollment rates in Ghana have increased for girls and boys, but most students are not achieving benchmarks in literacy and numeracy. Students sit in classrooms; most do not learn (Ministry of Education, 2016). In our course, 28 students—in groups of four or five—were asked to design a project to address this problem on behalf of Farmerline, a for-profit social enterprise with expertise in using digital technologies to improve the livelihoods of low-income farmers and their families (Farmerline, n.d.). Specifically, the stu-

1 An example of this exercise can be found at https://www.youtube.com/watch?v=aiI1ONyQqnc, where I lead it for 120 high-school educators.

dents were charged with designing a cell-phone-based technology (similar to technology Farmerline uses for farmers) to help primary-school students learn.

To begin this work, the Ashesi students used two approaches that are prominent in PBL courses: systems thinking (Senge, 1990) and design thinking (Kelley & Kelley, 2015). Through using systems thinking tools, the students identified and assessed the range of societal forces that affect schooling in Ghana; using design thinking tools, they explored possible solutions to the low quality education. For example, using exercises developed by the Luma Institute (Luma, n.d.), the students created network diagrams to illustrate the complex ways that different stakeholders—teachers, parents, administrators, and students themselves—affect day-to-day classroom activity.

There is no single approach to understanding unjust social equilibria; in PBL courses, systems thinking and design thinking offer pragmatic, proven tools that students can quickly put to work.

5. PBL students honor expertise

A danger of PBL courses is that students develop a false sense of expertise. At their worst, our students may study a problem superficially, select a solution with little reflection, and at the end of the semester present a few snappy PowerPoint slides suggesting that they have somehow mastered a challenge that has bedeviled experts in a field for decades. Such an outcome is a disservice to our students and (if applicable) our community partners: students develop a false sense of mastery, and partners often receive a report that is irrelevant to their daily work.

To avoid this tendency, PBL students must take the time to learn from the work of others, particularly those with expertise in the field they are studying. Practitioners at Oxford's Skoll Centre for Social Entrepreneurship have developed an approach called "apprenticing with a problem" in which students systematically assess what others have done: for example, the instructor will challenge students to interview leaders at "five organizations working in the same sector, within the same geography, or with the same demographic" and then build their ideas based on what they have learned from others' successes and failures" (Papi-Thornton, 2016).[2] Following such an approach, students are inevitably humbled by the challenge they are studying and thus develop a new appreciation for the complexity of social change.

6. PBL students listen to community members

Community partnerships are central to many PBL courses. When students first meet with community leaders and others, it is essential that they "shut up and listen" (Sirolli, 2012), building on the empathy skills that they have begun to develop. In doing so, they can tap into local knowledge and practices that will help them unravel the problem they are addressing.

For our course at Ashesi, student groups led a series of meetings with local stakeholders, including primary-school parents, teachers, and students. Using a range of design thinking tools (Luma Institute, n.d.), they gathered answers to a range of questions: What makes it hard for students to learn in the classroom? Are students able to read and do math at home? What do the best teachers do? What incentives do they face? Do most families have access to cell phones? If so, what kind? The answers comprised a unique dataset from which the students began to design their proposed technology.

7. PBL students test their ideas.

The five stages of the design thinking process are "empathize, define, ideate, prototype, and test" (Cohen, 2014). The best PBL courses build in time for students to design and then test their ideas with their community (or other) partners. In doing so, students learn that pragmatic problem solving is iterative.

In our Ashesi course, students shared their prototypes ideas with a range of education stakeholders: fellow students, other professors, and the community members with whom they had consulted earlier in the semester. This process was invaluable: the student teams got specific feedback on their design prototypes, often given guidance that potential users of their technology wanted clarity, simplicity, and, the lowest possible cost—precisely what one would expect when designing a consumer good.

2 Tools for this approach can be found at http://tacklingheropreneurship.com/.

8. PBL students celebrate … and then ask "What's next?"

The most rewarding episodes of social change are characterized by moments of joy. Participants in the civil rights movement now reflect on those times—when many of them were undergraduates—as deeply fulfilling (Lewis, 2017). In PBL courses, students should not only share their final results with each other, their instructor, and their community partners: they should do so in celebration. Bring in food and drink, play music, offer gratitude, have fun: the end of the semester should serve as a reward for students and joyous benchmark of what they've achieved.

In the final meeting of our Ashesi course, student groups presented their top three ideas to our partners with Farmerline, who offered their assessment of each one and picked a final winner.[3] Students then offered their gratitude to each other and their community partners: over drinks and snacks, we discussed what worked, what didn't, and what comes next. (Three of the students received job offers from Farmerline.)

All told, this course succeeded because the students learned first-hand about the challenges of improving well-being from their PBL partner, community members, and each other. No student finished the class believing that they had fully solved a problem; based on the student evaluations, most of the students felt that they were better equipped to take on problems that they cared about in the future. Our Ashesi course, in large part thanks to the hard-working, talented students and an excellent community partner, illustrated the power of the PBL approach.

Conclusion

Project- and problem-based learning, if we are lucky, can help fulfill John Dewey's vision for social change as this complex century continues to unfold. The articles in the rest of this volume hint at the power—and potential limits—of these two approaches.

As I have led new PBL courses over the last 15 years, I have continually asked what I hope my students will take away from them. Long after they have forgotten the nuances of supply and demand or the history of the Clean Air Act—bread-and-butter topics in my undergraduate courses—I hope that they will retain the eight qualities that I have shared here. When taken together, I believe that these qualities will help our students to develop two essential foundations for a life of meaning and purpose: radical empathy—"to put ourselves inside the experiences of another and to allow ourselves the pain, allow ourselves the heartbreak, allow ourselves the sense of hopelessness, whatever it may be that they're experiencing" (Wilkerson, 2016)—and deep listening—the "humbling eclipse of self" that comes from "profound learning from others" (Bornstein & Davis, 2010, quoting Andrew Carnegie).

For in the end, we should not only be trying to develop young problem solvers in our PBL courses; we should be trying to guide our students toward a life of compassion and humility.

3 The winning entry can be found at https://www.youtube.com/watch?v=fhe3BvGAFC0.

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Project-Based and Problem-Based Learning

— Martin Fromm

Collectively, the contributors to this volume use evidence-based research to present the practical and theoretical benefits of Project (and Problem) Based Learning. They explore the ways in which PBL can promote authentic, "deep" learning by engaging students with real-world issues, exposing them to the challenges and rewards of risk taking and collaboration, incorporating technology into the classroom in ways that enhance creativity and inclusivity, and creating new interdisciplinary applications for writing and writing-intensive skills. The articles included here use PBL, therefore, as a lens for rethinking relationships between the classroom and the "real world"; between academic rigor, authentic self-expression, and emerging technologies; and between expertise-based authority and collaborative risk taking.

More specifically, these authors extend and deepen the transformative and collaborative possibilities of service learning, identifying practices and principles that push students to apply analytical and interpretive skills in new contexts and through different mediums. They pose an exciting and unsettling challenge to educators to collaborate with each other and with students in ways that reveal vulnerabilities, induce risk taking, and expose students to authentic learning processes that are often hidden behind the veil of authority, hierarchy, and expertise. In response to the ever-growing impact of digital technologies on pedagogy (a topic that will be the theme of the Spring 2020 issue of this journal), several of the authors prescribe best practices for utilizing tablets, apps, and digital media as platforms for undertaking projects that involve depth, complexity, creativity, and engagement with real-world issues. Recognizing the increasing importance that institutions of higher education have been placing on writing within and across the disciplines, contributors to this issue also identify Project Based Learning as a means of aligning writing more explicitly with learning objectives and making the processes and products of writing more meaningful, applicable, and relevant to students.

In "Extending Experiential Learning Opportunities in Teacher Education: Connecting Preservice Teachers and their Communities through Project-Based Collaborations," Corrine Hinton, Stephanie Chickadel, Kristen Childress, and Amanda Nix describe a project-based service learning venture conducted by undergraduate preservice teachers focusing on STEM fields in collaboration with a local children's museum. The authors show that in the process of helping the museum director align the exhibits with state educatioal standards, the student teachers deepened their own understanding of the fields and found ways to adapt their formal academic knowledge in creative ways to serve the wider community. Shifting from institutions to individuals as community partners, Ashley Hall reveals the interdisciplinary benefits of community based and project based learning in a case where students "3D print, assemble, test, and use a prosthetic hand" for a community member with upper-limb difference. Explaining in vivid detail the creative processes involved in the project, in "From Tchotchke to Techne: Project-Based Learning in the Arts and Humanities" Hall shows that this project-based approach combining community-based research and design thinking pushes students to "work across spoken, written, multimodal, and material modes of communication." She argues that "when project-based learning that involves emerging technology is reconceptualized as an entanglement (of product and process, of humans and technology), it becomes clear that this approach to teaching and learning is indeed well suited to the priorities, values, and traditions of teachers and scholars in the arts, humanities, and social sciences."

As Laurie McMillan and Lindsey Wotanis illustrate in "Those who can't, teach? Project-Based Learning for

Teachers and Students in the Digital Age," collaborative project-based approaches to teaching and learning can also lead to dynamically transformed interactions between teachers and students. Describing a Youtube production project in which teachers worked as novices alongside students in engaging with digital technology, McMillan and Wotanis show that this teacher-as-novice approach to project based learning benefited the students by "allow[ing] them to better understand and embrace composing processes, collaboration, risk taking, and, perhaps most surprisingly, playfulness. At the same time, as faculty, we gradually became more willing to expose our novice status, learn alongside our students, and showcase processes that are often hidden when sharing our expertise in the classroom." This willingness to be vulnerable, open, and continually flexible and adaptable in a creative, collaborative environment is also central to Jenna Morton-Aiken and Christina Santana's thesis in "Cultivating Collaborative Writing Space: A Framework for Working Through the Sticking Points of Collaborative Authorship." Identifying the "hallmarks of collaborative writing (authorship, momentum, dissensus)," they argue that performing (with colleagues) and modeling (for students) the collaborative writing process "embeds holistic peer review throughout the writing process," "embodies communication as situated in discourse [and] as responding to actors in motion rather than static proclamations of articulation," and "helps prepare our students for employment and citizenry, establishing habits of listening, conversing, and responding to context beyond themselves." Like McMillan and Wotanis, Morton-Aiken and Santana suggest that the messy, disruptive, and "at times contentious" work of collaboration enable both teachers and students to engage in and expose the dynamically co-constructed nature of knowledge production.

Collaboration and writing are also themes in "Partners in Writing: Addressing the Gap Between High School and College," in which Michal Reznizki and Jennifer Rooney describe the role of letter writing partnerships between underprivileged high school students and college students in bridging both socio-economic and academic divides. They suggest that "expos[ing] students to a new and different genre, outside the normative academic essay" in which "both groups of students produce texts that are 'purposeful and responsive'" creates an "authentic and concrete experience that makes students really think about their audience, style, tone, and word choice." Through this exercise, students are able to meld together academic and real-world writing styles and genres, imbuing the learning process with empathy-generating meaning and purpose that stretch the horizons of their own contexts and experience. In "'Now We're Trying to Teach the Public': Writing and Project-Based Learning in General Education," Brad Jacobson argues that applying project based learning principles to writing is an effective way to bring together the often-disconnected "civic, intellectual, and disciplinary" facets of general education. Comparing case studies involving attempts to engage students in content-driven courses with real-world issues, Jacobson illustrates how the integration of technology, PBL, and attention to context in selecting genres of writing can help instructors "effectively align their writing assignments to higher-level learning outcomes" and "create opportunities for formative assessment and revision" while enabling students to "see themselves as contributors to ongoing conversations in academic and public life."

While the use of emerging technologies appears throughout this issue, Celestine Caruso and Judith Hofmann's "A Task-Based Approach to Tablets and Apps in the Foreign Language Classroom" focuses specifically on how project based approaches to embedding tablets and story-making apps in the classroom can, in the context of language learning, "foster complex competencies that involve the interaction of ideally all language skills (reading, writing, listening, speaking, and mediation), while at the same time improving media literacy." They argue that these digital technologies and "digitally mediated tasks," given their "openness" to "creative negotiations of possible solutions," their enabling of "outcome[s] [that] can be produced with multiple tools and involve[ing] various channels of language perception and production," and their capacity to "scaffold complex materials or tasks by being multisensory themselves," are ideally suited for the purposes of PBL and Task Based Language Teaching.

The book reviews selected by our Book Review Editor, Kisha Tracy, add to this discussion about the place of Project Based Learning in higher education. The three reviews respectively examine theories and practices of PBL that cultivate deep learning and 21st Century skills, classroom strategies for effective PBL implantation, and the Envision Education Schools' backward design model for transforming the university curriculum. Samuel J. Touchette reviews Scott D. Wurdinger's *The Power of Project-Based Learning: Helping Students Develop Important Life Skills* (Rowman & Littlefield, 2016); Lena Ficco reviews Ross Cooper and Erin Muphy's *Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom* (Times 10, 2016); and Alyson Snowe Leitch reviews Bob Lenz, Justin Wells, and Sally Kingston's *Transforming Schools: Using Project-Based Learning, Performance Assessment, and Common Core Standards* (John Wiley & Sons, 2015).

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Cultivating Collaborative Writing Space: A Framework for Working Through the Sticking Points of Collaborative Authorship

— Jenna Morton-Aiken and Christina Santana

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Abstract

As teacher-scholars transitioning from graduate school to faculty life, we are uniquely positioned in academic-workplace writing, a hybrid space between industry and the academy, where we enact the collaborative writing skills we know well to help our students transition to their own professional lives. This article identifies hallmarks of collaborative writing (authorship, momentum, dissensus) as they are informed by our experiences and reinforced by scholarly traditions in multiple fields. It provides a framework for collaborative writers to prepare a project blueprint, work through breakdowns, and reflect on what to change for next time. By sharing our experiences, we hope to professionalize the writers who come after us, better preparing them to encounter obstacles and continue moving forward.

Keywords

Collaborative writing, academic-workplace writing, teacher-scholar, authorship, momentum, dissensus, blueprint

Introduction

Somewhere in front of a keyboard, a writer has her head in her hands. Student, academic, or employee, she sighs because she is trying to write something with her group, and it's just not working. *Wouldn't it be easier if I could do this alone?* she asks, resisting the urge to check Facebook (again). Perhaps a group member has failed to meet a deadline. Perhaps a group member has overzealously redrafted the entire piece differently than what the group had discussed. Perhaps a group member has gone radio silent. Or, perhaps, writing together is just frustrating and challenging even at the best of times.

The origins of this article are rooted in the collaborative writing experiences that both authors enjoyed during their graduate and early professional years. The word "enjoy" is used both genuinely and facetiously. We mean it genuinely because collaborative writing has been a productive, engaging, and invigorating experience at times. We have learned much from our collaborations and have revised good ideas into strong publications that we know were more effective than if we had written them individually. We also mean "enjoy" facetiously because collaborative authorship is taxing, exhausting, and demanding. Merging multiple voices, visions, and perspectives into a single manuscript can be complicated, frustrating, and time-consuming, sometimes resulting in battles that might not be worth their final cost.

As graduate students and early career academics, the risk-reward involved in collaborative writing can also be a time-intensive balancing act that requires skills not necessarily covered in coursework. Jenna became aware of this when co-authoring an article that won the 2015 CWPA Graduate Student Writing Award (Foley-Schramm, Fullerton, James, & Morton-Aiken, 2015) and was ultimately revised and published in *WPA Journal* (Foley-Schramm, Fullerton, James, & Morton-Aiken, 2018). The project was successful, but the total timeline from launch to actual publication took five years. Realizing that the process of learning to write collaboratively as an academic-professional had itself been a critical step in her professionalization, she proposed a panel called "Navigating Collaborative Authorship: Tips, Tricks, and Tales from the Trenches" at the 2017 Northeast Modern Language Association (NeMLA) Conference. Christina presented as part of the panel, sharing a very quick experience of successfully co-authoring an article in the *Community Literacy Journal*, one that was drafted in three weeks and published in a special issue just four months later. This unlikely timeline was achieved in part because Christina collaborated with her mentor as a PhD candidate to plan, pivot, and drag the manuscript across the finish line. In later conversations, Jenna and Christina continued to reflect on separate collaborative writing experiences, interrogating the highs and lows of different projects and locating where in our graduate training we had learned those collaborative writing skills.

We were particularly interested in understanding where we had acquired those skills because we both regularly assign group work in our undergraduate classes. We do so because it's often required by our departments, but also because our students will need collaborative writing skills in their future academic and professional work, and because we value how collaborative writing embodies the practice of writing as being situated in discourse. But we also agreed our classroom practice didn't spend enough time on the how-to aspects of teaching collaborative writing. While Jenna attempted to summarize her top tips in five pithy points for graduate students[1] at that conference presentation, our individual experiences as graduate students and instructors led us to believe that not enough attention is spent on teaching students how to do group work. After all, "collaborative writing is a complex activity and needs to be actively taught" (Gollin, 1999, p. 289).

Moreover, there is a gap in scholarship that speaks directly to those of us who've recently transitioned out of graduate school, who want to meet their personal or professional commitments to publish and have the desire to do this through collaborative writing. We are uniquely positioned as participants in academic-workplace writing because we function in a space not of the classroom and not of industry. As teacher-scholars, we often find ourselves working to unpack our own experience in order to help our students. In particular, how we as teacher-scholars recognize and enact collaborative work matters because this shapes what we are able to model and emphasize beyond directing and supporting.

Collaborative Writing in Theory and Practice

Teacher-scholars who are interested in introducing or improving collaborative authorship in their classrooms are well-supported by rich scholarly conversations in two primary disciplines: rhetoric and composition and business/professional communication.[2] There are several key literature reviews that provide comprehensive

1 Jenna's top tips for collaborative writing: 1) talk about order of authors; 2) lay out clear roles, expectations, and timeline; 3) do your job fully, but do your job alone unless asked for assistance; 4) talk through challenges with each other whenever possible; and 5) work harder to listen more often (Morton-Aiken, 2017).

2 The topic of collaborative writing is also an important topic in other disciplines, especially including organizational dynamics and project management; a few sources standout (Gorli, Nicolini, & Scaratti, 2015; Mayordomo & Onrubia, 2015; Moses, 2015). However, since writing is not a primary focus of practitioners in those fields, we have limited our focus to the fields of rhetoric and composition and business communication.

overviews of recent scholarship as well as identify opportunities for future research. For example, in the field of business and professional communication, Bremner et al.'s *Task Design and Interaction in Collaborative Writing: The Students' Story* details a variety of benefits and issues related to teams, teamwork, collaboration, and writing most specifically, highlighting the notion that there is a "need for more conscious efforts on the part teachers to consider tasks and assignments that will furnish learners with opportunities to experience meaningful collaborative activity" (2014, p. 153). Hence, their focus on task design. In the field of rhetoric and composition, Van Steendam's editorial, *Forms of Collaboration in Writing*, introduces a special issue that identifies key topics in collaborative writing, such as "instructional strategies and/or scripting, interaction (interactional patterns), group composition, individual characteristics, tasks" while "confirm[ing] the complexity of collaboration in writing and show[ing] that many questions remain and much more research is needed" (2016, pp. 183, 185). Van Steendam also claims that the "future of research focus in collaborative writing might focus on the interactions of variables on the individual, collaborative and contextual level that count rather than the variables separately" (2016, p. 183). Finally, Lowry et al., in *Building a Taxonomy and Nomenclature of Collaborative Writing to Improve Interdisciplinary Research and Practice*, provide the most comprehensive survey of research on the subject with the logic that our disciplinary silos inhibit our progress:

> Often, collaborative writing issues are studied in isolation through one perspective, whether it be through science (computer science, information systems, information technology, or software engineering), social science (group decision making, social psychology, sociology, applied psychology, communication, group dynamics, organizational behavior, or change management), or through the humanities (rhetorical discourse, linguistics, English, or Composition). Much can be gained by building on the strengths of each area, through a common discourse, to create interdisciplinary solutions to pressing issues. (2004, pp. 68–69)

In their article, Lowry et al. "defin[e] key collaborative writing terms and buil[d] a taxonomy, including collaborative writing activities, strategies, control modes, work modes, and roles," at the same time, "stress[ing] that effective choices in group awareness, participation, and coordination are critical to successful collaborative writing outcomes" that can be "promoted through collaborative writing software, chat software, face to face meetings, and group processes" (2004, p. 66). For our purposes, we identify ethos-building threads that might inform a teacher-scholar about the history and contemporary state of collaborative writing and empower others to navigate the wealth of scholarship on the subject.

The field of rhetoric and composition, with roots in an English Literature tradition, seems to still be coming to terms with what collaborative authorship means in practice, theory, and value. In 1987, the Conference on College Composition and Communication's Executive Committee addressed the issue in their position statement on Scholarship in Composition: Guidelines for Faculty, Deans, and Department Chairs, writing that "A significant percentage of the scholarship in composition studies is being conducted and reported collaboratively. Collaborative work, while having a long tradition in many disciplines, should be respected as a legitimate and appropriate form of professional scholarly activity" ("Scholarship in Composition: Guidelines for Faculty, Deans, and Department Chairs," n.d.). Ede and Lunsford published their *Singular Text/Plural Author* three years later to recognize the labor and value of collaborative writing and explicitly push back against the "hindrance to academic collaboration in the humanities," which they believe is based on "the practice of insisting on the concept of primary and secondary authorship" (1990, p. x). More recent scholarship also focuses on how practitioners in rhetoric and composition advocate for their collaborative work and writing, particularly in terms of promotion and tenure (Howard, 1995; Leverenz, 2000; Royster, 2000). Podis and Podis (2007) talk about how collaborative work sometimes can be viewed as cheating by authority figures, while Bommarito (2015) investigates how graduate students in particular use collaborative work to construct disciplinary and professional practices.

Relevant scholarship in the field of business and professional communication is based on the notion that "a substantial portion of the writing that takes place in organizations is carried out collaboratively" (Paradis, Dobrin, & Miller, 1986). Several studies center around why authentic collaboration "tends to be challenging from the onset," "even when underlying structures for collaboration are in place [and] the communication required to orchestrate a diverse team" exists (Dopke & Crawley, 2013, p. 37). Studies like these seek to better understand the interworkings of "discourse communities, conflict, power relations, and narrative" (Forman, 2004, p. 28). For example, Palmeri examined the specific challenges of interprofessional collaborative writing among attorneys, nurse consultants, and writers in a law firm. He concluded in his case study that the best way to "minimize the detriments and maximize the benefits of interprofessional conflicts" was to "emplo[y] professional writers to act as discourse mediators, merging together legal and nursing perspectives into dialogic, persuasive narratives" (Palmeri, 2004, p. 37). Beyond solution-oriented research threads, scholars have been committed to acknowledging that "collaborative writing is a complex activity and needs to be actively taught" (Gollin, 1999, p. 289) (see also Colen & Petelin, 2004; Dovey, 2006; Fredrick, 2008).

Within and outside the fields of rhetoric and composition and business/professional communication, collaborative composing also attends to questions of interpersonal engagement in two distinct ways: 1) to explore issues of power and gender, and 2) to structure supportive behaviors. Mary Lay (1989) argues in *Interpersonal Conflict in Collaborative Writing: What We Can Learn from Gender Studies* that critical reflection can lead to a better product, but the resulting conflict can also provoke negative feelings, particularly when the interactions begin to feel personal rather than simply about the content. This can be complicated by the fact that women tend to try to avoid conflict, meaning that in female dominated fields or working teams, navigating group critical engagement becomes even more complex. Issues of power also affect the quality of engagement collaborators can achieve, in terms of how "our society locates power, authority, authenticity, and property in an autonomous, masculine self" (Ede & Lundsford, 1990, p. 134). With this logic, Ede and Lunsford identify two primary models, the hierarchical model, and the dialogic model, for collaborative writing, highlighting that the latter supports more equal power distribution. While academic writing traditionally is based on hierarchical models, Ede and Lunsford make the argument for more voices to be incorporated through a dialogic model. Extending this important work, Marttunen and Laurinen, in their case study of student writing groups, shed light on how workloads are distributed among collaborative writing teams from what we argue is a hybrid hierarchical-dialogic model; they provide a taxonomy of speech turns that identify "characteristic ways in which groups as a collective approach the task at hand" (2012, p. 75). Other studies rely heavily upon case studies to better understand the impact of support structures on students, including instructional moderators (Ortoleva, 2015; Seuba & Castelló, 2015), online collaborative writing environments (Limbu & Markauskaite, 2015; Yarrow & Topping, 2001), and task design (Bremner et al., 2014).

The decision to engage in collaborative work in general and author order more specifically is particularly important to female authors. While Lay writes about the struggles that women face while navigating through the interpersonal conflict that often accompanies collaborative work and Ede and Lunsford warn against the authority that society locates in a masculine self, recent research also indicates that women actually pay a penalty for collaborative work when facing tenure and promotion. Heather Sarsons finds that women are less likely to receive tenure the more they co-author, particularly if they co-author with men (2017), while a longitudinal study examining first authors of original research published in high impact general medical journals from 1994 to 2014 found that "representation of

women among first authors of original research in high impact general medical journals was significantly higher in 2014 than 20 years ago, but it has plateaued in recent years and has declined in some journals" (Filardo et al., 2016). In 2015, two female evolutionary geneticists were told by a review of PLoS one that they should add a male scientist in the next round of revisions (Else, 2015).

Another key aspect of collaborative writing concerns the technologies and tools we use. Interdisciplinary scholarly threads explore the usefulness of key collaborative writing technologies, such as Google docs/track changes (Birnholtz & Ibara, 2012; Calvo, 2011; Suwantarathip & Wichadee, 2014) as well as text mining/methods (Southavilay, Yacef, & Callvo, 2010; Yim & Warschauer, 2017) that support language learners (Peres-Prado, 2017) to navigate the waters of group maintenance (Birnholtz & Ibara, 2012; Teevan, Iqbal, & Veh, 2016). Specifically in the field of rhetoric and composition, scholars explore the theoretical underpinnings of digital writing spaces that disrupt traditional forms of writing and authorship (Purdy, 2009; Warschauer & Grimes, 2007). A key example of this is Rebecca Wilson Lundin's piece (2008), *Teaching with Wikis: Toward a Networked Pedagogy*, which explores how technology changes the way we're able to use technology such as Google Docs and Wikipedia to seamlessly co-author in real time even though academia is still figuring out how, and sometimes if, to value such work.

Why This (Still) Matters

Though this is our first time writing an article together, as novice collaborative writers we separately experienced several situations that ranged from excellent to exhausting. Within different groups, we struggled to negotiate authorship, roles and responsibilities, process difference, and dissensus. Though the process that accompanies these points of tension are often productive, working through them in real time can be stressful and potentially destructive to personal or professional relationships. We suspect that these challenges will continue to present themselves in greater or lesser forms as we pursue collaborative work, but we also believe that articulating some of the common challenges and offering productive response mechanisms will better prepare the novice collaborative writers who come after us. And as children of the 80s might remember, knowing is half the battle.

Issues of Authorship

As naïve graduate students launching careers, we hadn't realized the power--and tension--embedded in the order of author names on an article. For example, in the experiences described above, we hadn't recognized that author order was something to be considered before writing even began. For graduate students in particular, who may only have worked on group projects where the highest stakes involved are a shared grade, there are two facets of author order to know before diving into collaborative writing. First, the place of first author carries weight on a professional curriculum vitae, particularly in the sciences, so order must be decided intentionally, not assumed. This decision will determine whose name is listed in the citation and who is relegated to "et al."[3] and this order will have consequences for all authors later on regarding tenure and other professional advancement. That's in part because, second, the order of authors often delineates a working hierarchy.[4] The first author usually does the bulk of the work, functioning as a leader of the group and investing the most time and energy in the process and final product.

The first author also is in a better position to make final decisions when points of contention arise. We have worked in groups where the first author hadn't already been discussed. This meant that when the order hadn't been pre-determined, we went into high-stakes writing situations with groups of equally empowered peers. While this might sound good in theory and reflect the dialogic model that Ede and Lunsford advocate, we found that it made our collaborative writing lives more difficult. We were motivated, well-versed in the literature, and capable writers, but without a sense of hierarchy and/or a clear decision maker, there was no one to mediate differences or move us forward when we became mired in circular conversations. A named first author may have helped us move through the process more quickly or cleanly, but it would have meant that someone was in charge.[5] By the time we did talk about author order, tensions were already high as we struggled to assert ourselves, and sometimes our conversations became more about credit than of roles and responsibilities.

Issues of Momentum

More than simply establishing leadership and arrangement on a CV, however, talking about author order also is a productive way into talking about how roles, expectations and timelines can affect the momentum of a project. Project teams need much more than good intentions to execute a successful project, especially when juggling a multitude of personal and professional responsibilities (teaching, service, advising, etc.). We have seen projects stall and never recover, and in response we have identified three facets of maintaining momentum to know before diving into writing.

First, from the onset, most groups divide the workload in two ways. One way is to assign and/or assume discrete roles in a linear sequence that include a writer, consultant, editor and reviewer (Baecker, Nastos, Posner, & Mawby, 1993; Posner, Baecker, & Mantei, 1992). The other is by what we are calling a distributed/recursive sequence that enacts the dialogic model that Ede and Lunsford introduced in which everyone is given the opportunity to share during every stage of the project and leverage peer review throughout the entire process, potentially culminating in a stronger product given that the document has gone through several polyphonic iterations. Although one might assume that we used one direction or the other (linear or recursive), our collaborative writing experiences have taught us that the reality is somewhere in between: the dynamic nature of collaborative interaction is messy. After all, participants can only contribute to the best of their abilities at any given time, so collaborative writing project teams must be responsive, and members need to be poised to meet each other where they are and ready to pivot around variable and specific components of the group at hand. Recognizing that individuals' abilities to carry out workloads needs to be more fluid than static can empower group members to re-engage where possible and enable others to re-align contributions to resume momentum.

Second, meaningful time spent in the planning phase can contribute to sustained momentum. As graduate students and faculty members alike, we often ely on fixed curricular or project management arcs to reduce the cognitive load of our many commitments. These mechanisms allow us to rely on autopilot at times, safeguarding best-laid plans against major tangents, and allowing only for minor course corrections along a pre-designed path to ultimately reduce time to product. When our plans articulate expectations for ourselves and others, we might think of them as blueprints or mechanisms of forward motion, which hold the potential to efficiently achieve a shared vision (Santana et al., 2015). Similar in concept to blueprints, adaptable scripts, according to Weinberger et al., are typed in two ways: interaction-oriented structuring tools and content-oriented structuring tools, which "support both individual knowledge acquisition, and… facilitate participants' interaction in collaborative learning tasks" (Ortoleva, 2015, p. 46). Scripts most often are used in

3 This decision is particularly important with changes to the MLA 8th edition citation style where even the works cited list is abbreviated to first author alone.

4 STEM fields tend to have more straightforward guidelines about author order (see American Psychological Association, n.d.; Fine & Kurdek, 1993; National Academy of Sciences, 2009)

5 We also must acknowledge, of course, that the wrong person being in charge might have led to a less successful final product that the one produced here.

computer-mediated collaborative learning to "facilitate the communicative process among group members" (2015, p. 46). We have been on writing teams that have incorporated effective prompting by identifying a "*team leader*, a person who plans the work of the group and rewards and motivates its members" or a "*facilitator*, a person external to the collaborative writing team whose task is to lead the team through the requisite process but who does not give content-related feedback" (Marttunen & Laurinen, 2012, p. 57). Under this logic, a writing team with an established first author might monitor and strategically nudge if or when established benchmarks are in flux.

Still, momentum can prove to be elusive as we have found ourselves in projects that break down, leaving members feeling lost without a map or shared tools (i.e., vocabulary, conceptual terrain) to guide the work. In these moments, when we ask, *what do we do now*, we are seeking a means of recovering momentum. And, truly graduate students and faculty members alike may find that their writing teams struggle to maintain traction at any number of different stages of the writing process (invention, drafting, revision, editing). For example, we have worked on conference paper proposals in which all participants share a genuine desire to work together, yet landing on the same page seemed impossible. Various technology applications have proven useful to overcome these hurdles, but familiar tools and asynchronous drafting via Google Docs might suffice and ultimately save time by avoiding the burden of adapting to a new platform. Further, incorporating such technologies may provide a means of meeting people where they are. For example, changing the medium of communication (i.e., to email, Facebook, text message, phone call, etc.) can provide an opportunity to adapt to breakdowns in communication routines and interaction patterns among members of a team. This strategy has worked for us at times when members stopped responding to established group communication channels, which we, in the role of first author or team leader, responded to by pivoting to alternate means of communication.

Issues of Dissensus

Collaborative writing can be challenging under the best of circumstances, but it is particularly so when co-authors begin to feel at odds over the course of a writing experience. Nairn et al. (2015) use the term "mutiny" to convey their experiences, unpacking the power dynamics that complicated composing processes and which threatened to upset personal-professional relationships. Mutiny is an excellent word choice but carries with it connotations of hierarchy and authority that are not always applicable to a writing scenario; we use "dissensus" to convey similar feelings of frustration and disempowerment, while acknowledging that power dynamics are inextricably tied to the disagreements that impact progress. Like disagreements between friends or romantic partners, willingness to engage in difficult moments of tension is a sign of a healthy and productive partnership. Like those relationships, however, points of contention must be resolved before momentum can be regained.

We began this section talking about author order and momentum because, in retrospect, we believe that spending more time on these conversations in advance could have prevented some of the frustrations we encountered later when processes began to break down. We have experienced projects in which one of the group members wanted to take the piece in a very different direction. In one particular instance, the dialogic model--equal power between equal authors--actually worked against us. Without a clear leader to reinforce a mutually agreed upon vision, a well-intentioned single contributor literally continued to rewrite the manuscript again and again because all members had equal authorial rights to the text. Even when external feedback confirmed the majority's direction was more likely to lead to publication, the single contributor had trouble stepping back and releasing what the rest of the group agreed was a negative hold on the writing process. We were fortunate that this individual was well-intentioned--there was no desire to disrupt or undercut, just an inability to play well with others--but we struggled with the power dynamics of a dialogic model that we had fallen into rather than had pursued intentionally. We became aware that we lacked mechanisms to help us get out of this mess. We pursued the project because we had already invested much time and energy into it and were determined to get the CV line out of the effort. We succeeded, but not all personal-professional relationships survived.

There is no way to know if this particular collaboration would have been less painful or stressful if we had predetermined a first author or if we had more actively designed a project blueprint before we started working, but we would at least have had a mechanism to fall back on when things became difficult. We relied on mentors' and colleagues' advice in the absence of more formal models, but we would have benefited from 1) knowing what challenges we were like to encounter before we got there, and 2) having a tool to give us direction and support when the path to success seemed unclear. We hope that this article shares our experiences in order to prepare the academic-professional writers who come after us, and that it also serves as a productive tool so that when academic-professional writers encounter what we now believe are inevitable obstacles in collaborative writing, they have a mechanism for moving forward.

Conclusion

Despite the challenges, we continue to teach and to engage in collaborative writing because it is valuable. Writing together diffuses the solitude of putting words on the page and embeds holistic peer review throughout the writing process. Writing together also embodies communication as situated in discourse, as responding to actors in motion rather than static proclamations of articulation. Collaborative writing in the academy also helps prepare our students for employment and citizenry, establishing habits of listening, conversing, and responding to context beyond themselves. Collaborative writing as professionals reminds us that we are part of scholarly traditions that build knowledge one piece at a time, sometimes contentiously, and that it positions us to speak meaningfully about what it entails to work through difference, changes, and challenges.6

Collaborative writing has been addressed in many fields owing to a wealth of scholarship that documents best practices, as well as pitfalls and opportunities for future scholarship. Even with this strong foundation, however, we believe that that we can do more to inhabit better collaborative writing practices ourselves so that we can progress our careers and our pedagogy. As teacher-scholars transitioning from the world of graduate school to professional employment, we know well that performing our knowledge is where the rubber meets the road. The hallmarks of collaborative writing that we identify in this article (authorship, momentum, dissensus), informed by our experiences and strengthened by scholarly traditions in multiple fields, demonstrate how others might use their experiences to improve as collaborative partners and model the kinds of practices we want our students to grow into and ultimately model for others.

Beyond a valued product, the transferable skills that come out of collaborative writing are a renewed attention on responding respectfully to difference. Whether differences in mindset, process, or ability, collaborative writing requires participants to move beyond themselves to meet the needs of the people in front of them. We hope that beyond improving our skills and those of our students, the mindset of engaging with difference in the classroom and in our professional academic lives better enables us and our students to engage more productively with issues of difference as participants in diverse communities.

6 It may be useful for readers to know that we feel that we collaborated successfully on this article for three key reasons. First, we shared a professional mindset, a deep investment in our work, and similar writing styles/processes before we even started writing. Second, we built and maintained a strong rapport and a trusting, healthy space over time by socializing sincerely before getting down to very organized business. Finally, we consistently met face to face over a short period of time. We believe these three elements—some pre-existing and some intentionally cultivated—meant that we had clear and robust habits of communication in place so that we were never surprised by the actions/contributions of the other, and were able to negotiate issues that may have otherwise been contentious with understanding.

A Worksheet for Working Through the Sticking Points of Collaborative Authorship

Beyond simply theorizing our experiences, we wanted to provide a framework that engages with the messiness we described above. Though this tool could be used by collaborative writers at any level, we developed it particularly for writers coming out of graduate school or early career faculty who are engaging in high-stakes collaborative writing probably for the first time. We recommend working through these questions to develop a "blueprint" before participants actually start writing, and keep the notes for items like tasks and timelines in a central location for easy reference and ideally return to revise the document at regular intervals throughout the project.

Develop a Blueprint Before Writing

Authorship – What model are you going to follow for establishing author name order? How (if) will author order determine group roles and responsibilities? Is anyone "in charge," and/or does anyone have a final say as lead author? What (if any) are the different levels of investment in the project that could impede time to completion?

Momentum – What are the tasks that need to be carried out? Who is going to do which? What is the anticipated timeline? What mechanisms do you have for making sure that everyone carries out their tasks in a reasonable timeframe? What technology will assist with completing tasks, and do different members have different technological needs/comfort zones?

Dissensus – Where do you anticipate encountering challenge? How will you work through tension and/or dissensus? How will you manage power differentials when you're working alongside each other as co-authors? How will you negotiate between democracy and dictatorship in the space that usually ends up somewhere in between?

Open in Case of Emergency

Authorship – Is author order continuing to inform workload and vice versa? Is everybody fulfilling their responsibilities as laid out in the planning documents? How are you productively talking through breakdowns in commitments?

Momentum – Is everybody still responding to group communications? How can you adjust timelines and tasks to respect your group members and still achieve your collective goals? What needs to change so that you can resume progress? Does the blueprint need to be renegotiated? What will it take to get this back on track?

Dissensus – What are the points of tension or dissensus that need to be addressed? What mechanisms are in place for those sticking points to be articulated and addressed? Where can you compromise, and where do you need to stand your ground in ways that still move the group forward?

Close the Metacognitive Loop

Authorship – What were the benefits and drawbacks of your planned author order? What would you do different next time both working with the same group and as a group member of a new, different group?

Momentum – What works and what fell apart in the blueprint? Could you have planned differently to prevent some of the challenges? What would you do different next time both working with the same group and as a group member of a new, different group?

Dissensus – What were the points of tension? Why did they happen, and could they have been avoided? Were you satisfied with how the group worked through the challenges? What would you do different next time both working with the same group and as a group member of a new, different group?

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"Now We're Trying to Teach the Public": Writing and Project-Based Learning in General Education

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Abstract

Given perpetual critiques of general education, scholars have called for a paradigm shift from a teaching-based to a learning-based approach to instruction (Grubb & Lazerson, 2005; Harris, 2006). This article responds to this call by bringing together theories of project-based learning and writing studies scholarship in an argument for designing more effective and engaging writing tasks that meet general education outcomes. Drawing from interviews with two students and their instructors, I explore the ways in which a project-based approach that values student agency and an approximation of a real-life situation can lead to greater student engagement and a deeper level of learning in a content-driven course.

Keywords

project-based learning, writing, general education, instructional alignment, engagement, genre

"Now We're Trying to Teach the Public":

Writing and Project-Based Learning in General Education

Even though there may be "broad consensus" among educators and employers that the kinds of skills and habits of mind developed in general education will prepare students for the world (Shoenberg, 2005), general education programming remains a continual focus of higher education reform efforts in the face of accountability mandates and political pressure to curtail student time to degree. In response to these challenges, scholars have called for a paradigm shift from a teaching-based to a learning-centered approach to instruction (Grubb & Lazerson, 2005; Harris, 2006). These arguments suggest that by privileging student engagement instead of content coverage in course design, faculty might better help students see connections between their courses and a range of majors, careers, and life situations (Thompson, Eodice, & Tran, 2015), or foster a greater understanding of how skills gained can be applied to present and future situations (Adler-Kassner, 2014; Driscoll, 2014). This article responds to this call and makes an argument for incorporating principles of project-based learning when designing writing tasks in content-driven courses. Drawing from case studies of two first-year students' writing experiences, I explore the ways in which a project-based approach that values student agency and an approximation of a real-life situation can lead to a greater level of student engagement and deeper learning.

While this article's attention to writing and learning-centered approaches is applicable to many content-driven courses with a writing component, I focus on general education due to its valued yet contested position in U.S. higher education. Loosely defined as education that all undergrads at an institution share regardless of their disciplinary major, current models of general education reflect inherited expectations that are often in conflict with each other (Wells, 2016). For example, Adler-Kassner (2014) has noted that general education programs were developed to encompass three potentially competing goals: to promote the intellectual development or liberal learning of students, to prepare students for participation in society and the workforce, and to learn to approach problems in discipline-specific ways (p. 438). While those in the academy tend to see these competing goals as a form of productive tension, Adler-Kassner suggests that many policymakers and reformers see a strain to be resolved through a greater focus on professionalization. These competing visions have become more salient in recent years as public discourse surrounding education has focused on career preparation at the expense of disciplinary enculturation, perhaps most visible in initiatives like the Common Core State Standards that emphasize "college and career readiness," and in standardized tests like the Collegiate Learning Assessment (CLA) or the Collegiate Assessment of Academic Proficiency (CAAP) that measure skills such as critical thinking, reading, and writing divorced from their disciplinary contexts. Possibly influenced by this pervasive focus on college as career preparation or skill development, survey research has shown that students tend to see general education courses as a waste of time or even as an institutional money-making venture (Driscoll, 2014). Even when students do recognize the holistic purposes of general education to develop well-rounded individuals and responsible citizens, many would still prefer more courses in their major instead of general education courses (Thompson et al., 2015).

This disconnect between the multifaceted civic, intellectual, and disciplinary potential of general education and negative perceptions from students and other stakeholders has led some scholars to point to a more fundamental problem of teaching and learning in the current higher education landscape. Harris (2006) has called for a paradigm shift from a teaching-based to a learning-centered conception of instruction in order to protect general education in a market-based, consumer-driven, higher education environment. Grubb and Lazerson (2005) have similarly argued that academics who believe a broad-based, liberal learning model of general education will benefit professionally driven students need to invest in training that will help improve teaching and learning throughout the curriculum (p. 18). These arguments suggest that general education as a whole might benefit if instructors thought less about how much content needs to be covered, and more about what and how students should be learning in the course.

Toward Learning-Centered Approaches: Project-Based Learning (PBL) and Writing

Such calls to learning-centered approaches present an appealing context to introduce engaged learning pedagogies like project-based learning (PBL). Building from the progressive-era emphasis on "learning by doing" and supported by more recent cognitive research highlighting the ways learning happens in the course of authentic activity, PBL offers potential to heighten student engagement. PBL approaches attempt to maximize learning by making school more applicable to student interests and the outside world through "projects"—learning experiences centered on a "driving question" that lead to products as varied as launching a rocket, making a dress, or writing a letter (Barron et al., 1998; Thomas, 2000). According to Thomas (2000), PBL is best understood as an approach to teaching and learning or as a set of principles rather than as a particular model of curricular design. Some of the features that categorize PBL include: a project central to the curriculum, not tacked on as an extra assignment; a central problem or question that leads students to engage with the core concepts and principles of a discipline; students engaged in new learning as part of their investigation; a student-driven dimension; and a feeling of "authenticity" for students, or a measure of real-life situation (Bell, 2010; Thomas, 2000). According to researchers, a PBL approach can both improve content learning and impact higher-level cognitive skills such as critical thinking and problem-solving (Barron et al., 1998; Bell, 2010; Thomas, 2000), which are often emphasized in general education goals and outcomes statements.

Considering most PBL projects already include reading and writing components (Bell, 2010), I see great benefit in bringing PBL and writing scholarship together to develop engaged student learning opportunities. Writing has emerged in recent years as another leading teaching strategy for increasing student learning and engagement. Large-scale research has pointed to connections between writing and learning (Arum & Roska, 2011) and the American Association of Colleges & Universities has identified writing-intensive courses as a "high-impact practice" (Kuh, 2008), even dedicating the Winter 2017 issue of the Peer Review journal to research on writing and learning (Carey, 2017). The prominence of first-year writing courses and Writing across the Curriculum (WAC) and Writing in the Disciplines (WID) programs demonstrates institutional support for writing in postsecondary settings. In fact, the large research university where this research was conducted recently implemented a writing policy that prescribes minimum word counts and requirements for feedback and revision in every course included in the general education curriculum.

Deep Learning and the Importance of Context

Pedagogical approaches like PBL and writing are highly valued because they encourage opportunities for "deep learning," when students focus not only on acquiring information, but also on understanding the underlying meaning of that knowledge (Kuh, 2008). However, researchers of both PBL and writing pedagogies have cautioned that simply implementing these strategies is not enough to ensure such deep learning. For example, Barron et al. (1998) found that it's possible for students to get so involved in the activity of a project that they don't make connections between the project and the underlying skills or knowledge it is intended to encourage (p. 174). The researchers suggested that effective PBL design should include frequent opportunities for formative self-assessment and revision, and also create social structures to promote motivation and agency, including group work, peer review, and opportunities to break out of the classroom by presenting to real audiences (Barron et al., 1998). K-12 research has also shown that practical concerns such as class sizes, availability of resources like technology, and limitations on time can affect the success of a PBL curriculum (Thomas, 2000).

Writing scholars have similarly cautioned that incorporating more writing does not necessarily lead to more learning. Ackerman (1993) reviewed 35 studies of writing research published over a 10-year period and found a lack of empirical evidence connecting writing to learning. He suggested that the act of writing in itself is not enough to bring the intellectual change that proponents often call for, and pointed to the variety of cultural and institutional pressures that shape school-based writing. He called for teachers and scholars who advocate for writing to study the teaching and learning contexts that support or hinder the potential relationship between writing and learning.

A recently published study from a collaboration between the Council of Writing Program Administrators (CWPA) and the National Survey of Student Engagement (NSSE) further explored such contextual factors. After adding 27 writing-related questions to the NSSE, the researchers examined over 70,000 surveys from first-year and senior students enrolled in bachelor's degree programs at over 80 institutions in an effort to identify some of the features that create opportunities for "deep" student learning in writing assignments (Anderson, Anson, Gonyea, & Paine, 2015). Results pointed to a correlation between three elements of effective writing tasks and deeper learning experiences:

- Interactive writing processes, in which student writers have an opportunity to gain feedback about their ideas and writing, orally or in writing, before submitting a final draft

- Meaning-making writing tasks, in which students are asked to engage in some form of integrative, critical, or original thinking; and
- Clear writing expectations from teachers, in which students feel they understand what they are supposed to show and do, and how they will be evaluated (Anderson et al., 2015, pp. 206-207).

Analysis of the survey data showed that each of these constructs was more strongly associated with students' engagement in "deep learning activities" than a similar correlation with the number of pages, implying that the quality of assignments offered may be more important than the number or size of writing tasks completed (Anderson et al., 2015, pp. 227-229). It is clear, then, that simply adding more writing does not necessarily mean more learning will occur.

Both PBL approaches and writing demonstrate potential for deepening student engagement and learning in content-driven courses. In fact, effective PBL curricula and writing tasks share characteristics, including emphasis on a core problem or question that leads to critical or original thinking and opportunities for formative assessment and revision. Thus, incorporating a PBL approach in general education writing tasks requires careful attention to the teaching and learning context. As Barron et al. (1998) explained, "A major hurdle in implementing project-based curricula is that they require simultaneous changes in curriculum, instruction, and assessment practices—changes that are often foreign to the students as well as the teachers" (p. 271). In the next section, I introduce a framework of instructional alignment that can help guide these changes as we consider effective writing-based project design.

Connecting Tasks and Outcomes Through Instructional Alignment

In an effort to focus curricular design on student learning, Cohen (1987) described instructional alignment as a match among intended outcomes, instructional practices, and assessment. While this may sound intuitive, even common sense, Cohen argued that classroom assessment is often separated from the practice of teaching. Tests, writing assignments, and other assessment activities claim to measure the same skills as those taught in the classroom, but there is often a disconnect between the skills actually being measured on the assessment and the stated outcome. For example, common learning outcomes like "critical thinking" or "higher cognitive skills" often remain undefined, meaning they cannot successfully be assessed (Cohen, 1987, p. 19). For Cohen, the shift to a learning-based classroom involves a shift in curricular thinking. Following mastery models of curricular design, he suggested designing the assessment before writing the rest of the curriculum. Put simply, an assessment should test what instructors actually teach.

To be clear, Cohen (1987) was not advocating for "teaching to the test" or the kinds of large-scale, standardized tests often associated with constrained curricula. Instead, he described a pedagogical approach in which the assessment accurately reflects the intended goals of the course and the teaching and learning activities therein. Biggs (1999) has even argued that there is nothing inherently wrong with the "backwash" from assessment to classroom activity, as a problem only arises when the assessment tests lower cognitive skills than the desired outcomes. For example, a multiple-choice test that elicits memorized facts, dates, or definitions would not be aligned "unless that teacher really did think memorization was adequate" to meet the objectives of the course (Biggs, 1999, p. 69). Considering that general education course and program outcomes often focus on higher-level skills, the assessments (writing assignments, tests, or projects) should provide students opportunity to demonstrate such abilities.

In proposing "constructive alignment" for curricular design, Biggs (1999) drew from constructivist and phenomenological theories of teaching and learning to remind instructors that learning is more than simply acquiring new information. Instead, learning happens when a person interacts with the world in different ways. In school situations, however, students are often asked to demonstrate what they know or have learned rather than apply what they have learned in new situations. For example, Melzer's (2014) study of over 2,000 postsecondary writing assignments from across the curriculum found that even when teachers frame assignments around goals like critical thinking, they still tend to call for writing that would display the "right" or "correct" answer (pp. 22, 36-37). On such tasks, if a student cannot prove that they have learned the material, then they have "failed."

Instead of focusing on what the student did or did not learn, or what the teacher did or did not teach, Biggs (1999) called for an emphasis on student activity: What does the student do? According to Biggs, designing for constructive alignment should attend to student activity in a three-step process. First, the curriculum must state a clear objective, and teachers must make explicit the meanings they want student to address. For example, an outcome like critical thinking should be clearly defined because it might have different meanings for an instructor than for a student. Second, the teaching and learning activities must be set up to encourage the kind of cognitive work that meets the stated objective. If the goal is critical thinking, an hour-long lecture followed by a multiple-choice quiz may not provide the opportunity needed. Finally, an assessment process must reflect the thinking of the first two steps. If the assessment is designed for alignment, Biggs (1999) explains, when students focus on the assessment they will be engaging in the processes—the doing—to meet the outcomes (pp. 64-69).

These considerations of instructional alignment can help faculty to reconsider the ways writing is incorporated in general education and other content-driven courses. If the goal of a course is to put knowledge to use, but the assessment only provides opportunity for students to declare their knowledge, to show that they know about something, then the assessment is not aligned with the desired goal (Biggs, 1999). Constructive alignment is thus one way to evaluate and encourage a well-designed PBL approach to writing. As Thomas (2000) explained, a PBL project should encourage students to go beyond demonstrating what they have learned, as "the central activities of the project must involve the transformation and construction of knowledge" (p. 3). Similarly, the prevalence of writing tasks focused on demonstrating knowledge must be reconsidered in the context of the NSSE research on student engagement, which showed evidence of deep learning when students construct meaning, engage in the problems and questions of the disciplines, and know what is required of them to succeed (Anderson et al., 2015). The traditional "term paper" may not offer these opportunities to students who are unfamiliar with the content or discourse conventions of a new discipline, leading to much-maligned book reports or "quasi-plagiarized data dumps with long quotations and thinly disguised paraphrasing" (Bean, 2011, p. 91). The case studies that follow provide an opportunity to explore the potential effects of task design from an instructional alignment perspective by examining two students' writing experiences in general education courses that shared similar content but offered different writing opportunities.

Case Studies: Task Design and Student Experience

The case studies in this article emerged from a longitudinal study of student writing experiences at a large research university in the southwest United States. I met monthly with participating students through their first year of study, during which time we discussed assignments, teacher feedback, attitudes about writing, and strategies for success. I also interviewed some of their teachers, especially those in classes they enjoyed. With teachers, I discussed course goals, the logic behind writing tasks, assessment procedures, and, when possible, the student's writing. The data presented here draws from transcripts of student and teacher interviews about the writing projects, and I use the assignment guidelines and rubrics as a method of triangulating findings. With instructional alignment in mind, I begin by describing the teachers' respective learning objectives and writing tasks before examining each student's appropriation of those tasks.

Learning Outcomes and Task Design

Both of the instructors interviewed for this project seem to view their general education courses as more than simply content transmission. In courses that focus on sex and AIDS from a public health perspective, they wanted students to be reflective of their own experiences, identities, and sexual practices, and they also wanted them to be engaged in the world around them. In short, these instructors see general education as an opportunity for personal, professional, and civic learning.

For years, Taylor has been teaching a course exploring the social and epidemiological phenomenon of AIDS.[1] Taylor knows there is a gap in sex education in our conservative state and sees an opportunity to make a difference by teaching students about human sexuality, transmission of disease, and prevention (Interview, November 7, 2016). Taylor described the course as "trying to fill a gap" in sex education. They continued:

> I want to talk about this pandemic that we seem to have forgotten about, because when you see the stats, it's the young people that are still propagating this epidemic. And so somehow we've got to get that word out so they can reflect on it. So in terms of that, I think this Gen Ed [course] helps students reflect on who they are, what their sexuality is, and how they can be, I guess, not only safer, but kinder in a way. (Interview, November 7, 2016)

From this excerpt, Taylor's stated learning goals can be divided into three parts. First, there is a declarative knowledge component, as students should "understand the basics." There is also a more inward-facing goal, that students might "reflect on who they are," implying that the course might challenge student pre-conceptions, and create a self-awareness of their own sexuality and choices. Finally, Taylor hopes students will be "kinder," an outward-facing goal that may influence the way students think or talk about those with HIV/AIDS. Taylor's description of his course seems to embody the productive tension of general education described by Adler-Kassner (2014): they are hoping students will gain knowledge, reflect on the ways they interact in society, and think about sex and sexuality from a more discipline-specific frame.

To meet these goals, Taylor assigns seven analytical writing tasks over the course of the 16-week semester. Each of the seven tasks are presented to students in sets of guiding questions that give students "something to think about" as they engage in a "critical analysis" of a text, video, or topic related to course content (Interview, November 7, 2016). For example, one analysis task asked students to explain whether or not the U.S. government should institute a national program for harm reduction, like a needle exchange. According to the written guidelines, the writing should be a 300-500 word, thesis-driven, source-based text with an introduction, body paragraphs, and a conclusion that connects the writing to current societal issues. In short, the prescribed format requests something similar to the common five-paragraph essay assigned across K-12 and higher education. The evaluation rubric similarly emphasizes these parameters, with analytic criteria for analysis, use of sources, structure, and format.

Like Taylor, Blake is an instructor concerned about a lack of general knowledge among students. They remarked that "[students] know way less about sexual health than I thought they would," and recognized an opportunity to share safe sex practices with a captive audience of mostly first-year undergraduate students (Interview, January 30, 2017). Beyond knowledge of safe sexual practices, Blake's "more ambitious" goal is for students to see disease and health as more than "nice little pocket issues." They want students "to think about intersectional factors" and start to see public health concerns as multifaceted social issues, not simply medical problems to be fixed (Interview, January 30, 2017). Blake continued, "They're not going to walk out of this class being experts in that, but thinking about race, gender, sexuality, we have to look at all those things if we're going to deal with something like public health" (Interview, January 30, 2017). Blake's teaching goals are thus similarly multifaceted. They want students to have the knowledge of safe sex practices, and also to begin to see the "intersectional factors" that contribute to public health issues. Understanding these factors may help to "deal with" public health, which one might see as a call to action.

During the semester when this data was collected, Blake introduced a "New Media Project" as the final project in the course. For this task, students were to create a digital project educating an online audience on a topic of their choosing related to the course material. The assignment was loosely designed in terms of both content and formatting. As Blake explained in an interview, evaluation would not focus on whether or not the project met formal expectations, but on whether the content included was understandable to an intended audience. Blake continued,

> That's the big difference is that this one is for an audience. If they're writing stuff that's really obscure to people, and it's not coming across, that's a problem. But if it's like, "Oh, you've clarified a point that people are probably confused about," that's what I'm hoping for here. (Interview, January 30, 2017)

Blake sought to create a real-life situation for the students to write to, and the task also clearly positions the students as educators teaching their audience about the topic. Blake is asking students not only to share what they know, but to "deal with" the issue by educating others about it; they are asking students to use their knowledge to new ends. Blake's evaluation rubric for the new media project reflected this audience-oriented goal by incorporating criteria to assess not only the quality of information and use of sources and citations, but also the choice of medium and quality of presentation in terms of that medium.

Jain's Experience: "Just Asking Our Opinion"

Jain was in his first semester of college study when he enrolled in Taylor's course.[2] An aspiring engineer, Jain enrolled in only general education courses in his first semester. While he found himself lost and bored at times in general education, he frequently discussed the sex and AIDS class in our monthly interviews. He saw value in the content and thought the course would help him "to be smart about my sexual choices" (Interview, September 28, 2016). He also looked forward to sharing what he learned with his teenage siblings. In our discussions, Jain identified course goals in much the same way as his instructor, saying that some of the goals were to "bring awareness to the students" (Interview, October 28, 2016) and "hopefully prevent stuff in the future" (Interview, September 28, 2016).

However, Jain struggled to connect his writing tasks to these goals, recognizing that his class projects did not give him an opportunity to pursue the awareness-raising goals that he found interesting about the course (and that his instructor seemed to desire). In an interview discussing his analysis of needle exchange programs, Jain said he was "trying to persuade people why it's important to have those programs" (Interview, October 28, 2016). But while he thought it would be important to write for the affected community, this is not the role the task was asking of him. He explained, "The prompt was *just*, 'Why do you think the exchange programs are helpful or important?' So it's just asking our opinion" (Interview, October 28, 2016, emphasis added). The use of just in that excerpt is instructive, as Jane seems to imply that the prompt is falling short of the task goal.. Because it's just asking for his opinion, the task is not asking him to use that opinion for any particular end. In another interview, he described the analysis paper as an opportunity "just to show that we're actually understanding the material, reading the articles, and paying attention to lectures" (Interview, September 28, 2016).

1 All names are pseudonyms in an effort to protect participant identities. Teacher participants were assigned gender-neutral pseudonyms and will be referred to with the singular "they" throughout this article. Student participants selected their own pseudonyms, and will be referenced with pronouns that reflect their self-reported gender identity.

2 Jain was an avid consumer of television procedurals when I met him in high school, and he selected this pseudonym from the character Patrick Jane on the television show, *The Mentalist*.

In other words, Jain saw these writing tasks as teacher-oriented, as opportunities to "show" his teacher that he's doing the work, but not to educate others or actively reflect on his own life.

In this way, the assignment design also limited Jain's ability to achieve the learning outcomes set forth by his instructor. Jain mentioned that "as a student," his role was to show his teacher what he learned, but he also identified ways in which his knowledge could be used for a more outward-facing purpose, saying, "If I was an activist or something, if I'm trying to prevent people from making mistakes […] It would be important to actually publish stuff for people to read" (Interview, September 28, 2016). Jain seems to acknowledge the constraints of this instructor-driven task in ways that echo Biggs's (1999) call for educators to focus more on what the student does in the activities of the course. Most learning objectives, Biggs explained, ask students to use knowledge, however much teaching and assessment is about knowledge. He suggested that constructive alignment must create opportunities for students to "engage in (appropriate) learning activities" that are likely to achieve the objectives of the course (Biggs, 1999, p. 64). In the case of Taylor's course, if the goal is to both have knowledge and use it, for self-reflective or educational means, then students need to have an opportunity to engage in activities that lead to such ends. This seems to be what Jain wanted, an opportunity to use his knowledge in the world.

Lucy's Experience: Teaching the Public

Lucy, a first-year student enrolled in Blake's course, talked about her experience in ways that lend insight into the value of considering alignment when designing writing-based projects. Like Jain, Lucy appropriated the course goals of her instructor. Over the course of the semester, she talked about discrimination in the history of HIV/AIDS and came to realize that structural inequalities still exist in the treatment of disease. In other words, she was starting to view public health in a more discipline-specific way.

For her new media project, Lucy wanted to "destigmatize" people with HIV/AIDS so she worked with a few peers to create an Instagram page. When asked in an interview, she described the purpose of the project as follows:

> I feel like 'cause it's accessible for everyone, it's kind of *to spread the word a little bit*. Not promote sex and AIDS, but show the real side of it, and how media stigmatizes it a certain way. So I feel like our job is to unstigmatize the media a little bit. 'Cause we've been learning about how most of the HIV and AIDS patients aren't scared of the sickness, but they're more scared of discrimination that goes behind it, and that's usually media influenced. So it'll be pretty cool. *Unstigmatizing the media*. (Interview, April 4, 2017).

In this excerpt, Lucy makes the connection between the task and the outcome. Because she is making an Instagram page, she recognizes that it's "accessible" for a real audience, and because it's accessible for everyone, the goal is to communicate something to a broader audience, to "spread the word." In a later interview after she completed the project, Lucy expanded on this idea, identifying a particular social purpose:

> I felt like our goal was to kind of educate people that stigma is one of the main things that people with AIDS and HIV deal with besides the disease itself. [The page is] to promote them, not to stigmatize them, in a way. So I felt like if someone came and looked at my Instagram page…what I wanted them to take away from it was just to be a little bit more caring and open-minded about people who deal with this disease. (Interview, May 3, 2017)

Lucy's description of her project thus reflects the "more ambitious" goals that Blake set for the course. Blake hoped that students would see public health as a social issue beyond simply curing or preventing diseases, and Lucy has clearly appropriated that goal in her new media project.

When we consider Lucy's experience in terms of instructional alignment, it becomes clear that the new media project served as an opportunity to use the knowledge she had gained in the class. In fact, Lucy recognized this herself when talking about the project. She called it "one of the most interesting projects" she completed in her first year. She and her group "took in all this information, and now we're trying to teach the public about it" (Interview, May 3, 2017). This writing task provided Lucy with an approximation of a real-life situation for her writing, one that allowed her to see a purpose beyond pleasing the teacher to use her knowledge to meet the learning outcomes of the course.

Writing, Alignment, and Genre in General Education Projects

In these brief descriptions of student experiences, it is easy to differentiate some clear differences in the ways Jain and Lucy discuss their projects. Jain saw his project in terms of demonstrating his knowledge, showing the teacher that he's doing the work of the course. Lucy, on the other hand, was imagining her work as social, as engaging with the outside world in discussion of the societal issues she was learning about in class. Lucy had to use her knowledge, not simply declare it. Even if the Instagram page remains private, only visible to the teacher, Lucy is operationalizing what she learned in class toward what feels like an authentic end. In fact, she said she felt "like an activist," the same role Jain identified as one that would have been meaningful for his class. "I feel like I was trying to be like a public voice," Lucy said. "Like an activist. That's what I was trying to be" (Interview, May 3, 2017).

The differences in these students' experiences seems to reflect the different learning contexts of these assignments. Lucy's assignment focused on what she should do, how she should use her knowledge. As the learning theorists Brown, Collins, and Duguid (1989) have argued, learners in school situations should be offered opportunities to experience the ways of thinking, being, and doing that are associated with the content they are studying. In math classes, for example, students need to learn to think like a mathematician, not to memorize formulas (Brown et al., 1989, p. 38). Through the new media project, Lucy was offered an opportunity to inhabit the role of a public health "activist" or an educator sharing knowledge, whereas Jane was constrained by his "student" role. Jain imagined a way to use his new knowledge when he said, "It would be important to actually publish stuff for people to read," but recognized that this was not the goal of his writing assignments (Interview, September 28, 2016).

Principles of instructional alignment can remind instructors that the tasks we assign and the assessments we use need to reflect the goals that we have identified for our courses. In this case, both participating instructors appeared interested in helping students meet the multifaceted goals of general education. In fact, their discussions about course goals often demonstrated the ways university faculty embrace the productive tension embedded in the potentially competing goals of liberal learning, preparation for society, and disciplinary enculturation (Adler-Kassner, 2014). In interviews, both instructors made clear that they wanted students to gain knowledge of safe sexual practices, to "be kind" or accepting of others, and to respond to their world. They seemed to echo Hanstedt (2012), who suggested that one of the goals of general education is to help develop "people who are independent and flexible in their thinking and capable of responding to the demands of a changing world in civic-minded, deliberative ways" (p. 2). The cases described in this essay suggest that if general education is really about developing flexible thinkers and writers, then student assignments need to move beyond opportunities to demonstrate knowledge and toward tasks that use knowledge to new ends. To do so, it may be helpful to consider writing tasks as projects, and to commit to creating approximations of real situations when designing writing tasks.

This goal can be augmented with careful consideration of genre. Bazerman (2015) has explained that all communication emerges from a social problem or exigency. As a person recognizes the situation, it "frames our understanding of the communicative action of others and gives us the urgency and motive to respond because somehow we sense our words will satisfy our needs in the situation or otherwise make the situation better for us" (Bazerman, 2015, p. 35). Whether during a con-

versation with a student or a negotiation with a salesperson, prior experience in similar situations has attuned speakers to potential choices, and they draw upon that knowledge as they dialogue with others. Writing works in similar ways. According to Bazerman (2015), writers understand their situation, their potential goals and audience(s), and the kinds of messages they can construct through genres. For example, a frantic email from a student missing class helps a professor determine their response, just as a call for proposals from a leading journal helps a scholar frame their reply. In this way we can understand genres as rhetorical actions that help writers to meet needs or solve problems. It follows, then, that a PBL approach to writing-based projects requires this more situation-based conception of genre. Rather than starting with the task (i.e., a term paper), the design of the writing task should begin with a consideration of the question students should answer or the problem students should solve, and how they might go about doing so.

The case studies presented in this essay serve as contrasting examples, demonstrating the ways that genre can limit a student writer's sense of agency or open up possibilities. In both of the general education courses discussed, engagement with real-world issues and disciplinary questions was a feature of the writing task: Jane was asked to engage with a real-world question of needle exchanges, while Lucy was asked to educate a non-academic audience, a common task for those in public health fields. However, while Jain was asked to engage with an important real-world question, the task itself did not reflect a real-world situation. It is highly unlikely that someone involved with AIDS-related advocacy or research would ever make an argument about needle exchanges in a five-paragraph essay, which Jain seemed to recognize in his discussion of the project. A five-paragraph essay is a school genre, an opportunity for students to demonstrate their knowledge to teachers in a recognizable form. In contrast, an Instagram page could be an appropriate genre to raise awareness of stigma related to HIV/AIDS. Lucy recognized herself as an "activist" or a "public voice" when she was writing in this genre, perhaps because she was explicitly writing for a public audience (Interview, May 3, 2017). The instructor's project-based approach offered an opportunity for Lucy to engage in the ways of thinking, being, and writing that allowed her to use the knowledge she had learned in the course and engage in the world around her.

Implications for Engaged Learning

Project-based approaches hold great possibilities for faculty interested in creating more engaging writing and learning experiences in general education and across the curriculum. By creating writing-based projects that ask students to engage in real-world situations and use new content knowledge and ways of thinking in their work, instructors can effectively align their writing assignments to higher-level learning outcomes. The case studies presented in this article have demonstrated the ways that such an approach can provide opportunities for students to see themselves as contributors to ongoing conversations in academic and public life.

As Barron et al. (1998) have suggested, implementing such a design brings new challenges, as a project-based approach confronts long-held beliefs about teaching, learning, and assessment. For example, there are undoubtedly some faculty and administrators who will read about Lucy's Instagram page with skepticism. They may wonder whether one should really consider Lucy's work academic, considering it consists primarily of images with one or two sentence descriptions, and is published on the same platform students are using to share their weekend highlights.[3] Or they may wonder how to assess this project, as it would not fit neatly with a rubric from a more traditional writing assignment. In order to address these concerns, it is necessary to return to the principle of instructional alignment and offer suggestions for those interested in pursuing a project-based approach to writing tasks.

Instructional alignment reminds us that the writing activities students engage with should be aligned with learning outcomes. When those outcomes include critical thinking or application of knowledge, common goals of general education programs, the assessment activity itself should allow students to demonstrate their learning by using their knowledge to new ends rather than simply demonstrating they have learned it. A project like Lucy's seemed to achieve these goals, even as it moved away from traditional notions of academic writing. In fact, Lucy's successful appropriation of the task and her interest in the project seems to support arguments for designing less traditional tasks to improve critical thinking and learning. Hanstedt (2012) has argued that in general education, where students are just beginning to learn the content and discourse conventions of the discipline, students may better demonstrate deep learning when they feel less pressure to impress their instructor with academic jargon in unfamiliar disciplinary discourses. As a result, he suggests that "one of the ways to get more scholarly thinking and writing from students is to move their work into a less scholarly context" (p. 78). Bean (2011) has similarly suggested an emphasis on the rhetorical situation of the task—the audience, purpose, and genre—in order to best engage students in the kinds of critical thinking and problem-solving that leads to deep learning. This emphasis can be used to redesign more traditional academic tasks, like an article written for an undergraduate journal instead of a term paper, but Bean also emphasizes the possibility for "alternative" assignments like reflective essays, personal narratives, letters, dialogues, or multimedia projects (pp. 118-119). As Bean's examples show, these less scholarly contexts do not have to include social media or digital technologies. One might imagine a variety of potential writing situations for Lucy to achieve her goal of lessening the stigma faced by people with HIV/AIDS. She could write an editorial for the school newspaper, create a poster for an imagined public health conference, or write a letter to a family member who may have less-informed opinions. After all, the work of public health practitioners often involves conveying complex information and data to a lay audience. Lucy might even complete a more self-reflective project in which she interrogates her own beliefs and feelings about HIV/AIDS over the course of the semester, bringing in course texts and other research when appropriate. If this were a class for public health majors, she might explore genres of the field, such as research proposals, literature reviews, or position statements. Any of the examples listed above can meet learning outcomes and encourage scholarly thinking and writing.

Assessment of such writing-based projects must also carefully consider the learning outcomes, an important consideration for all quality assessment. Writing scholars have found that teachers across the curriculum struggle to enumerate their expectations even for more traditional writing assignments, saying they "know it when they see it," and even at times offering conflicting expectations in the written assignment guidelines (Lea & Street, 1998; Leki, 1995; Melzer, 2014; Soliday, 2004). Developing projects that align with the learning outcomes and grading criteria to match can provide instructors with an opportunity to make clear what matters to them and provide students with better guidance, providing a more effective grading process. For example, Blake was assessing organization and coherence just as an instructor might on a more traditional writing task, but framed these criteria in the terms of the new media genres students would be working with. While it would be unreasonable to expect all instructors (and potential TA graders) to be familiar with all potential genres for an open-ended project like the one Lucy completed, it would not be unreasonable to ask students to attach samples to their final submission, or even to include a one-page justification for the choices they made. In an interview, Lucy said she based her Instagram page on other social justice-oriented pages she found during her

3 It is important to note the academic work already occurring in digital spaces. For example, the creator of the Tumblr blog, *People of color in European art history*, explains that they post images of artwork by or of people of color throughout European history in an effort to counter dominant narratives of a white-only Europe (medievalpoc, 2017). This blog poses an argument, it is researched, and sources are cited. Even it is not a traditional scholarly publication, this blog certainly demonstrates scholarly thought and activity.

research (Interview, May 3, 2017); asking her to provide links would help the reader evaluate her approach.

Finally, it is important to note that both student writers interviewed for this article wanted opportunities for deep learning as described in the NSSE research: they wanted to construct meaning and influence others in their general education courses, and they wanted to be involved in real questions related to their course topic (Anderson et al., 2015). While these case studies represent only two of hundreds of students enrolled in the representative classes, the findings here reflect broader discussions of alignment and writing across the curriculum. In writing assignments, in particular, calls to wider audiences beyond the teacher lend to real-world situations and genres more likely to align with outward-facing goals of our general education courses and programs. For instructors who believe in a higher education experience that helps students to shape their world, these stories remind us of what's possible when we create the right learning contexts.

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From Tchotchke to Techne: Project-Based Learning in the Arts and Humanities

— Ashley Hall

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Abstract

In this essay, I describe and analyze a case study in project-based learning in which humanities students collaborate with a community partner—a young girl who was born with upper-limb difference—to 3D print, assemble, test, and use a prosthetic hand. I first introduce the essay's theoretical framework, which combines community-based research (CBR) with Design Thinking. I then describe and analyze the project-based learning sequence in which students investigate and respond to an authentic situation with a community partner, using Design Thinking to overcome the problems or challenges they encounter, to illustrate practices that are broadly applicable.

Keywords

Project-Based Learning, Community-Based Research, Design Thinking, 3D printing

> *" The education of the technological imagination is not just the business of engineers and computer scientists; on the contrary, it is the responsibility of educators across the curriculum."*
>
> *— Anne Balsamo*

Educators from across the disciplines generally recognize that student engagement is important but many also agree that it can be a challenge (Anderson, 2008; Bean, 2011; Driscoll, 2011; Kuh, 2008). Scholars do not agree on a single metric for measuring or method for studying student engagement. In one widely discussed example, Richard Arum and Josipa Roksa, authors of *Academically Adrift*, conducted a large-scale study of 2,300 undergraduate students using a mixed methods approach which included standardized testing, self-reported data about the time students spent on academic coursework, and grades. Arum and Roksa concluded that not only were the students in their study less engaged than students from previous generations but that they were also working less and learning less. The publication of *Academically Adrift* called national attention to questions of student engagement. The correlation between student engagement and learning is an important issue that leads to several research questions that scholars from across the disciplines should explore through their research and their teaching (which, of course, then re-informs theory and research). As teachers and scholars, we can—and should—ask research questions about the specific teaching practices and pedagogical theories that can foster student engagement and then seek to develop better understandings of how that contributes to student learning.

Education scholar George Kuh has studied the connection between student engagement and learning, ultimately identifying a set of "high impact practices" which "have been widely tested and have been shown to be beneficial for college students from many backgrounds" (AAU&P, 2013). While Kuh does not specifically use the term project-based learning, I argue that PBL is an effective way to implement high impact practices, heighten student engagement, and promote authentic learning due to its emphasis on "knowledge and skills gained by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge" (Buck Institute).

In this essay, I describe and analyze a project-based learning sequence in which students investigate and respond to an authentic situation with a community partner, using Design Thinking to overcome the problems or challenges they encounter, to illustrate high impact practices that are broadly applicable. I present a case study in which humanities students collaborate with a community partner—a young girl who was born with upper-limb difference—to 3D print, assemble, test, and use a prosthetic hand. Throughout, I draw from pedagogical scholarship to theorize the implications of project-based learning in the arts and humanities and make recommendations for working with emerging technologies to cultivate the technological imagination across the curriculum.

Theoretical and Methodological Framework

The theoretical framework for this article combines community-based research (CBR) and Design Thinking. While design principles have been long integrated into particular disciplines such as architecture, engineering, art, and more recently graphic web design, the term Design Thinking refers to a methodological approach to problem solving and innovation that was developed in the Design School (d.school) at Stanford University as way to "generate new ideas, solutions, or approaches" (Kelley and Kelley, 2013, p. 3). Writing scholar Rebecca Pope-Ruark, who coordinates the Design Thinking Studio in Social Innovation at Elon College and is a co-editor of a special issue of the *Journal of Business and Technical Communication* focused on Design Thinking, explains that as a methodology Design Thinking can be "broadly defined as the human-centered, empathy-driven process of imagining, creating, testing, and revising responses to critical, highly contextual, and messy problems" (Pope-Ruark et al., 2017, p. 520). Several key terms in this definition can be easily connected with and applied to PBL.

First, the idea of responding to critical, highly contextual, and messy problems is a centerpiece of PBL pedagogy. In theoretical terms, this can be understood as what Lloyd Bitzer calls a rhetorical exigence, "an imperfection marked by urgency; it is a defect, an obstacle, something waiting to be done, a thing which is other than it should be" (1968, p. 6). Bitzer clarifies, though, that not every exigence is rhetorical, noting that for something to be a rhetorical exigence it must be something that can be modified or improved through discourse. In Bitzer's original formulation, discourse referred to spoken and written text. However, with the rise of multimodal composing practices, multimedia texts, and material rhetorics, the term discourse is now more capacious and includes a wide range of meaning-making practices. Consequently, as I will argue below, complex and messy projects of the sort suitable for PBL sequences present students with rhetorical exigencies because they require a broad range of problem-solving skills and often necessitate that students work across spoken, written, multimodal, and material modes of communication.

Additionally, drawing from the ways in which empathy and human-centeredness are foregrounded in Design Thinking as a methodology is a critical (and crucial) contribution to how we conceive of and implement PBL in classrooms. The value of using Design Thinking to shape PBL assignment sequences is particularly apt in situations where students interact with individuals

outside of the classroom, such as when PBL is used in conjunction with service-learning or community-based research.

Jeffrey Grabill opens his essay "Community-Based Research and the Importance of a Research Stance" in *Writing Studies Research in Practice: Methods and Methodologies* with the reflective comment "I have always been interested in how people use writing to get work done in the world" (p. 210). The simplicity of this sentence belies its significance. Much of the writing students are asked to do in college happens in what I call "a context of justification" (Hall and Stephens, forthcoming). Often times students are given writing assignments for the transactional purpose of demonstrating task completion. Take, for example, a widely used type of assignment such as a reading response: the writing students turn in to their instructor serves the primary purpose of demonstrating task completion of a reading assignment. This kind of assignment, governed by a context of justification, can be contrasted with the kind of writing (and other modes of discourse) students produce when they engage in project-based learning assignment sequences that involve stakeholders outside of the classroom. The latter kind of assignment shifts students into writing and composing in what I call "a context of invention and application" (Hall and Stephens, forthcoming). To borrow from Grabill, it helps students understand the role of writing—and speaking and making—in how people get work done in the world. And not just any kind of work, meaningful work.

The pairing of CBR with Design Thinking sheds light on the role action and collaborative participation can play in the construction of knowledge and the production of positive change; it authorizes students to take on a new role, as agents of change. Thus, using Design Thinking in the context of Grabill's (2012) definitional framework for CBR and applying these methodological frameworks to PBL assignment sequences, illuminates how we as teachers and scholars can enact a belief in the capacity of everyone to learn how to use design to "develop their own creative potential" (d.school, Welcome section, para. 1). What's more, we can then begin to see how such enactment can make meaningful contributions not just for individual students who complete the PBL assignments but for groups and communities outside of the classroom as well.

I use the case study of 3D printing a prosthetic hand in a humanities course to analyze and address how project-based learning framed by Design Thinking and in the context of CBR engages students with high impact practices including community-based service learning and collaborative assignments that have writing-intensive components, while also requiring students to use other modes of discourse effectively. I also address how this approach offers a pathway for effectively integrating PBL by exploring and embracing emerging technologies in the arts, humanities, and social sciences.

Throughout, I use the combination of Design Thinking with CBR in this project to illuminate how project-based learning yields an entanglement of product1 and process. There is the thing itself that is produced—a 3D printed prosthetic hand, which is a material manifestation of ideological and social participation. And a process—sets of unfolding relations that are non-linear, reflexive and reciprocal, messy—just like the kinds of work we aim to prepare students to conduct outside of the classroom. When project-based learning that involves emerging technology is reconceptualized as an entanglement (of product and process, of humans and technology), it becomes clear that this approach to teaching and learning is indeed well suited to the priorities, values, and traditions of teachers and scholars in the arts, humanities, and social sciences.

Finally, recommendations for working with emerging technologies across the curriculum will also address how project-based learning can be a way to introduce students to the emerging field of disability studies in sensible, ethical, and effective ways (Eisenhauer, 2007; Loja et al., 2013). Moreover, the engagement with disability studies woven into the discussion of the case study I present reveals how some approaches to service learning or project-based learning in the context of disability communities can reify problematic relationships of power. I point to ways that enable teachers and students to resist, challenge, and transform practice. The outcome of this transformed practice can produce more balanced and reciprocal power relations that affirm the role of the disability community (and other community partners) in the production of product, process, and ultimately knowledge.

1 As a rhetoric and writing studies scholar, a theoretical understanding that differentiates between product and process is familiar to me and to those in my field; this is not, however, necessarily the case for those working in other disciplines.

Trends in Project-Based Learning and 3D Printing Across the Disciplines

The broad range of possible applications for 3D printing has made the technology interesting to educators, especially those in STEM disciplines. In his 2010 article, "Get Students Excited! 3D Printing Brings Designs to Life," Gary Lacey uses an example of a female high school student who expressed excitement after successfully designing and 3D printing a plastic model of a screw top container lid as the basis for his assertion that "projects that involve 3D printing both educate and motivate technology students. They teach students processes used in today's industry for product design and manufacturing. And through them, students of differing skill and grade levels can work together toward a common goal" (Lacey, 2010, p. 17). There is no doubt that when the student exclaimed to her classmates "Cool! Look what I created" (Lacey, 2010, p. 17) that she was genuinely excited about her accomplishment. Excitement is far from superfluous in active, engaged learning; it is an integral part of the process which can lead to measurable pedagogical benefits, as observed by technology instructor David Atwood who reports that "all students respond better to project-based learning because it is easier to learn and gain context by doing than to learn simply by reading a textbook" (Lacey, 2010, p. 17). If this is in fact true of all students, why then should project-based learning assignments using 3D printing be so prevalent in STEM classrooms and so absent throughout the humanities?

While there are undoubtedly many reasons for the imbalance, one factor is that humanities scholars do not immediately see how they can design assignments that would have their students meaningfully participate in project-based learning sequences that rely upon emerging technologies such as 3D printing. One example of this imbalance can be found in the percentage of STEM teachers who participate in the e-NABLE online community compared to the lack of humanities teachers who do not yet participate in that community. e-NABLE is an international non-profit that matches volunteers (who have physical access to 3D printers and the digital literacy to produce 3D objects) with recipients (who have upper-limb difference). e-NABLE provides a digital ecosystem that facilitates discussion, learning, connections between individuals, and serves as a catalog of the open-source files needed to produce 3D printed prosthetics.

According to the Centers for Disease Control, "each year about 1,500 babies in the United States are born with upper limb reductions" (CDC, "Upper and Lower"; Parker et al., 2010). These children, who have reductions in part or all of an arm or hand have, until recently, either relied upon expensive medical prostheses or lived without an assistive device. Recognizing the potential for 3D printing to be used in these situations, online communities have formed to connect volunteers who have access to 3D printers and the digital literacies to use them with recipients who need prosthetic devices.

The online e-NABLE community has a specific area of their digital community platform devoted to teachers and students. This points to the interest in not only 3D printing in education but more specifically to project-based assignments that involve students producing 3D printed prosthetics for this particular community. Analysis of the discussion, however, reveals that the vast majority of the teachers and students participating in the community are focused on technical aspects related to 3D printing prosthetics. Only one instance of someone from the humanities (outside of myself) could be found in the hundreds of posts. The field of rhetoric and writing studies has a well-established tradition of analyzing and using computer mediated communication technologies; the nexus of researching and writing

in online communities paired with 3D printing for a specific rhetorical and practical service learning purpose is, however, a new direction for the field. This is the path my students and I explored for the project-based learning sequence presented as a case study below.

Institutional Context

Wright State University is a mid-size public university located in Dayton, Ohio. Of the roughly 16,000 students at Wright State, approximately 80% live off-campus, and a little over a third (about 5,000) are first-generation college students. The profile of the university is similar to many other public institutions of higher learning, especially those with a large base of commuter students. Wright State is also a nationally recognized leader in accessibility, especially in terms of physical infrastructure for those who are differently abled. However, a number of barriers limit the access and opportunities Wright State students have to participate in formal undergraduate research programs. For instance, while there was previously an office to support undergraduate research across the entire campus, there is no longer.

Two units on campus still have formal programs to support undergraduate research, the College of Science and Mathematics and the College of Engineering and Computer Science. The Chemistry Department, for example, describes undergraduate research to their students saying it "allows a student the opportunity to share in the excitement of exploratory research, to hone experimental skills, use state-of-the-art instrumentation, utilize the chemical literature, and last, but not least, learn how to approach problem solving. In short, participation in a research project can be one of the most valuable experiences in an undergraduate's career." The qualities of excitement, experimentation, immersion in scholarship and state-of-the art technology, and problem solving should not, however, be reserved only for those who major in STEM disciplines. Those same high impact experiences should be available to students in all disciplines; problem-based learning sequences, especially those that embrace emerging technologies, can help attain that objective.

Course Context

The course used as the case study presented below was an upper-level special topics writing class cross-listed in the Department of English Language and Literatures and the Department of Communication. The students in the class were primarily juniors and seniors from those two departments. Without formal undergraduate research programs for students in the humanities and social sciences, engaging with an extended project that posed an authentic research question without a known answer—one that required investigation, experimentation, application, and communication of results—was a new and exciting experience for the students. Students were presented with the following guiding research question for the semester: how are digital media and emerging technologies changing the ways we live and learn, work and play, and understand what it means to be human? None of the students in the class had experience working with 3D printing, the emerging technology that was the focus of our project-based learning sequence.

On the first day of class, students were given a set of 3D printed pieces that were still attached to a raft, a foundational layer that enables better outcomes when 3D printing. They examined it as they passed it from one person to the next. Their task was to figure out what the object was. When the object reached one of the students, she noticed that some of the parts were loosening and becoming almost detached from the raft. She remarked, "I'm afraid to even touch this because it feels like it might break." In order to establish an effective foundation for the project-based learning sequence, it was necessary to acknowledge the student's apprehension while also encouraging experimentation and inquiry.

I replied "Go ahead, and break it. See what happens." With a visible sense of relief apparent, she pulled one of the pieces off and examined it, set it down, and started looking for other pieces to pull apart. Soon, a number of other students crowded around her; some examined the parts that were being placed on the table while others were reaching in and grabbing pieces to pull from the raft. Others still looked on talking about what they were seeing. As soon as one of the students realized that not only could they take the pieces apart but that they could put them back together to assemble some sort of object, the excitement grew. The low murmur of conversation grew into excited suggestions about how the pieces might fit together and speculations about what the object might be.

When I finally explained to the students that they were holding pieces of what would become a 3D printed prosthetic hand for a child with an upper limb difference, excitement and discussion permeated the room. The specific pedagogical aim for this mini-activity on the first day of class was twofold: (1) to promote interest and excitement about the project-based learning sequence we were about to begin and (2) to introduce students to the emerging technology of 3D printing that we would be using throughout the sequence. That twofold aim was contextualized within a broader framework of introducing students to community-based research in which students would engage with disability studies by 3D printing a prosthetic hand for a young girl and her family located about an hour and a half from our campus. The family, as our community partner, became the stakeholder for the students' work. This was also the basis of an extended argument I made to my students and with my students: that the qualities of excitement, experimentation, immersion in scholarship and state-of-the art technology, and problem solving should not be reserved only for those who major in science, technology, engineering, or math disciplines. They can be and should be open to us as humanists as well. Together, and through our 3D printing project-based learning sequence, we explored this possibility.

Project Design

> *The design process is a balance between doing research so that you can get the best idea and theory of how to approach a problem but then also just, just working at it. Sometimes trial and error is the best way to learn.*
>
> *—Jeff Powell, co-founder of "Helping Hands, UNC,"*

With an introduction to a 3D printed object on the first day of class coupled with the notion that such an object could be potentially useful in the lived experience of a community member outside of the classroom, students were positioned to participate in the project-based learning sequence. Following the best practices in Design Thinking (Kelley and Kelley, 2013) and project-based learning, the students began a process of defining the problem, doing research to explore and understand the problem, prototyping and iterating, getting feedback from stakeholders, iterating and revising, and ultimately successfully completing the project. Throughout, the students used autoethnographic methods to document their process.

Exploring and Understanding the Problem

As students began work and started defining the problem, it became apparent to us that the some of the language we were using at this stage of the process could be problematic. In this particular instance of project-based learning, students were not working on some sort of abstract problem such as building a model bridge that could span a distance defined by the teacher (the kind of project-based assignment one might find in a STEM class). Students were working on a project that impacted, and indeed involved, a specific human being—our community partner—who would be the recipient of the device that they were learning to make and then producing. It troubled us to refer to her or her lived experience as a "problem." So, with my mentoring and guidance, we reframed our work as defining an opportunity for engagement. In other words, we placed defining a problem sous rature; instead of defining a problem we saw ourselves as defining an opportunity for engagement.

This example illustrates that we were not just humanists "playing in the STEM sandbox." Rather, our training in humanistic methods, our understanding of and attention to the role language plays in (re)producing culture and at times cultural biases, and our ability to communicate effectively with our community partner enabled us make theoretical discoveries that can now lead to broader contributions. We are able to co-produce knowledge about more ethical and equitable ways of having students engage with disability communities when doing service learning projects or engaging in

project-based learning. This shifts the focus—and benefits—of project-based learning from what the students take away from the experience, allowing us to also understand what they contribute. Reframing our view of project-based learning in this way enables us to see students as not only the consumers of benefits gained from project-based learning but also as producers and co-constructors of knowledge. Following Balsamo (2011), who asserted that "where artists and humanists stand to gain insights about the process of technological reproduction, engineers and technologists are exposed to the systematic methods of interpretation and analysis" (p. 13), we came to see our engagement with this process as a reciprocal relationship between human practices and technological innovations. Drawing from scholarship in rhetoric, human-centered design, and cultural studies as well as health communication, interpersonal communication, and disability studies, we can now advocate for the need to carefully examine the language used in project-based learning sequences involving disability communities and shed light on how the language and discourse surrounding new and emerging technologies can sometimes reify problematic relationships of power and identity.

In the next phase of the project, students began doing research to explore the problem and understand the opportunity for engagement. This involved a mixture of formal research from reliable sources as well as immersion in the online ecosystem of the digital e-NABLE community, which is comprised of volunteers, recipients, and organizational administrators. Using humanistic methods of inquiry, especially systematic textual analysis and interpretation, students examined how the non-profit presented itself to the public through its web site and analyzed the effectiveness of the rhetorical and communicative strategies being used. This part of the project helped students gain deeper insight into the community they were joining as volunteers and helped them take a critical and informed stance in viewing their relationship to the members of the community who are recipients.

Part of our knowledge work in this part of the project was tactical. The students had to research and learn about the various devices they might assemble, the materials and processes involved in doing so, and make decisions about how to approach the printing and assembly of the devices. But another crucial aspect of our knowledge work involved developing a sense of self awareness about our default assumptions when engaging with various members of the online community. This led me, as the instructor, to identify future opportunities to engage students with theoretical concepts in scholarship from disability studies. In particular, I now integrate discussion and analysis of ableism during this phase of the project and guide students in working to understand how to use language to effectively challenge ableist tendencies (Loja et al., 2013). This advancement in my own pedagogical practice would not have been possible without the participation and contributions of both my students and our opportunity to engage with our community partner, something that our CBR framework helped us recognize (Grabill, 2012). Thus, it becomes immediately apparent that we were all active participants in the co-construction of knowledge as a result of our project-based learning sequence.

Prototyping and Iterating

> *Literacy educators and students must see themselves as active participants in social change, as learners and students who can be active designers—makers—of social futures.*
>
> *—The New London Group*

During the next phase of the project, students began prototyping and iterating, cornerstones of the Design Thinking process (Kelley and Kelley, 2013). This required students to put theory into practice. For example, students had learned about copyright and intellectual property issues during the research and exploration phase. They learned that by default, any creative production, whether it be a picture, music, a story, or even a design for a 3D printed object, is by default the property of the creator. They also learned about Creative Commons as an alternative licensing option that enables creators to freely share their work through online repositories for the good of the community. We discussed how prevailing narratives of students engaging in file sharing tend to be negative and assume that file sharing is synonymous with piracy or theft (e.g. Napster, Popcorn Time, Middle, or Pirate Bay). Theory was translated into practice as we examined these narratives and reframed them by using legal and ethical file sharing sites, thereby (re) producing through our actions new narratives of file sharing for good.

Students worked in teams and applied the information they had gathered during the research phase about how to find open source .stl files for the different components of the prosthetic hand. Each team also applied what they had learned by reading and watching video tutorials through physically operating the 3D printer to produce each component of the device.

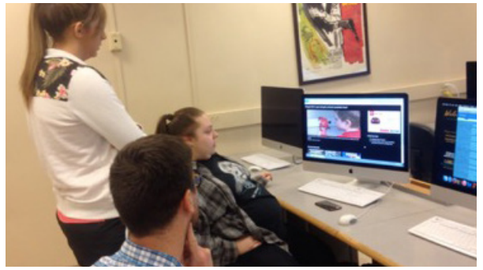

Figure 1 Students watch online videos of e-NABLE recipients working with 3D printed prosthetic devices to better understand the process in which they are engaged.

According to the AAC&U, collaborative group work of this nature "combines two key goals: learning to work and solve problems in the company of others, and sharpening one's own understanding by listening seriously to the insights of others, especially those with different backgrounds and life experiences." Here again, theory was put into practice.

The direction the community partner provided to her father who then communicated with me was crucial. It not only provided the technical information we needed; it also helped students more fully understand that this project-based learning project was not an exercise in

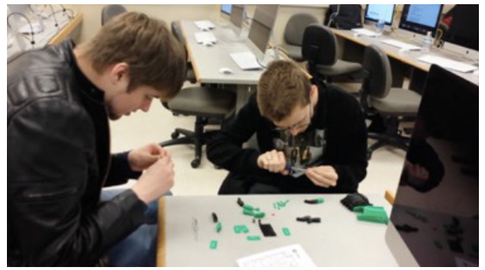

Figure 2 Students work with 3D printed pieces to learn the assembly process. The students selected green and black because they represented the university's color.

abstract problem solving but an opportunity to engage meaningfully with another human being using digital media and emerging technologies to facilitate communication and build a mutually respectfully relationship. It also helped us examine and actively challenge some of the power relationships that can be typical in service-learning projects in which volunteers are framed as the ones who possess resources, literacy, and knowledge and therefore hold more power while community partners are framed as the ones who are in need, vulnerable, and therefore hold less power. We worked to understand power as residing in the opportunity for collaboration not in one group or the other. We also affirmed that the knowledge the family had, through their lived experiences, was necessary and vital. For the project to be successful, we needed their contribution of knowledge as much as they needed ours.

Another example of students putting theory into practice came when the 3D printer we were using in the university library broke unexpectedly and squarely in the middle of our project. The technology librarian requested permission to order a replacement part but it was going to take several weeks for the request to be processed through the school's purchasing process, for the order to be placed, fulfilled, and shipped. In class, students had read about and discussed problem solving as part of the prototyping and iteration phase of design thinking. The broken part on the printer coupled with the delay it would cause in their work presented students and me with an authentic problem, one that would benefit from creative and divergent thinking. In

partnership with the technology librarian, we discovered that we could 3D print a replacement part for the 3D printer. The librarian helped us find a suitable file for the printer in the library, I reached out to community members with 3D printers who might be able to help us and found a viable option, then students coordinated and organized the printing of the replacement part. Something that was unexpected and could have potentially torpedoed the project (at least our ability to complete the work by the end of the semester) was transformed into a learning opportunity and an occasion for putting theory into practice yet again.

Getting Feedback from Stakeholders

" Innovations are not really things, but are better understood as assemblages of practices, materialities, affordances."

—Anne Balsamo

Once students had printed and assembled two prototypes with different designs and color options, they shared the physical objects with the community partner. Even though we had been corresponding electronically with the father of the young girl who would be the recipient of the 3D printed prosthetic, exchanging messages and images of the work in progress, when the father and daughter had the opportunity to actually hold and examine the prototypes they directly communicated their excitement and enthusiasm about the project. What was up to that point only an abstract idea to them became concrete; they could see the direction the project was heading and also touch and hold and manipulate the physical prototypes the students had produced. But, it is important to note that while sharing their excitement motivating, it was not the primary contribution they made during this phase of the project. It was the feedback they provided as a result of physically examining and evaluating the prototypes that directed the remaining development of the project.

While both designs were functional, the recipient preferred one over the other. And while the family appreciated seeing a range of color options, the recipient made

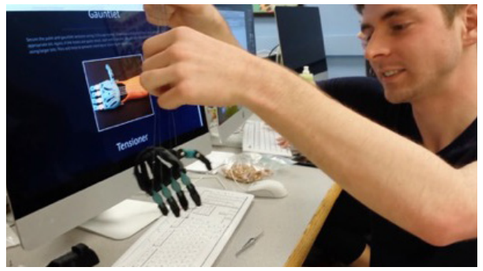

Figure 3 Students learn how to attach tension strings that add functionality to the device. In this iteration they used glow in the dark filament to provide another option to our community partner.

a special request for a color that we didn't yet have (hot pink). Their feedback was vital in producing an object that was not only functional on the most basic level but one that was meaningful and reflected an equal partnership in the design and production of the final outcome. This is yet another instance when theory was put into practice. We did not only have to complete a project successfully, we had to develop a nuanced level of understanding about the interests, values, and desires of our community partner who we viewed was an equal collaborator throughout the process. I often explain to my students that as their instructor I see myself not as the primary audience for their work but as a guide and mentor who can support them in being successful in communicating with other audiences. In this case, as with many service learning projects, students gained a deeper understanding of this concept and how to interact effectively with external stakeholders.

Iterating, Revising, and Successfully Completing the Project

" Why bother with technical skills and things in the composition classroom? Because the making that occurs through the interplay of things and humans yields creative and personal transformations"

—Daniel Anderson

With feedback and direction provided by our community partner, we ultimately produced a 3D printed prosthetic that was correctly sized, designed, and colored. These elements were not arbitrarily defined for students

Figure 4 The completed prototype in hot pink and black—colors our community partner selected that represent her identity and personality.

to simply demonstrate that they could 3D print and assemble a prosthetic hand. Rather, each element was purposefully and carefully matched to the specific individual who would receive the device.

Speaking at the 33rd MIT Enterprise Forum on the topic of Achieving Better Life Experiences for People with Injury, Disability, and Aging Challenges through 21st Century Technologies, John Hockenberry, who is a journalist, leader in the disability rights movement, and former Distinguished Fellow at the MIT Media Lab moves around the stage in his wheelchair. As he does so, he instructs the audience to look closely at his front wheels to see how the dimming of the lights "enhances all of my features physically" (00:05:19). With each revolution, the small front wheels light up in a rainbow of colors. Then, responding to the delighted sounds made by the audience he exclaims "It's infectious, isn't it?" He goes on to explain that "suddenly, because of a simple technological upgrade, the whole idea, the whole notion of this physical object that I spend, ya know, eighteen hours a day with, is transformed. I become the author of the experience of the object" (00:07:09-00:07:24). In the same manner, our community partner, who selected hot pink and black for her 3D printed prosthetic hand, became the author of her experience of the object.

When it came time to actually deliver the device, I met the family at a public location, following the guidelines of e-NABLE that aim to increase safety for both parties. Meeting in a busy public location, I worried that we might have trouble finding one another. However, as soon as a young girl came bouncing through the door wearing black and hot pink—the same colors she asked for the prosthetic to be printed in—there was no doubt in my mind about who she was. The colors she picked for her 3D printed prosthetic device matched her outfit and were an expression of her personality and identity. Unfortunately, the students were not able to accompany me to this meeting as a result of timing at the end of the semester and the need to respect both the privacy of our community partner and to avoid overwhelming our community partner by having too many people present for the exchange. As I move forward with designing project-based learning sequences that integrate digital media and emerging technologies for and with my students in the humanities, finding ways to open up these kinds of experiences while balancing the experience of the community partner remains an open research question for me. Pursuing this research question will amplify the opportunities for students to participate in translating theory into practice and to experience a meaningful human connection as a result of using digital media and emerging technologies and it will help us do so in a way that affirms and extends our commitment to working in more ethical and effective ways.

Discussion: Recommendations for Transformed Practice through Project-Based Learning

If converging humans and machines not only yield multiple literacies but also hold the potential for delivering body and soul realizations, engagement, educational magic, shouldn't that be our focus when integrating technologies into the composition classroom?

—Daniel Anderson

J. Dale Prince, the executive director of National Network of Libraries of Medicine for the Southeastern/Atlantic regions, describes 3D printing saying that it is "a disruptive technology that promises to change the way we consume, create, and maybe even live in the world" (2014, p. 39). His description points to the variety of applications 3D printing is being used to explore in realms ranging diversely from civil engineering, to medicine, to

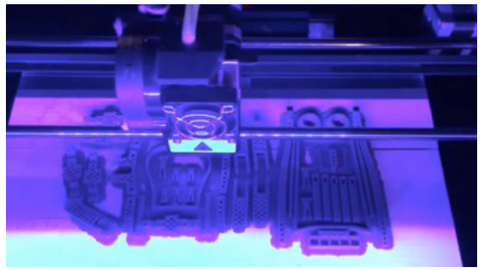

Fig. 5 A 3D printer makes parts for a prototype of a prosthetic hand.

art. For instance, the result of a study recently published by researchers at Wake Forest Institute for Regenerative Medicine showed positive indications for the feasibility of printing cartilage, bone, and even potentially muscle tissue. In another recent example, a Brazilian doctor 3D printed a model generated by ultrasound for an expecting couple who are both blind and therefore were not able to see the image of their developing child. These are exciting developments that have both scientific and

Fig. 6 Students conduct a Skype video chat with Jeff Powell, founder of Helping Hands UNC and a volunteer who prints and assembles prosthetic hands for recipients, to learn about his experience working with community partners and completing projects successfully.

humanistic areas of interest.

According to David Sheridan, rhetoric and writing scholars should consider working with the emerging technology of 3D printing "because it's possible" (251); "because it's powerful" (253); "because it's valued" (256); "because it's ours" (257). The case study presented above demonstrates one way to integrate 3D printing into a humanities curriculum, not for the sake of the technology itself but as a way of heightening student engagement, transforming practice, and using emerging technologies to build relationships, co-construct knowledge, and affirm the value of multiple parties in the knowledge production process. As a result, students can find new opportunities for making knowledge. For example, students recognized that financial support is a necessary part of the work we were doing and researched how the organization could increase small-dollar dona-

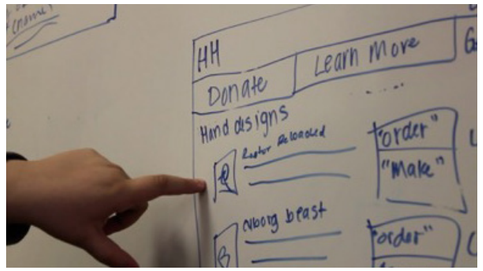

Fig. 6 Students brainstorm ideas for how the non-profit could re-design their web site to increase small-dollar donations by letting donors sponsor component parts of requested devices.

tions through more strategic web design and site functionality.

Later, students realized that in some ways the tacit knowledge acquired by members of the volunteer community over time was, in many ways, just as important as the financial resources needed to complete this kind of project successfully. Those students decided to make a different kind of contribution to the community—technical documentation. They first evaluated the existing assembly instructions and discovered that not only were there places that could be improved, through their work they had learned useful strategies for working with devices that needed to be scaled down in size for smaller recipients. They created a supplemental instructional

Fig 7. A student explains the need she and her classmates discovered for the site to be redesigned and explains to other members of the class why her group thinks the approach shown in Fig. 6 would be more effective. She explains that their research question at this stage was "how can we … as in this group [the class] in general, make people donate the money, make the dollars go towards these hands, so that they are actually doing something for e-NABLE?"

guide for the e-NABLE community (see Appendix for their documentation).

Conclusion

Both theoretical frameworks used in this study have a foundation in pragmatics, in contrast to other frameworks typical in humanities scholarship that foreground semantics or syntactics. In this project-based learning sequence, students--through the process of techne or rhetoric as craft--become researchers who are engaged in producing a material object in response to a specific and authentic rhetorical exigence, one that is viewed as an opportunity for engagement rather than a problem to be solved. The applied work of producing a material object of practical and symbolic significance is complemented by more traditionally humanistic inquiries that involved students asking questions and sharing ideas with one another and with the online community, using methods of interpretation and analysis, and (re)producing new cultural narratives through their practice and through the communication of their work in documentary form.

In her book *Designing Culture: The Technological Imagination at Work*, Anne Balsamo (2011) asserts that "innovation has become the dominant zeitgeist of the early twenty-first century" (p. 2). However, this spirit is not limited to those working in STEM fields. Drawing from her analysis of socio-technical and political systems giving rise to new class identities, work practices, and organizational forms, Balsamo goes on to observe that "technological innovation requires the formation of creative and productive relationships among humanists, artists, engineers, and technologists--each of whom has something necessary to contribute to, and learn from, the experience of collaborative multidisciplinary technology development" (Balsamo, 2011, p. 13). By understanding how to design and implement project-based learning sequences that embrace emerging technologies, instructors in the arts and humanities can develop rich, engaging learning environments in which all students are affirmed as agents of change and co-constructors of knowledge.

Humanistic methods of inquiry and research have often engaged material objects but have taken them up as objects of analysis rather than a means of producing knowledge. Gentry Sayers, a rhetoric scholar working in a humanities discipline, addresses this issue in his 2015 article "Why Fabricate?" He begins from the premise that "humanities research frequently renders three dimensional objects two-dimensional for the sake of reference and communication" (p.1). He then goes on in an attempt to reverse the currents exploring a number of reasons why professional researchers in the humanities might benefit from the production of material objects using the emerging technology of 3D printing, which he says includes "1) data physicalization, 2) remaking old technologies, 3) cultural studies of negotiated endurance, and 4) infrastructure studies" (p. 1). To this list of possibilities, I add that we should consider and explore the value of 3D printing for its pedagogical potential, what Daniel Anderson (2008) has called a low bridge to high benefits. Crossing this bridge can help us not only break down unproductive divisions between the arts and the sciences but, more importantly, it can lead us to both new teaching practices and new theoretical insights about teaching with technology.

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Appendix

Appendix

Those who can't, teach? Project-Based Learning for Teachers and Students in the Digital Age

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Abstract

Two faculty and two students became collaborators through an independent study focused on developing their YouTube production skills. This variation on project-based learning followed traditional models in its use of authentic experiential learning. However, the collaborative element included novice instructors who learned with the students instead of coaching students from an expert position. The four participants improved their digital skills but also reaped other benefits. The students described learning about composing processes, collaboration, risk taking, and playfulness in ways that would support them in future learning situations. The faculty became more willing to teach from a novice position and expose learning processes from which students can learn. These lessons were applied to other teaching situations. The YouTube project thus had a healthy effect on approaches to teaching and learning.

Keywords

YouTube, project based learning, lifelong learning, modeling, faculty as novice, digital

The boon and the bane of the digital age is the constant change, the introduction of the new, the speed of communication—and the risk of becoming "outdated" in a "rapidly changing environment" (Camblin & Steger, 2000, p. 1). Both faculty and students can experience anxiety in response to these conditions, but avoiding new digital tools is neither practical nor desirable. As faculty who teach courses in communication arts, writing, and rhetoric, we are especially committed to helping students improve their ability to produce online multimodal texts, even though we struggle to develop and expand the repertoire of tools we are comfortable using. Thus, when we decided we ought to become proficient with YouTube production so we could better teach our students entrepreneurial approaches to the platform, we found the time commitment daunting.

Our solution came once we reframed our approach to teaching. Rather than understand our own learning and the learning of our students as sequential steps, we developed an independent study that positioned four of us—two professors and two students—as collaborators, working and learning together while developing a YouTube channel. This design is aligned with project-based

learning in its focus on experiential collaboration, but it deviates by involving instructors in the project as novices who learn alongside students. The endeavor ended up extending beyond that first semester as we gradually realized that taking a project-based approach to learning a digital platform held unexpected benefits.

We all improved our YouTube production and social media skills, which was the original goal. Additionally, however, the students' end reflections emphasized larger lessons that came from this particular version of project-based learning. Students explained that working with faculty allowed them to better understand and embrace composing processes, collaboration, risk taking, and, perhaps most surprisingly, playfulness. At the same time, as faculty, we gradually became more willing to expose our novice status, learn alongside our students, and showcase processes that are often hidden when sharing our expertise in the classroom. These were lessons we carried into other teaching situations. In short, the YouTube project not only helped us stay on top of new digital skills but also changed our approaches to teaching and learning in healthy ways. We share our experiences in hopes that others might also benefit.

Project-Based Learning using YouTube Production

Background

We decided to develop a YouTube channel so that we could improve our own video production and social media skills enough to teach our students. As professors of Communication Arts and English, we had noticed that our students and recent alumni were regularly finding internships and entry-level jobs that involved social media writing. In addition, our research on successful YouTubers showed us possibilities for entrepreneurship (Wotanis and McMillan, 2014; Davis, Webb, Lackey, & DeVoss, 2010, p. 195). Although students are "digital natives," many of them arrive at college having used online environments only for social connections and entertainment (Hargittai, 2010, p. 108), so we saw a need for teaching social media writing for academic, professional, and civic audiences. Many faculty are in similar positions, aware of students' needs for digital tools and seeking opportunities to develop expertise themselves (Blaschke, 2012; Camblin & Steger, 2000; Hargittai, 2010; Kukulska-Hulme, 2012). While some institutions have found creative ways to prioritize faculty development and help support the learning of new technologies (Camblin and Steger, 2000; Kukulska-Hulme, 2012), the more typical situation at small institutions is that faculty struggle to balance priorities and make time to learn new digital media tools.

That was our challenge when we began planning a YouTube channel in 2013. We initially titled the channel WinkyFace, though we eventually renamed it YouTube Faculty. We chose video themes (parodies of faculty life, parody interviews with fictional characters, and behind-the-scenes videos), and we began building a social media presence with attention to audience and brand. We chronicled our efforts to later serve as a model for students or other potential YouTubers. However, despite our enthusiasm, we found our work stalling because it required more time and learning than we had anticipated. Nel (2014) described the tendency of many faculty to over-work, trying to meet both self-imposed demands and institutional expectations involving a myriad of teaching, research, and service obligations. For us, these pressures of academic life meant we were regularly overcommitted, and often our YouTube channel was pushed to the side.

A turning point eventually arrived when we began viewing students not simply as learners but also as potential collaborators. We developed an independent study for two students—Brigid Edmunds and Mackenzie Warren—who would develop their YouTube production skills by contributing actively to the project we had barely begun. The project was thus motivated by a combination of pedagogic and professional goals (Helle, Tynjälä, & Olkinuora, 2006). Although as instructors we felt uncertain throughout the independent study as we made mistakes and self-corrected, by the end of a semester of struggle and reflection we realized how much we all had learned. As is typical with experiential learning, the lessons extended far beyond the immediate goals of developing our online video skills.

A Variation on Project-Based Learning

Although not developed with project-based learning (PBL) in mind, this YouTube work manifested many of the qualities associated with PBL. Typically, PBL involves groups of students making choices and working collaboratively to solve an authentic problem that they have identified (Brundiers & Wiek, 2013; Helle, et al., 2006). In this model, faculty act as advisors and coaches, providing guidance and support while students direct their own learning processes (Helle et al.).

In our variation, the instructors were positioned not as coaches but rather as two more learners who collaborated with the students to meet the challenge of developing a successful YouTube channel. We further deviated from PBL criteria because we, the faculty members of the group, had already defined the challenge and many parameters of the project before the students joined us as collaborators. Roles were thus less clear than they usually are in teaching and learning situations. On the one hand, the faculty were leaders and decision-makers who provided coaching and guidance. On the other hand, we were amateurs who were actively engaged in learning, so we were not able to offer the kind of expertise we were used to. We discovered some of our plans were not practical, our expectations for cinematography had to be adjusted, and our use of video editing software required ongoing troubleshooting. In this grey area, we regularly wondered: Were we fulfilling our commitment to the students? Were the students learning in ways that would be useful to them?

Despite our worries, two elements built into the independent study helped keep student learning at the forefront. First, we created a syllabus that provided structure but, over the course of the semester, offered increased opportunities for students to exert agency and apply what they had been learning. This balance was important because teachers are most likely to "enable self-direction, knowledge building, and learner control by providing options and choice while still supplying the necessary structure and scaffolding" (Lee and McLoughlin, 2007). The students were willing to meet new challenges and take a lead in writing and directing videos once they had some confidence in their filming abilities and a level of comfort and familiarity with the project as a whole. Research on PBL design suggests scaffolding learning is widely recognized as beneficial for students (Thomas, 2000, p. 7). In this case, if the students had been working with other students rather than with us, the instructors, they may have taken on leadership roles sooner, but it was more daunting for them to make decisions when collaborating with faculty. The gradual expansion of responsibilities kept them from feeling overwhelmed or intimidated as they developed expertise and met new challenges.

Second, we used the syllabus and weekly conversations to make some of the lessons of the project more explicit and visible to the students—and, ultimately, to ourselves. At the start of the semester, we met with the students, articulated our goals, and reviewed the syllabus. We explained our purpose was to learn more about digital composition on YouTube and to enhance our own multimedia skills. That way, we would be better teachers and stronger scholars. We made clear to the students that the purpose of developing the YouTube channel wasn't just about making funny videos, though we hoped that creating funny videos would enhance digital media skills for all four of us.

To build on this initial conversation throughout the semester, we took time during every scheduled meeting with the students to sit down, discuss progress, and identify the learning challenges we were facing. We invited the students to discuss strategies for problem solving and wrestled with decisions about whether to work with imperfect shots and missing footage or to rethink, refilm, or re-edit to compensate for errors made during filming. In their reflections, the students noted that much of their learning took place during these group discussions. Students are used to receiving grades and comments on their work, but the conversations about quality and process helped them gain a fuller sense of investing in and attending to quality with minimal extrinsic pressures. Again, although we didn't create a syllabus with PBL in mind, these discussions and the end reflections on learning both fit with guidelines for PBL

that emphasize metacognition. Ongoing self-assessments and reflective practices contribute to the transfer of learning to new situations (Robertson, Taczak, & Yancey, 2012), and these elements thus complemented the scaffolded structure of the independent study.

The final reflections on the semester that the students submitted detailed many of the video production and social media skills that they had learned. What surprised us, however, was the degree that they reflected on other lessons that would be likely to benefit them in the future. Digital tools will continue to change, but the students' focus on composing process, collaboration, risk taking, and the importance of play will serve them as they continue to adapt to new technologies.

What the Students Learned

Composing Processes

While working on the YouTube project, we did not need to tell students to pay attention to purpose, audience, genre, and other contextual factors. Instead, they experienced an ongoing process of considering composing choices with a specific audience in mind, whether we were creating scripts, filming and editing videos, or posting updates on social media sites. In one situation, we wondered whether a video sounded overly critical of students. In other situations, we talked about elements such as the kind of humor academics would appreciate or set design that would help establish a sense of parody. After participating in such discussions, Brigid said that writing for a new audience was something that she initially struggled with but was a process she came to enjoy as she took on new tasks, including writing a video script and finding shareable content for the channel's social media sites.

Writing for the YouTube platform was also beneficial because we composed in non-linear ways that required us to "wrestle with audio, with video, with still images, and with myriad other compositional elements, all requiring deep attention to rhetorical concerns" (Davis, Webb, Lackey, and DeVoss, 2010, p. 195). In other words, the composition work was complex and messy, so the students never considered a "one-and-done" single-draft process that is sometimes popular with inexperienced writers. As we, the instructors, discussed our doubts and concerns or praised the times that we struck the right chord in a video, the students grew accustomed to practices of self-critique and peer review and gradually participated more in these conversations. They also noted the value of seeing us struggle and strive to improve our work, even witnessing and honestly relishing the moments we settled on "good enough" due to constraints of time and energy. Seeing "expert" composers struggle throughout the process is valuable for novices, who often resist the struggle or are naïve to the labor involved in the composition practices of experienced writers (Sommers, 1980).

Collaboration

Like the nonlinear complexities common to composing processes, collaborative work is often part of professional lives without necessarily being formally taught in the classroom. Instead, teachers often focus on end-results, with the complex dynamics behind those results hidden from view. Collaboration is vital, however, to lifelong and self-directed learning, so involving students actively in a collaborative situation through the independent study served as guided practice.

The students saw how collaboration helped us set priorities and be accountable to one another. Whether completing a script, drafting an article, or editing a video, we set deadlines that clarified expectations and relied on each other to meet those deadlines. This system was complemented by healthy communication, so that at times one of us would ask for an extended due date or help with a project. As they participated in the YouTube project, the students embraced the collaborative work ethic, with Brigid noting that she learned a lot about organization from seeing our work process. Both students were consistently on time and prepared, and Mackenzie said she spent time double-checking that all equipment was remembered, functioning properly, and fully charged because details matter when working with others; if even one piece of equipment did not work, the schedule was delayed for the whole group.

Collaboration also involved bringing diverse perspectives and areas of expertise together. Because we were working at the amateur rather than expert level, we talked a lot about choices and process (Dreyfus and Dreyfus, 1980; Kinchin, Cabot, and Hay, 2008). We didn't perform every task automatically, and, as we learned, we made time to reflect in a number of ways, including conversations with the students as mentioned above. One of these conversations occurred at the beginning of a production day. We faculty had been concerned about the amount of time the project was requiring, and the students were simultaneously concerned that some of the filming was not of high quality. After much conversation and consultation with an outside colleague who had extensive experience with YouTube, we decided that we would make do with imperfections because YouTube viewers tend to appreciate amateur videos. Our channel would, however, use good audio with catchy video titles and thumbnail images, because these factors would have a big impact in attracting viewers. All four of us similarly brainstormed opening shots, voiceovers, and signature sounds for the channel, sharing pros and cons of the various possibilities before making a decision.

These kinds of collaborative exchanges gave the students some freedom and flexibility to experiment and troubleshoot rather than rely on their professors to solve problems. At one point, Brigid made a suggestion to use three cameras for a particular video; she explained that the effort in hauling the equipment would be worth it when it came time to edit. On some days, Mackenzie enjoyed showing the faculty what she had learned in other classes that could be used when setting up shots or refining themes. These moments of shared expertise or open brainstorming made the entire project more productive for all the team members. Experience with collaboration is typical of PBL, though having a mixed group of students and faculty is atypical and potentially may have inhibited students. Luckily, however, the students were willing to join in, and we all benefited from the skills they brought to the project.

Risk-taking

As the collaborative process suggested, taking risks, experimenting, failing, and trying again is key to learning and to success. That does not make the process easier, especially when there are real stakes involved, whether grades for students or tenure and promotion for faculty. In academia, where expertise is touted as a gold standard, it may be especially difficult for students and faculty to admit they lack skills and knowledge. To that point, never have we faculty wanted to be called "know-it-alls" more than during our first few weeks working with the students on this project. Admitting that we were not expert scriptwriters or video producers was difficult. What would the students think?

In reflections, however, Brigid said the collaborative work was more comfortable because the faculty were honest about their lack of expertise. She specifically pointed out the way Laurie explicitly identified insecurities with filming and with the video-editing software they were using. Mackenzie noted that if professors have difficulty adjusting to new software, different cameras, and different microphones, it is a normal process. When technology changes, everyone is starting over and figuring out the basics; it takes time to develop professional skills. Despite our tendency, as faculty who were also amateurs, to be embarrassed, we consistently shared our difficulties and learning processes with the students so they would be more comfortable facing learning curves. Being vulnerable in front of students can thus be a good thing. Feeling vulnerable, inadequate, or embarrassed can push a teacher to work harder to learn. When we know that students are watching and looking to us for "the answer," we may feel more compelled to follow through rather than give up on a project. There's nothing but value for students when they watch us engage in that process. Demonstrating vulnerability and showing that it can be overcome can motivate students to take risks and to have a better understanding of the nature of scholarly work—or rather, play.

Work as play

The final theme students discussed in their end reflections was their surprise at the dedication and enjoyment we brought to our work. Davis, et al. (2010) argued that teachers should be encouraging students to see composition and research as an enjoyable process, teaching them "how to play with ideas, to consider research as a process

of inquiry, and to make deliberate, rhetorical choices about forms and styles" (p. 190). The YouTube project allowed such a dynamic to occur naturally.

To some degree, the independent study was exhausting for the students. They were not used to working for hours without taking a break, and for the first third of the semester, too much work was being packed into each production day. We, on the other hand, never considered implementing a formal break; we were used to working and simply taking break-time as needed by joking around, using the restroom, or grabbing a coffee. While the students could not relate completely to our viewpoint, they did notice a difference between this setting and typical classroom environments. Brigid viewed it as a more professional setting than what she was used to, and she believed it improved her ability to concentrate and focus. She took pleasure in finding shareable internet content, especially because seeking parody and feminist videos was an unusual class assignment. Similarly, Mackenzie saw the experience as preparation for "the real world," without someone standing over her shoulder or quizzing her about what is right. She especially took pride in the work she did individually—writing a script and editing a video.

The experience of feeling self-motivated and choosing to complete work—and often laughing while working together—helped the students to move beyond their traditional roles of striving to meet requirements set by others. The students still found the work more exhausting than their other classes, but they believed it was a good exhaustion that was worthwhile.

What the Faculty Learned

Fear is one of the main obstacles that prevents faculty from incorporating technologies into their courses (Urbanski, 2010). Indeed, throughout the semester we experienced fear of embarrassment and failure as we struggled to learn YouTube production, and we simultaneously feared that we were doing the students a disservice by posing as teachers while we were actually in the throes of figuring out what we were doing. As we looked back, however, and as we considered the students' feedback on our semester together, we became more aware of all the benefits that come from integrating teaching and learning. Indeed, we ended up repeating independent studies with new students for two more semesters, later co-teaching a YouTube production class that drew on what we had learned and eventually adjusting our teaching practices in our other classes. The key, we realized, was modeling learning, whether by admitting to a lack of expertise and showing students how we learn and grow, working alongside students on a project, or simply exposing our past learning processes to students.

While research points to the importance of facilitating learning through PBL via experiential collaboration, our variation of PBL allowed us to also model approaches to learning that students might not usually witness from their teachers. When teachers are in novice positions and work collaboratively with students, we can indirectly teach attitudes, strategies, and mindsets that contribute to self-directed learning. This reminder may make it easier to embrace risks and fears like those associated with learning new technology. Currently, teachers may avoid using new technologies with their classes because "glitches" are unavoidable and can feel "disruptive and stressful" to teachers, but these "moments of failure" may actually allow teachers to model traits associated with lifelong learning (Croxall & Warnick, 2016). In these moments, teachers show students that "problems can be overcome" (Croxall & Warnick, 2016), a lesson that may be especially important in the midst of rapid 21st century changes. And, while this particular project dealt specifically with learning a new technology, the approach—pairing novice teachers with novice students to learn new skills side-by-side—can be applied in a variety of disciplines.

Even when our digital abilities had improved and we were teaching a full class of students to develop their own YouTube channels and to work collaboratively on a community service project, we regularly used our early learning processes to frame our students' experiences. Often, we simply identified with student struggles, shared our own stories of stress and insecurity, and reminded students that learning curves are difficult but necessary. Other times, we offered strategies based on our own past challenges, letting students know that failing equipment and software updates have less of an impact when we work ahead of schedule, have contingency plans, and rely on Google and knowledgeable classmates for advice when things go awry. Our experiences as learners also helped us to be more patient with our students, and they tended to trust us more as they struggled to develop their YouTube capabilities.

Finally, the YouTube project reminded us how important reflection is for helping both students and faculty process learning. The ongoing conversations helped all four of us to process our thinking and learning during the semester. Then, as the students reflected on the semester at its close, they seemed to find their own "teachable moments" and make their learning concrete. Similarly, conversation, writing, and even research helped us as faculty to think through and better apply what we learned during our first semester of the YouTube project. The fact that, after this experience, both students and faculty have more to say about learning how to learn (and how to teach) than about specific digital skills is instructive; it is often the more seemingly abstract lessons that have the most currency for learners at any stage.

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Partners in Writing: Addressing the Gap Between High School and College

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Abstract

The article describes a unique writing partners collaboration that included a letter exchange between high school and college students. The project helped to connect high school and college students in an effort to bridge the gap between the two. It helped both groups of students experience the genre of letter writing, practice writing to an actual audience, and meet students from different backgrounds. The article begins with a short literature review, outlines the details of the project, discusses the community outreach aspects, and concludes with simple steps on how to implement the collaborative process in different contexts.

Keywords

First-Year Composition, Community Outreach, High School Writing

One of the noticeable and extensive problems that many college instructors and high school teachers face is bridging the gap between high school and college writing (Griffin, Falberg, & Krygier, 2010). Teachers on both sides of the divide try to address and/or resolve this gap by using various approaches in their classrooms, such as digital literacy and online assessment communities (Griffin, Falberg, & Krygier, 2010). The aim of this article is to introduce a practical project that connected high school and college students as a way of bridging the gap. Although online and digital strategies may be very successful in making this connection, our approach was a more "old fashioned" tactic that has been working for our students: that of pen pals. This article describes the unique writing partners project we implemented with both high school and college students. The first section of the article outlines the details of the project and demonstrates how the project enhanced audience and genre awareness in our students. Then we explain the community outreach aspect of the project. Finally, we conclude with several simple steps that may help other teachers implement this kind of project.

Both Jennifer and myself (Michal) have noticed problems in our classrooms that concern the transition from high school to college—especially in regards to students' writing abilities and their preparedness to engage in college writing. While this gap is well- known and documented in the literature (Applebee & Langer, 2011; Crank, 2012; Davies, 2011; Fanetti, Bushrow, & DeWeese, 2010; Mosley, 2011), the two of us experience the disparity in our everyday work. Jennifer needed help getting her students away from formulaic writing models—namely the five-paragraph essay—and to start thinking of themselves as writers. Fortunately, as her school geared up to make the shift to Common Core, Jennifer began to believe that she could focus on the writing skills that her students badly needed. And I, teaching first-year composition, have noticed that my students are not only unprepared for the different writing assignments in college but also that I have to help students "unlearn" rules and skills that might have been useful in high school but that are not so beneficial in college. Therefore, we decided to try this unique collaboration in an effort to motivate and empower our students.

Because I (Jennifer) had begun my teaching career as a college composition instructor at a four-year college, I have a fair amount of experience that helps me at the high school level, but I also know that turning the secondary classroom into a composition classroom—with the heavy amounts of grading involved—is nearly impossible for high school teachers. During my composition days, however, I had experience with a program that unites college writers with students from the high school community who are faced with socio-economic challenges. Using this as background, I partnered with Michal, a college composition instructor, to address some of the writing problems I was struggling with as an English teacher in high school. Working with a nearby university gave my high school students a positive, safe writing environment with a real audience and a serious purpose.

Understanding the Gap between High School and College Writing

As mentioned earlier, we as a college professor and a high school teacher are not the only ones who encountered the gap between high school and college, and this issue has been discussed and researched in the literature. In fact, according to Crank (2012), "there seems to be a clear consensus among writing teachers and researchers—in comments quantitative, qualitative, and purely anecdotal—that students entering college are not fully prepared to do the kinds of writing tasks required of them at college" (p. 50). While clearly some students may be better prepared for college than others depending on the students' background and location, there are still many students who are "overwhelmed by and unprepared for" writing tasks assigned in college (Crank, 2012, p. 49).

There are two main reasons for the gap between high school and college, relevant to our project. First, many high school English teachers are not aware of all college writing expectations and therefore struggle with what to focus on (Davies, 2011). This is partly because in many cases there is no actual communication between high school teachers and college professors about college expectations or curriculum (Davies, 2011). Similarly, according to Donahue (2007), "college faculty seem to know little about what high school teachers are asking students to do and why, and less about what high school students bring with them to the college writing classroom" (para. 3). This means that the gap between high school and college is not only about the students, but is also related to the teachers' knowledge of what happens in each context.

Second, high school writing is different from college writing. It is more formulaic and predictable and is shaped by standardized testing (Mosley, 2011). Mosley (2011) also indicates that high school students lack experience in reading and writing as they are still young and are used to already established routines. She emphasizes the fact that everything students have been doing since kindergarten "has been conforming to the require-

ments set before them by their educators" (p. 59). Another reason for the differences between the two levels of writing is that high school is a time when students are deeply engaged in the process of maturing and acquiring more writing skills (Mosley, 2011). While there are a wide variety of high schools and colleges and therefore a wide variety in terms of students' preparation for college, scholarship on the topic nonetheless indicates that college instructors and their students in many different institutions are affected by this gap (Fanetti, Bushrow, & DeWeese, 2010; Crank, 2012; Davies, 2011; Mosley, 2011).

Another important issue relevant to the gap between high school and college is the preparation of students from low socio-economic backgrounds. Whereas students from well-resourced backgrounds may be extremely well prepared for college (despite the documented gap between high school and college), students from low socio-economic backgrounds continue to be underprepared for four-year colleges and universities (Holland & Farmer-Hinton, 2009). One of the main problems for these students is that they rely on "secondary schools for college preparation and guidance," mostly because their parents did not attend college and they are not acquainted with people who did. Consequently, these students "are less likely to have access to the human and material resources that are critical for college preparation" (Holland & Farmer-Hinton, 2009, p. 25). Most of the high school students in our project fit Holland and Farmer-Hinton's description.

For all these reasons, connecting students from low socio-economic backgrounds to college students can greatly benefit these students. Likewise, connecting high school teachers and college instructors not only through professional development but through activities with students can tremendously help with minimizing the gap and improving high schools students' understanding of and transition into college.

Writing Partners

Our concern with addressing the gap between high school and college writing turned into a project that pairs college students with high school freshmen by means of letter exchanges. Each group of students wrote five letters and received five letters from their partners throughout the term. The project ended with a field trip of the high school students to the university campus to meet their partners. We administered the Writing Partners project for a year, with four different groups of students from two different high schools. Our project was based on one of the programs of the non-profit organization *Write to Succeed, Inc*. as described by Gabor (2009) with several modifications influenced by the local context. The goal of our project was for the students to practice writing to a different audience outside the classroom, an audience that does not assess or criticize their writing. Both of us wanted our students to start thinking of themselves as writers and to become more aware of the differences between high school and college writing.

Evidently, Writing Partners is not a new idea and many teachers are administering letter exchanges and school-university writing collaborations in different contexts (Gillis, 1994; Shah, 2018). While different letter-exchange projects have specific characteristics, our project was unique in terms of the content of the letters and the project's goals. The content of the letters in our project focused primarily on writing in college and on exposing the high school students to different elements of college education and college culture. Meaning, we tried to create for the high school students an environment that is "accessible to all students and [is] saturated with [. . .] ongoing formal and informal conversations that help students to understand the various facets of preparing for [. . .] postsecondary academic institutions" (Holland & Farmer-Hinton, 2009, p. 26). In that respect, the content of our students' letters was directed to one specific and important topic—college. In addition, our project had a community service aspect in that the purpose was to help disadvantaged high school students. In the letters, we emphasized the importance of helping disadvantaged students by exposing them to aspects of the college world, a feature that does not always exist in other letter-exchange projects.

Our project was also distinctive in focusing more on audience awareness and on appreciating the disappearing genre of letter writing on paper. As opposed to similar projects that use email or social media as the correspondence medium, this project exposed students to a more traditional genre that is simultaneously both personal and formal. Writing actual letters gave students a chance to connect with their pen pals by seeing their hand-writing and trying to imagine the person behind the letter. It also gave them an actual artifact (the letter) that they could hold on to and save, as opposed to an online correspondence. In addition, in order to help students experience and understand letter-writing, we did not allow them to look up or connect with their pen pals on social media, at least not until after the project was done. This helped with experiencing the genre and learning about how to imagine their audience.

Understanding Audience and Genre

Perhaps one of the best things we can do to get our students to start thinking of themselves as writers is to give them an authentic audience—not just the generic "reader," who every student knows is actually only going to be his or her teacher. Our project did this by providing the high school students with a college pen pal. While college seems a far way off for students in middle or high school, the college student pen pal is someone with whom they could relate—someone not too much older, not too far removed from their own experience, but someone who had still managed to make it to college. Writing to a college student made the high school students become much more aware of their audience, and, for many of them, this was the first time the reader was not a teacher. Thus, they wanted to impress their pen pals and really tried to create an image of who they were through their writing. In many cases, writing to someone they did not know, as opposed to writing for a teacher, was more intimidating and it made the high school students think about their audience and try to imagine who they might be on the other end. Part of the scaffolding I (Jennifer) provided for my students was raising questions in class about who their pen pals are and how to address their audience according to their answers: How old are they? Am I writing to a boy or a girl? What are their interests? Should I write about sports or about the music I like? What if they do not like sports, or do not listen to the same type of music? Discussing these questions helped my students imagine their audience and made writing the letter easier for them.

Just as the high school students had a more authentic audience that they could relate to, the college students had a similar experience, but with a bit more responsibility. Although their audience, the high school students, did not evaluate their writing, it was a real audience that, in a way, looked up to them and could be influenced by what they wrote and the way they wrote it. That means that the college students had to be friendly and welcoming, on the one hand, but also had to have some kind of authoritative voice, on the other hand. For example, in one of the letters a college student commented on the high school student's difficulty with math: "We are the exact opposite when it comes to math because math is my favorite subject. My least favorite subject is economics. You should go talk to your math teacher it'll help you a bunch!" (College Student 1). The college student was being friendly but also was trying to give advice to the high school student to encourage them to take action. Another example is a college student who tried to inspire the high school student to follow their dream: "I can really see that you are very motivated, and know what you want. There may be people who may tell you not to come to [college] for such a major…or they may say you can go somewhere else and get it cheaper… But I say go for it because they have said the same things to me. If you know what you want go for it. Don't let no one make you second guess your decision" (College Student 2). This shows how the college student was conscious of their audience's age and situation. The college student was very aware of their audience's difficulties in deciding what to study and gave the high school student

advice from their own very recent experience. Having a younger audience made the college students feel more important and appreciated, and most of them did their best to impress their partners and give them helpful advice. The college students, being aware of their audience's sensitive and volatile position, tried to make the high school pen pals feel comfortable and welcomed, creating an atmosphere that encouraged asking questions and inquiring about writing, college, and higher education.

In addition to writing to a different audience, both the college and high school students had to write in a very specific genre—the personal letter. By exposing both sets of students to letter writing (as opposed to email writing), we required them to consider the genre's expectations. The letters had to be about a page long. Students had to divide the letter into paragraphs, begin with "dear" student's first name, and end with their name signature. Both groups of students had to consider diction, tone, structure, and how all these elements added up to project their character—or ethos—through writing. For instance, in reading their letters I (Jennifer) noticed the students' efforts to project their personalities. Students wanted to appear smart, responsible, and interesting to their slightly older peers, and they labored over their sentences in ways that I had seldom seen evident in their formal assignments.

A distinctive part of this project is that while these letters were personal on the one hand, they were public on the other hand, in that the teachers had access to the letters. In addition, being part of this project made students write outside of their comfort zone where the teacher (whom they know) is their audience, the familiar essay is the genre, and the internet/email is in many cases the platform. It was also out of their every day comfort zone of writing and communicating via social media where they write and post pictures to a broad audience of their friends.

Administering this project also contributed greatly to the students' development of rhetorical knowledge. According to the *WPA Outcomes Statement* (2014), rhetorical knowledge "is the ability to analyze contexts and audiences and then act on that analysis in comprehending and creating texts" (Council of Writing Program Administrators, 2014). Writing Partners created a specific context for both groups of students, as they had to analyze and respond to their specific audience in writing. Furthermore, the letters provided an opportunity for the students to practice key rhetorical concepts of audience (their pen pals), genre (the letter), context, and purpose—all key concepts that *The Framework for Success in Postsecondary Writing* lists as extremely important when writers learn to compose different texts (Council of Writing Program Administrators, National Council of Teachers of English, & National Writing Project, 2011).

Writing Partners and Community Outreach

While I (Jennifer) pitched Writing Partners to my students as a way for them to practice writing and ask questions about writing in college, one of the really valuable parts of the program was bridging the socio-economic gap. Most of my high school students would be first-generation college students. They know that to compete in today's economy they must do something after high school, and for many of them that will be post-secondary school of some sort. But since many of their parents did not attend college, the whole experience of applying to and attending college is mysterious and intimidating.

Through the "quality control" reading of my students' letters, I found that many of them asked practical questions about what they should be doing in high school to prepare for college. What skills did they really need? Is college hard? Is it expensive? One of the most telling moments for me, however, occurred after a field trip when the pen pals had finally met after a quarter of writing. We were on the bus ride back and I overheard one of my students quietly say to her friend: "I feel kind of ghetto because I work. My pen pal said she's never had a job before." Although the confession highlighted the difference between my students and the college students, it also underscored the importance of Writing Partners. My students were also exposed to college students who were re-entry students (as I was when I went to college) and to students of different ages. Many of my students had never seen a college campus, and for them the only people they knew with a college education were their teachers. So many of my students felt that they are unworthy of college, or that college is only for a privileged class of Americans, but Writing Partners showed them that college is an attainable goal and that there are multiple paths to earning a college degree.

As for the college students, I (Michal) introduced the project as part of a community outreach initiative, where the college students would help the high school students learn more about college in terms of academics, social life, and college culture. As mentioned earlier, I instructed my students to mentor the high school students and answer any questions that they had about college and about applying to college. For example, in the third letter they had to specifically discuss college writing and the kinds of writing they do in college. Interestingly, most of the college students discussed writing elements such as rhetoric, the writing process, and structure in their letters, and exposed the high school students to the terms audience and genre. In addition, many of the college students compared their experiences in high school to their current experience in college. For instance, one of the college students wrote in one of the letters: "College is much more fun than high school, but it is also more work. Time management is crucial. I usually have four hours of class a day so more free time" (College Student 3). This gave the high school students an idea of the differences between the two situations, and made them think about this transition in terms of how they can prepare and what they should know. Many of the college students actually warned the high school students about what they should and should not do. One instance was the use of the five-paragraph essay; many of my students explained that this strategy should only be used in high school because it is very basic and formulaic, which makes it ineffective in college.

Throughout the quarter, the college students understood that they were helping high school students who were less privileged, but it was only after the field trip when the college freshmen really realized how these disparities affect their lives. This realization was very visible in the reflections that I required them to write about the project at the end of the quarter. One of my students wrote about her writing partner:

> She was a beautiful and smart girl, but she is at a hard point in her life because she wants to succeed and do better than her parents, but does not have the means to do so. She wants to go to college, she wants to get a tutor . . . but she says her family does not have the means to pay for any of the above. Reading about her life, allowed me to think more about who I was as a person and the privileges I have been given throughout my life, along with making me think more about how I could personally give back to my community and find a way to give students the same opportunities that I had (College Student 4).

Clearly, the project has truly affected the college students and definitely gave them an interesting perspective about life, education, and their community.

The "Hook": The Fun Aspect of the Project

In addition to its practical benefits, the letter writing experience for the high school students was just plain fun. Most of the students grumbled when I (Jennifer) first introduced the program, but by the second round of the letter exchange, students pestered me every day asking about their letters. For example, Oliver (pseudonym), one of my English Learner students who was failing nearly every single subject that semester, labored over his letters, explaining to me that he was trying to create humor in his writing. He wanted to make his pen pal laugh and feel comfortable because she came across as so "shy" in her letters. To get a student who hardly turned in work, who skipped many classes, to take accountability for his letters was no small feat. Not only that, but Oliver was striving to achieve a specific tone in his writing—without even knowing it. Oliver's experiences resembled similar moments with many of my students. For other students, the writing discovery was about different aspects of the letter such as structure, voice, and content. These became teaching moments

where individual revelations about writing became full class discussions. Not surprisingly, most of the students eventually found themselves eagerly awaiting their letters and their turn to write back.

Furthermore, writing letters gave both groups of students a break from the essay writing process. It allowed students to write without the fear of having their work marked up and criticized by their teacher. Writing is essentially about communicating and letter writing reminded—or in some cases taught—students that writing can be an enjoyable form of communication.

Just as the project was enjoyable for the high school students, it was also a lot of fun for the college freshmen. Most of the college students have admitted that they have never written actual letters to anyone and never had a pen pal. The project was not only a "break" from the usual class routine, but it was also something that created expectations, mystery, and entertainment for my (Michal's) students. They were always anxious to get the letters, and when they got them they could not wait and would always open them right away.

Another fun aspect for the college students was the fact that thanks to this project they suddenly started seeing themselves as writers with authority. That is, most of the college students have mentioned that they always felt they needed to get advice from someone, and did not have much influence or effect on anybody else. However, interacting with high school students and trying to help them and expose them to college has created a very enjoyable and lively experience, where they actually started perceiving themselves as trustworthy, reliable, and authoritative.

Challenges

As with any project, Writing Partners also had some challenges. On the high school side, the biggest challenge was getting students to turn their letters in on time. Most students got their letters in on the due date, but there were always a few stragglers. Sometimes students were absent, suspended, or had athletic commitments. Several high school students dropped the class during the semester—one went to juvenile hall, and migrant students returned to their home country—which meant that a college student would suddenly be left without a pen pal. Public school teachers by necessity are resourceful, however, and I found a solution to each of these challenges. Late letters could be scanned and emailed to the college professor. Also, a student from my class would often agree to take on another pen pal if one of their classmates suddenly dropped out.

In terms of the college students, one problem that came up is that sometimes there was no connection between the students. We assigned the letters randomly, and while there was a connection in most of the cases, sometimes the partners did not connect and had very different personalities, styles, ambitions, and interests. Another challenge was that sometimes not all the high school students could attend the field trip. The four field trips that we coordinated were very successful, but in some cases several students could not make it, and this created disappointment for the college students. We solved this problem by scheduling the last field trip during school hours, which resulted in full student attendance.

Conclusion

Working together for a year and administering this project with four different groups of students, both of us can attest to the project's importance and usefulness for both the high school and college students. The real benefit of the Writing Partners project is that it exposes students to a new and different genre, outside the normative academic essay. That is, in the case of the letters, both groups of students produce texts that are "purposeful and responsive" because they are written to an actual person outside of class (Johns, 2008). It is this authentic and concrete experience that makes students really think about their audience, style, tone, and word choice, because a person that they do not know is going to read their letter and create an image of who they are based on their writing.

Another evident and substantial value of this project is in helping the community by encouraging less privileged students to think about and consider applying to college. This authentic experience of corresponding with college students, asking them questions, consulting with them about the college experience, and eventually seeing the campus, may open doors for many of these high school students who otherwise would not have any access to the college world. Exchanging letters and corresponding about college and writing in college certainly addresses not only the gap between high school and college writing but also the differences and at times the disparities between different socio-economic classes and their access to higher education.

Lastly, this project created a better understanding between the two of us, a high school teacher and a college instructor. While this was not intended to be the aim of the project, our weekly meetings exchanging the letters and phone/email communications made each one of us better understand the other's situation. That is, I (Michal) started to understand the difficulties and challenges that high school teachers encounter and how they are constrained in what they can do. On the other hand, the high school teacher (Jennifer) asked me questions about terms, ideas, and activities that I do with my students in order to try to adjust the curriculum and better prepare her students for college.

To conclude, we would like to offer several simple steps that may help other teachers implement this kind of project.

1. If you are a college professor or high school teacher, look up and/or try to connect with the writing program, writing center, English department, or service learning center at your university or local college. In many cases these entities can help in collaborating on a Writing Partners project.

2. Once you have found a teacher to collaborate with, schedule a meeting to discuss and identify the goals and learning objectives for the project. Outlining a schedule for the letter exchange is a good strategy, and agreeing on a designated meeting place for dropping off the letters should be discussed, too. Mailing the letters is an option, though that slows down the process. We found that meeting in person once a week was the best plan for us.

3. When preparing instructions for students, try to include language that clearly explains the purpose and nature of the project. For us, it was important to emphasize that the students are not allowed to contact their pen pals through social media, as is so easy to do these days. See Appendices A and B for syllabus language.

4. Secure funding for the culminating field trip. The biggest expense is chartering the school bus. We secured funding through district and university grants that came from the writing program and the service-learning center on campus. Michal asked the university bookstore to donate items, which they generously did. The college students then gave these as parting gifts to the high school students. Fun ideas for the field trip: play a pen pal guessing game, take a tour of the college with the college students acting as tour guides, and have a picnic.

5. A good wrap-up for the project would be asking students to write a reflection about the experience. Some questions to ask students: a) What did you learn about yourself as a writer? b) How did your writing improve? c) Did you learn anything about attending or preparing for college?

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Appendix A – Instructions for the High School Students

Writing Partners Project

10 points per letter (100 point project)

For the next two months you are going to be pen pals with a freshman at [University Name]. Every other week you will write a letter to your pen pal. At first you will write introduction letters to break the ice between you and your pen pal. Later on your pen pal will discuss the college experience with you. Overall, the goal of Writing Partners is to develop a friendship through writing and also to learn about college. While I would like to give you as much privacy as possible in your letters, once in awhile I will select a round of letters to read – just to make sure we are all being appropriate and following good letter writing techniques. Writing Partners will culminate in a field trip to the University Campus (if you get parental permission), where your pen pal will be your tour guide of the campus.

Before we begin Writing Partners, however, we have to cover some guidelines in order for this to be an authentic pen pal experience. Read the requirements below and sign the contract if you agree to the terms.

- I will write about appropriate subject matter
- I will NOT include my last name in the letters
- I will NOT attempt to look up my pen pal on any social media
- I will NOT exchange photographs or email addresses in the letters
- The only contact I will have with my pen pal will be through the letters
- I will have my letter ready for exchange days
- If I receive two or more detentions or get a referral from Ms. Teacher, I forfeit my opportunity to attend the field trip to the college campus

Letter Requirements:

- At least two pages
- Handwritten and legible!
- Enclosed in an envelope
- Must follow letter writing conventions (e.g., salutations, date, organization)

Sign below, detach, and give to Teacher

I, _____ , promise to adhere to the Writing Partners guidelines listed above.

Signature _____

Additional Guidelines:

- You should not trade email addresses, Facebook/Twitter, or any social media accounts information with your writing partner
- You should not attempt to meet each other outside of class
- You should not include photographs, as we want this relationship to take place solely in writing
- Letter length should be at least one hand-written page
- You will receive specific guidelines for each letter that you write

Appendix B – Instructions for the College Students

Writing Partners Project

As part of this class you will be participating in the Writing Partners Project, a program that pairs university writers with secondary school writers in a writing relationship based on letter exchange. In most cases, the older writers model letter-writing techniques to the younger students. Through their stories, the older writers introduce many younger students to university education experiences. The purpose of this project is for you to practice writing to a new audience, adapting your content and tone to your partners' interests and needs.

Throughout the quarter you will write 5 letters to a high school freshman student from [High School Name], and will receive 5 letters from your partner. At the end of the quarter, there will be a culminating event that includes a field trip for the high school students to the campus where you will get a chance to meet your writing partner.

A Task-Based Approach to Tablets and Apps in the Foreign Language Classroom

— Celestine Caruso and Judith Hofmann

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Dr. Judith Hofmann is the project coordinator for the "Competence Labs," which are part of a larger project called the "Zukunftsstrategie Lehrer*innenbildung" (funded by the German Ministry for Education and Research) at Cologne University, Germany. After studying English, German and Pedagogy, Judith received her doctorate in Teaching English as a Foreign Language (TEFL). Her primary areas of research are literary and media studies in TEFL and intercultural learning.

Abstract

Digital media not only shape our society and culture, but they also strongly influence approaches to teaching and learning in educational settings. In this teaching report, we present some examples of how to embed tablets and apps productively into classroom settings. We argue that the (English as a) Foreign Language classroom can profit from tablets and so-called story-making apps if they are combined with project- and problem-based learning, and, more precisely, with task-based language teaching (TBLT). If (future) teachers know how to design app-based tasks that meet the criteria of TBLT, they will in turn know one way of engaging pupils in authentic interaction in the foreign language while at the same time developing media literacy. We backup our hypothesis with some examples of how such tasks were designed in "Digital Media in the EFL Classroom," a recurring seminar for future teachers at Cologne University (Germany).

Keywords

Task-based language teaching, tasks, product orientation, digital media, EFL-classroom, tablets, apps, teachers in training

Introduction

Most teachers and pupils are more or less constantly in contact with digital media, such as smartphones, PCs, tablets, etc. In fact,

> [o]ver the past several decades, our culture has undergone a period of profound and prolonged media change, not simply a shift in technical infrastructure for communication but shifts in the cultural logistics and social practices that shape the way in which we interact. (Clinton, Jenkins & McWilliams, 2013, p. 7)

Especially for young people, communicative applications such as Facebook, Instagram, Snapchat etc. play a major role in their social lives. Current studies reveal that 92% of young people between 12 and 19 years of age (in Germany) use their smartphone daily, and most of them use their smartphone for surfing the web (JIM study, 2016). It seems unquestionable that young people are spending a lot of time in front of screens and that digital media have a deep impact on our every-day and social life. They function primarily as set cultural spaces which adolescents mentally and actively deal with during their every-day lives, and which serve as guidance for both their adaptation to and acquisition of the world, their personalities and their concepts of living (cf. Theunert & Schorb, 2010, p. 250).

Taking into consideration the high exposure of digital media in the lives of young learners during their leisure time, the question might arise whether the classroom should rather be one of the few places where adolescents detach from their media lives: "You can't get much more conventional than the conventional wisdom that kids today would be better off spending more time reading books, and less time zoning out in front of their video games" (Johnson, 2005, p. 157). At the same time, we have to ask ourselves whether it makes sense to keep up "the technology-free zone characterizing many schools" (Clinton et al., 2013, p. 4). One can even argue that by not including media education in schools, not only are we keeping the learners from acquiring techniques and skills to critically and reflectively use digital media in their daily lives, we are even depriving those learners who do not have the access to informal learning and media exposure in their free time from "catch[ing] up with their more highly connected peers" (ibid.). Thus, in the controlled pedagogical setting of educational institutions, digital media should be explicitly dealt with, in order to form young people into competent and critical digital media users instead of mere consumers. Here, media educators Theunert and Schorb argue that digital media are cultural techniques whose communicative and productive potentials for the creation of authentic spaces can be used in educational contexts (cf. Theunert & Schorb, 2010). It is this authenticity of digital media that makes these forms a credible medium for pedagogical purposes.

Actually, in the past, a similar debate was led concerning the use of films (and basically every genre of popular culture) in the classroom. However, numerous scholars and studies have shown that there are different ways in which films can be productively embedded into the (foreign language) classroom in order to foster intercultural competence and language skills (cf. Freitag-Hild, 2016; Hofmann, 2017; British Film Institute, 2000; Müller-Hartmann, 2008, to name but a few).

Consequently, digital media education should not be excluded from the classroom: It would mean ignoring a major part of young people's everyday lives and not preparing them for a responsible and critical engagement in new cultural practices. In addition, as we are going to point out in this paper, it would also mean ignoring a meaningful and relevant way to teach English as a Foreign Language (EFL) with a project-based and problem-based approach.

Why Tablets and Apps in the Foreign Language Classroom?

In 1993, technology critic Neil Postman claimed that "fifty years after the printing press was invented, we did not have old Europe plus the printing press. We had a different Europe" (Postman, 1993, p. 18, quoted in Warschauer, 1998, p. 760). To this, Mark Warschauer responded some years later "that 50 years after the computer was invented, we do not have old language learning plus the computer, but a different language learning" (ibid.). However, not only did the diversity of technical devices and role of technology in our society alter language learning (if we believe Warschauer), but they also altered the ways we learn in general (cf. Dezuanni et al., 2015, p. 7).

This new or different (language-)learning in a world where digital media are shaping society, culture and, consequently, education, does not mean that all learning needs to be digital, that suddenly school books, worksheets, or even teachers are obsolete, but rather that these digital media open new ways of (language-) learning: "It would be tragic if we allowed new media literacy practices to totally displace traditional print literacy practices, but refusing to engage with new media out of a misplaced fear of change would be equally tragic" (Clinton et al., 2013, p. 11). However, before integrating digital media like tablets and apps into the classroom, the teacher should ask her/himself the following questions (cf. also Schmidt & Strasser, 2016, p. 3):

- Where can I embed digital media, and (in our case) tablets and apps meaningfully in the classroom?
- Where do they provide a surplus value?
- Which competencies do they foster which cannot be addressed with other materials such as worksheets or school books?
- Which learning arrangements and environments need to be created for a meaningful integration of digital media?

The purpose of digital media cannot be to digitalize analog material – there is no educational surplus value in simply using an iPad instead of a worksheet, that is, for example, to do a 'fill in the gaps' exercise. The teacher should rather reflect upon the question of what the chosen media and their digital tools are able to contribute to the classroom, where they can, for example, foster language learning while contemporaneously involving and fostering media literacy. One way to address the questions mentioned above will be described in the next paragraphs.

Complex Tasks as a Means for Problem-based and Project-based Learning

At the center of problem-based and project based-learning is the idea that learners are supposed to engage in real-world problems in order to foster competencies they need in their everyday lives (cf. for example, Stoller's characteristics of project-based learning, 2006). This is also one of the objectives of Teaching English as a Foreign Language (TEFL) in Germany. Furthermore, there is a strong emphasis on output and competencies that can be measured. The combination of bringing real-word problems into the classroom and output-orientation is not easy to achieve. Task-based language teaching (TBLT) is "an approach to language education in which students are given functional tasks that invite them to focus primarily on meaning exchange and to use language for real-word non-linguistic purposes" (Van den Branden, 2006, p. 1). We suggest that TBLT as an approach to language teaching has a lot of similarities to project-based learning, such as having a defined, communication-based process and a product, integrating many different (language) skills, or engaging with real-world authentic language (cf. Ellis 2009, p. 9 f. and Stoller, 2006). At the same time, tasks include a problem-orientation, as some kind of 'disturbance' which stands in the beginning of the tasks and needs to be solved, and through which a wholesome and rich learning environment can be created. This learning environment can be used for integrating digital media in a relevant and meaningful way into TEFL, starting as early as in primary school.

As a consequence, we have to ask ourselves what tasks for working with digital media have to look like in order to fulfil the quality criteria of a rich learning environment. In the past decade, researchers have already identified the potentials of technology for TBLT in the (English as a) foreign language classroom (cf. e.g. Schrooten, 2006; González-Lloret, 2007; Al-Bulushi, 2010; Thomas & Reinders, 2010). González-Lloret and Ortega (2014) argue that the digital world itself created new tasks, which are more or less embedded into the daily lives of adolescents and adults and which, in the context of English Language Teaching, can be used as authentic material. By definition, (pedagogical) tasks

- "involve communicative language use in which the user's attention is focused on meaning rather than linguistic structure" (Nunan, 1989, p. 10);
- are "goal-oriented communicative activit[ies] with a specific outcome, where the emphasis is on exchanging meaning, not producing specific language forms" (Willis, 1996, p. 36);
- are "activit[ies] in which a person engages in order to attain an objective, and which necessitates the use of language" (Van den Branden, 2006, p. 4).

If tasks meet the described criteria, they will be able to foster complex competencies (cf. Hallet, 2011) as they ideally involve all language skills (i.e., reading, writing, listening comprehension, and speaking). Only in tasks that are learner-centered, problem-based and product/outcome oriented do we see the opportunity of a meaningful integration of tablets and apps in the EFL classroom. This task-based approach to language learning with digital media formed the foundation of a seminar for teachers in training from Cologne University.

The Seminar "Digital Media in the EFL Classroom"

Seminars of the so-called Competence Labs focus on the connection between theory and practice for university students who aim at becoming teachers (henceforth referred to as teachers in training). The Competence Labs are a part of the "Zukunftsstrategie Lehrer*innenbildung" (which translates to 'future strategy for teacher education'), a project based at Cologne University, Germany, which is a part of the "Qualitätsoffensive Lehrerbildung" ('teacher training quality campaign'), a joint initiative of the Federal Government and the Länder that aims to improve the quality of teacher training. The program is funded by the Federal Ministry of Education and Research.

In the Competence Lab seminar "Digital Media in the EFL Classroom," teachers in training have the possibility to develop tasks with the help of tablets and apps and to teach these tasks to pupils from different levels, either primary or secondary school classes, depending on their teaching degree. The class, which usually takes place as a three-hour project, is videotaped, serving as material for the teachers in training to reflect on their own roles and performance as teachers.

The aim of the seminar, which is a recurring course in the BA-Module "Teaching English as a Foreign Language," is to address media literacy and competencies in principles of foreign language teaching. These combined literacies are supposed to enable the teachers in training to create complex app-based tasks (as opposed to exercises, which are traditionally less communicative, more form-oriented, and do not have an individual learner product as their objective) that focus more on meaning, i.e., communicative competence and spontaneous, creative speech production, rather than on (grammatical) form.

What makes this seminar special is the fact that by connecting TBLT, project-based, and problem-based learning, the seminar works on different levels: The seminar itself can be regarded as a project the teachers in training are working on, with a defined, but individual outcome – the tasks and lessons for the pupils. At the same time, the teachers in training create a similar project for the pupils – the latter are supposed to work on different tasks with the help of tablets and apps and create an individual outcome, for example, an animated version of their own short story.

Suitable Apps and Teaching Ideas

For their lesson planning, the teachers in training used the three apps *Explain Everything*, *Book Creator*, and *Puppet Pals* (all free of charge in basic/test versions; for a regular use in the classroom, however, it makes sense to pay for the full versions), for both primary school and secondary school levels. In Germany, English language education starts in primary school. There are, however, variations in the starting grade in the different federal states, and the intensity and quality of English in primary schools also varies. In secondary schools, English is typically the first foreign language the pupils have to learn institutionally. The teaching ideas we will present here can thus be transformed to other foreign language learning settings. Depending on the learner level or age, both the complexity of the tasks and accordingly the range of app tools and functions can be varied.

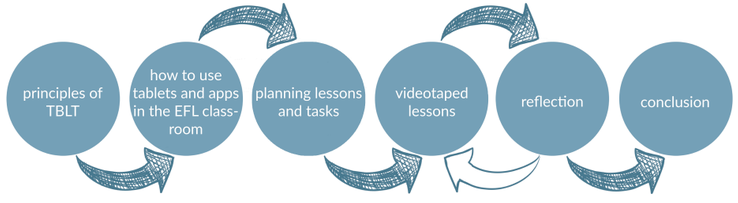

Figure 1: Exemplary model of the seminar process "Digital Media in the EFL Classroom".

Figure 2 Teachers in training instructing pupils how to use the app Book Creator for the task "My favourite hobby". The pupils made e-books about hobbies with the help of pictures, self-made drawings, written sentences/chunks and voice recordings. (Photo: Celestine Caruso)

The app *Puppet Pals*, developed by Polished Play, is a simple, yet creative, tool with which users can create short animated theatre plays or stories with the help of different backgrounds, self-made or pre-chosen characters, and recorded voice-over commentary. One example from a secondary school unit on "California" was the task to create a dialogue between two celebrities who meet somewhere in Los Angeles. It was an open task, as the teachers in training did not tell the pupils what the characters had to talk about. The products the pupils created were, consequently, very different, and ranged from longer dialogues with even funny twists to shorter exchanges that stuck more closely to previously provided scaffolding word-chunks.

With *Book Creator*, an app developed by Red Jumper Limited, users can create e-books or comics with the help of different tools and elements, such as pictures, drawings, self-made photos, image processing, and voice recordings (among others). In a primary school unit on "This is me," for instance, the pupils used the app to create a digital book about their hobbies. They used selfies, drawings, or pictures provided by the teachers in training to describe their favorite activities to their classmates. Again, the products were different: More advanced learners were able to describe the hobby, how often per week they practiced it and so on, while others just mentioned a few hobbies in a row, hence practicing new chunks they learned (e.g. "My favorite hobby is…", "I like dancing/singing/playing football" etc.), without adding more details. Similarly, as in one of the classes both first and fourth graders were taught together, the first graders' products consisted mainly of recorded word chunks combined with pictures that represented their favorite hobby, whereas the fourth graders, who were more advanced in the acquisition of written language, additionally produced written sentences describing their favorite activity.

Explain Everything, developed by Explain Everything sp. z.o.o., is a complex and versatile app and whiteboard tool that can be used to create short video clips explaining or visualizing specific subjects, topics, theorems, or phenomena by using drawings, images, image processing, and voice recording. When basic functions are utilized, *Explain Everything* enables similar products as *Book Creator* or *Puppet Pals*. However, the integrated video-processing tools enable a far more complex use. Pupils from primary school (fourth grade), for example, created a short presentation-video about their typical school day with the app by integrating simple images and voice recording. On the other hand, in a secondary school unit about global warming, pupils used the more complex functions of the app to create short videos about the causes and effects of the greenhouse-effect.

What is common in all three apps is the fact that the pictures, backgrounds, or images can be either pre-chosen by the teacher and stored or chosen by the pupils, who can browse through the internet (this can also be used as a teaching moment about copyrights and the dangers of plagiarism) or take pictures themselves (e.g. selfies, objects, freeze frames of scenes) with the integrated tablet-camera. The created products can be exported as project or video file and saved on the tablet or uploaded, shared, and sent via e-mail.

The three-hour teaching unit centered on a specific, curriculum-based topic for which the teachers in training had developed one task for each of the three different apps. After a short introduction to the basic functions of the apps, the pupils worked cooperatively in pairs or groups of three and produced individual and creative learning outcomes, such as an interactive newspaper article, a promotion video about Sequoia National Park, or a short animated scene from Oscar Wilde's *The Canterville Ghost*. Due to the fact that they worked in pairs or groups of three, the pupils engaged in collaborative language output through negotiation of the content as well as in the creation of the final products themselves. Finally, at the end of the unit, the pupils' products were presented to the whole class (if the pupils agreed to do so).

Discussion

In our experience, already very young learners from first grade often brought some basic media competencies or at least experience with digital media, such as tablets or apps, into the classroom, which resulted in a seemingly easy and intuitive handling of the tablets. Nevertheless, instruction about functionality and the technical use of both tablets and the individual apps (e.g. how to save projects so that they can be viewed by and discussed with the whole class) are indispensable for successfully working on the tasks.

One common concern among the teachers in training while planning the teaching units was that they feared the pupils would be distracted by the tablets too much to actually work with them. This potential problem, however, could be solved rather easily by using the limited options mode, which restricts the use of the iPad to certain pre-chosen apps or disables certain functions. Also, it sometimes helps to provide a previously chosen range of images, characters, backgrounds, etc. for the pupils, in order to still offer them a choice for their individual ideas while reducing the time spent surfing the web and looking for suitable pictures (and, thus, reducing the risk of the pupils choosing inappropriate or copyrighted material).

Ideally, the task focused on a creative and authentic language production and outcome (i.e., the product that the pupils created with the app). The use of tablets and apps in the EFL classroom can, however, involve processes of language learning and creativity, only if the conditions of a cooperative and open task are met (cf. Biebighäuser, Zibelius & Schmidt, 2012; González-Lloret & Ortega, 2014; Dausend & Nickel, 2017). We did have the problem that some teachers in training were not able to differentiate between open, product-oriented tasks and mere exercises and they thus created grammar units in which the pupils had only to fill in gaps. Such units, of course, are neither problem-based nor project-based or task-based, and leave no room for individual task-solutions and creative language use. Subsequently, it is vital to prepare the teachers in training well, to be a facilitator in teaching, and to help them with their expertise in teaching and learning methods (cf. Schmidt & Strasser, 2016, p. 5).

The quality criteria of tasks are well-theorized in TBLT literature (cf. for example Nunan, 2006, Ellis, 2009, Biebighäuser et al., 2012, González-Lloret & Ortega, 2014), and how these criteria are applicable for digitally mediated tasks has also already been discussed (cf. Biebighäuser et al., 2012, Dausend & Nickel, 2017). There is, however, usually a difference between the task that the teacher (in training) planned (i.e., task as workplan) and the task that is actually put into action (i.e., task in process or task in action, cf. van den Branden et al., 2007). Pupils influence the task in action, as they are actors in the classroom with their own ideas, beliefs, and perceptions that shape the interpretation of a task. At the same time, teachers (in training) influence the task in action, as they have to adapt it to current circumstances in the classroom and often have to improvise to meet the challenges of everyday life in schools: "[U]ntil the task is turned into action, it cannot be fully evaluated for its usefulness or effectiveness" (Cameron, 2001, p. 35).

Thus, in order to find out how digitally mediated tasks should be designed, we want to look at the quality criteria of the planned tasks as well as at those of the task in action (cf. also Samuda & Bygate, 2008, p. 65). In our seminar, we are going to analyze the tasks the teachers in training planned at three points in time. The task analysis is based on an analysis of math tasks by Blömeke, et al. (2006):

- **Task analysis 1 (task as workplan)**
  - Objective potential and identification of task criteria
  - Material: worksheets; scaffolded, differentiated, or additional material developed by the teachers in training
- **Task analysis 2 (task as workplan)**
  - Intended potential of task criteria
  - Material: Questionnaire (pre) for teachers in training (who developed the material) and teachers (who usually teach the class).
- **Task analysis 3 (task in process / task in action)**
  - Actually realized task criteria in the classroom
  - Material: Questionnaire (post) for teachers in training, pupils' task outcomes, video recordings of the lesson.

This planned qualitative analysis of the tasks developed in the presented seminar aims at finding out which of the intended criteria of the planned tasks (task analysis 1 and 2: objective potential and intended potential) are actually realized in the classroom and which aspects of the analyzed materials (task analysis 3) were responsible for the success and/or failure (i.e., if expectations/goals were met) of the tasks. As the material is composed of various tasks from the past university terms and the ones to follow, the analysis will further address the question whether there are common denominators for the success and/or failure of the task which can be ascribed to the digital components of the task. With this evaluation, we hope to find out which criteria digitally mediated tasks should have in order to fulfill the intended aims. We will therefore try to develop a recommendation for designing digitally mediated tasks that work independently from quickly developing software and hardware, hence addressing a fused media/language teaching literacy.

We believe that if these criteria of Task-based Language Teaching are fulfilled, the use of apps in the EFL-classroom can foster complex competencies (cf. Hallet, 2011) that involve the interaction of ideally all language skills (reading, writing, listening, speaking, and mediation), while at the same time improving media literacy. Due to their versatility, these app-based tasks can easily be employed from primary school to secondary school levels if they are adjusted to the pupils' needs and language levels. While working on their tasks, pupils can resort to their individual language skills and 'solve' the tasks accordingly. They can opt for a rather complex language product or a more basic version, depending on their language competencies. Hence, open, app-based tasks could be suitable for an inclusive classroom with diverse learner levels and competencies (cf. also Dausend & Nickel, 2017). The created products, i.e., the learning outcomes, do not only reflect the language level of the learners, but they are also unique creations. As authors of an easily shared product that can also be taken home, the pupils are taken as seriously in their roles as foreign language users as they are as active participants in the contemporary media discourse.

Furthermore, the pupils' products, as for example the videos, e-books, or interviews they created, can be presented to their fellow pupils (and teachers) at the end of class (which usually takes place via projector and sound) and do not (necessarily) involve an active presentation from the pupils. This possibility of presenting via digital tools is especially important for those pupils who are shy or hesitant in performing in front of the whole class, even if they are proud of their task outcome.

Conclusion

In our paper, we argued that it is vital to provide teachers in training as well as pupils with media competence, which cannot be taught in one isolated subject but should rather be regarded as an interdisciplinary aim of each subject. One possibility of integrating digital media and, more precisely, tablets and apps into the English as a Foreign Language classroom is through the principle of task-based language teaching. In particular, our presented examples of so-called story-making apps provide a suitable basis for authentic, problem- and project-based tasks that are focused on communicative aspects of language. We argue that it is not (only or primarily) technical know-how that teachers need in the classroom, but an understanding that especially problem-based, open tasks help the learners produce creative outcomes. Thus, it is more of a conceptual understanding of which criteria tasks should fulfill. This understanding applies to almost every digital medium and is not restricted to the EFL classroom. And since digital media and technology are "ever-changing, not always predictable, and can take on many forms" (Hamilton et al., 2016, p. 433), this understanding is especially important. Considering the fact that inclusion becomes a more and more important aspect not only in German schools, but also in schools everywhere, working with tablets and apps has the advantage of individual approaches to the solution(s) of the tasks. According to definitions by Ellis (2009), Willis & Willis (2007) or Müller-Hartmann & Schocker-von Ditfurth (2011), Müller-Hartmann et al. (2013) and Dausend & Nickel (2017) in the German context, tasks should serve as stimuli for self-determined negotiations of meaning. Instead of focusing on specific linguistic forms, the pupils should choose from their individual language resources, which help them solve the task. It is this consideration of the learner's individuality that enables a differentiation of tasks in a heterogeneous classroom (cf. Dausend, 2014: 164f, Dausend & Nickel, 2017: p. 184).

In our context, we argue that digitally mediated tasks especially appeal to a heterogeneous group of learners, not only because their openness ideally triggers creative negotiations of possible solutions (which, as a 'by-product', involve language output), but because the task outcome can be produced with multiple tools and involves various channels of language perception and production. The apps can be used to scaffold complex materials or tasks by being multisensory themselves (work with texts, sounds, images, videos etc.), embedding additional (explanatory) material. Furthermore, both hardware and software can be modified so that they fit the (special) needs of the users, by, for example, being able to read text aloud, magnifying objects, or enlarging the font.

We should, however, keep in mind that there still are many infrastructural problems to be solved and challenges to be overcome: Do tablets add to the financial problem of our educational system? Are schools able to provide a safe and stable WiFi network? Can a bias towards a provider of hardware be created by using a certain brand of tablets? Where can learning outcomes, videos, pictures, and materials be safely stored? How can privacy be maintained? How are risks of cyber-bullying minimized? What about copyright issues? And how can the clash of the curriculum demands, personal attitudes of the teachers towards digital media, and the resources of teaching teachers how to design digitally mediated tasks be addressed?

These concerns need to be taken seriously and solutions are not easy to find. Yet, it is a central task of schools and the educational system to provide rich learning environments of high quality that enable effective learning processes (cf. Schmidt & Strasser, 2016, p. 5). Consequently, the aim of using digital media in the (EFL) classroom cannot and will never be to completely substitute established methods of (language) teaching (cf. ibid.). Instead, we argue that we need to identify the most meaningful areas where the use of digital media actually provides a surplus value for teaching and learning. Digital media are always a means to an end, a catalyst for learning processes, and should not be used for their own sake (cf. ibid.).

Ideally, when planning teaching units, the starting point will be the teaching aims, and from there, we look at what kind of methods and media we can use to achieve these aims – and tasks for working with apps will naturally be among the pool of media and methods to choose from. Right now, however, we are still in the process not only of creating this pool of choices, but also of actually creating an awareness of the fact that digital media might be a part of the pool.

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Extending Experiential Learning Opportunities in Teacher Education: Connecting Preservice Teachers and their Communities through Project-Based Collaborations

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Abstract

Experiential learning opportunities can expand preservice teachers' content knowledge, critical thinking, creative problem solving, and adaptability to evolving learning environments and learner needs. Problem-based projects, especially those generated from community needs, are especially valuable for teachers who will work in rural areas. This article describes a problem-based experiential learning project developed by three preservice teachers in collaboration with the local children's exploration museum: to make the museum's activity centers appealing and useful to teachers, especially those within 100-mile radius. The project entailed aligning the museum's activity centers with education standards across four states included in the museum's service area: Arkansas and Louisiana Common Core, Texas Essential Knowledge and Skills (TEKS), and Oklahoma Academic Standards. Collaboration with the museum on this project not only increased the preservice teacher's knowledge of education standards, it also reinforced the value of partnering with available community resources to offer out-of-classroom learning for students, especially in STEM content areas.

Keywords

experiential learning, teacher education, STEM learning, museums, problem-based learning, community collaborations

Introduction

Experiential learning opportunities, especially service learning projects that connect preservice teachers to the communities they will serve, add value to teacher preparation programs (Gao, 2015; Ryan & Callahan, 2002). Preservice teachers can extend and expand their knowledge of content areas while learning to be creative, critical thinkers flexible enough to adapt to challenges within changing educational climates (Barnes, 2016; Gao, 2015). Additionally, community members benefit from service learning projects, establishing or reinforcing positive relationships with their campus partners while achieving relevant goals for their organizations, and building confidence in the universities and colleges preparing their community's future teachers. Such reciprocity is especially important for rural and rural-serving areas where campuses, schools, and community partners rely more on each other's mutual success (Bethune & Kiser, 2017; Borgerding & Caniglia, 2017).

The project presented here describes a problem-based, service learning project conducted by three undergraduates in a teacher preparation program at Texas A&M University – Texarkana, a comprehensive regional university and the largest producer of local teachers. While enrolled in a course focusing on effective and creative methods for teaching mathematics, science, physical education, and health, the preservice teachers visited a local children's museum whose mission focuses on supporting children's imaginations, creative play, and learning in literacy, science, and mathematics. After the museum's director expressed a desire to improve the ways the museum's exhibits could directly support educational standards, the three undergraduates (henceforth, "the project team") devised and implemented a service learning project intended to benefit their campus community, the museum partners, students, and classroom teachers in local districts. The project focused on aligning the museum's activity centers with education standards across four states included in the museum's service area: Arkansas and Louisiana Common Core, Texas Essential Knowledge and Skills (TEKS), and Oklahoma Academic Standards. As a result, these future teachers improved their own understanding of state education standards and learned the importance of working with, and learning from, colleagues and education advocates in the community. The purpose of this article is to share the project team's experiences with and derived value from completing a service learning project with an underutilized community resource as part of a teacher preparation program.

Experiential Learning in Teacher Preparation Programs

Drawing from Kolb's theory of experiential learning and models of authentic learning, experiential learning refers to a high-impact educational practice that usually meets three parameters: location, engagement, and reflection (Kolb, 1984). Location refers to an educational activity that takes place outside the classroom, engagement represents the actual interaction or practice with the phenomenon under study, and reflection offers learners the chance to consider the connections that have formed between their classroom learning and the experiential learning activity. Experiential learning values the learner's firsthand experiences as credible tools by which learners can connect what they have experienced (in their lives or professions) to what they learn in the classroom. Further, experiential education helps learners attain intellectual goals such as deeper understanding of subject matter, refined critical thinking skills, and an investment in learning as a lifelong practice (Eyler, 2009).

As professional pathways, most teacher preparation programs integrate experiential learning through exposure to and involvement in observations and student teaching practicums in actual classrooms. Such learning opportunities help preservice teachers develop the flexibility, adaptability, and reflexivity necessary to respond to the unique challenges of teaching (Gao, 2015). Recently, some teacher education programs have expanded the experiential learning opportunities for their students, not only to improve the quality of the teachers from their programs but also to improve relations with members of their communities. Project-based learning and service learning are two of the more recent experiential learning developments at work in some programs.

Project-Based Learning

Project-based learning, or PBL, is quickly gaining popularity in teacher preparation programs. Most simply defined, project-based learning is "a model that organizes learning around projects" (Thomas, 2000, p. 1). PBL's applicability to teacher education supports student-directed learning, as learners (often working together in teams) solve complex problems that are genuine to their profession. Using PBL in teacher education programs helps preservice teachers apply the model in their own classroom, often through posing problems that require creative problem solving with critical thinking and teamwork to solve (i.e., problem-based learning). Incorporating either project-based or problem-based learning in the classroom allows teachers to challenge their students and have students reflect on their own learning. The reflective component of both learning approaches is essential; students (and their instructors) must focus on the process as much as, or perhaps even more so, than the product (Strevy, 2014; Ward, 1988). Both project-based and problem-based learning present students with authentic learning situations, although the way in which students enter the learning process may differ.

Some preservice teacher programs have started integrating technology into both the learning process and in their student work products in project-based learning environments. In their survey study with 42 graduate students, Seo, Templeton, and Pellegrino (2008) investigated the ways in which multimedia-assisted, project-based learning impacted these preservice teachers' knowledge and self-efficacy in technology, content area knowledge, and teaching. Transcending the "limitations of print," "when used in teacher education courses, multimedia-assisted, project-based learning can create a more powerful effect because teachers learn not only how to use technology to communicate with their students but also how to teach their students to communicate with others through alternative media" (Seo, Templeton, & Pellegrino, 2008, p. 260). The integration of technology into students' learning products helps them reach state standards associated with mastery of instructional technology tools and applications. For the preservice teachers in this study, multimedia-assisted project-based learning significantly improved their participants' level of perceived preparedness to use technology in their own classrooms and the integration of technology to support learning in their respective content areas. Participants also reported shifts in their perceptions of the teacher's role (from authority to learning facilitator) and gained confidence in their ability to help their future students develop problem-solving skills. Thus, technology can act as a learning conduit for both teachers and students, allowing both to share in engaging experiences in project-based experiential learning environments.

Service Learning

Service learning provides opportunities for preservice teachers to apply their knowledge and skills in the community while also learning from those opportunities. The definition of service learning can vary across programs and contexts. One point of agreement rests in differentiating service learning from community service. Unlike community service, service learning "is a reciprocal relationship that merges both the field experience and community service and offers learning opportunities that link academics to the service, so that both the student and community benefit" (Ryan & Callahan, 2002, p. 128). The educative function of the service learning experience rests on ensuring participants reflect meaningfully, especially on issues related to power and equity that shape (and limit) their views of the world in order to move participants from a charitable (do-gooder) model to one focused on enacting social change (Desrochers, 2006).

Some teacher preparation programs have imbedded a service learning component into their teacher preparation programs in response to concerning trends within the field. Expanding understanding of diverse cultures is essential in teaching, and service learning has proven helpful in expanding preservice teachers' worldviews (Desrochers, 2006). While the need for secondary math and science teachers is high in many areas of the country, high-poverty, high-minority as well as urban and rural areas are especially impacted by the shortage (Ingersoll & Perda, 2010). Many teachers, especially those fresh from their programs, feel ill-equipped to handle the challenges of teaching in these environments and often allow their preconceived notions to guide their decision making in the classroom (Locke, 2005; Walker, 2007). In response to this challenge, some preparation programs have invested in service learning projects to connect their candidates to the communities whose children they will serve (Barnes, 2016).

Borgerding and Caniglia (2017) investigated the impact of one such program, following seven preservice teachers enrolled in a Noyce Master of Arts in Teaching (MAT) program throughout their degree and then throughout their first few years in the field. During their program, these MAT graduate students participate in community service science/math teaching projects, some of which engage populations in these critical areas; after graduating, these students are slated to take teaching positions in high-poverty, ethnically and culturally diverse urban or rural areas. Of the findings most relevant to the current project, Borgerding and Caniglia (2017) unveiled how the service learning projects "opened their minds, made them feel more confident teaching in high-needs contexts, and provided more exposure to diversity" (p. 71). The study, however, also revealed gaps in the Noyce program; teachers needed more opportunities for explicit reflection to address their stereotypes and greater exposure to rural contexts, where challenges can be unique to conquer due to differences in community participation and resource availability (Borgerding & Caniglia, 2017).

Community Collaborations

Community collaborations are essential to teacher education programs, as both the community and the college or university housing the preparation program have equal stake in the teachers produced. Community members must trust that the university is sufficiently vetting the quality of its teacher candidates, but they must also recognize their responsibility to provide preservice teachers with opportunities for youth involvement throughout their preparation (e.g., classroom observations, student teaching environments, and afterschool or summer mentoring, tutoring, or teaching opportunities). Likewise, colleges and universities must uphold the program's integrity by adhering to state compliance mandates and demanding academic excellence amongst its candidates to provide the community with well-trained, well-prepared teachers.

For rural communities, the campus-community partnerships have even more value and often transcend traditional conceptualizations of "community." While community may typically refer to the local EC-12 districts, childcare facilities, and nonprofit or private organizations that offer teaching or tutoring as experiential learning opportunities for teacher candidates, for rural communities, community extends beyond explicit centers for learning. Local and regional museums, historical sites, businesses or nonprofit organizations, libraries, community centers, churches, and other sites are also ripe for providing learning outside of the classroom - for both the area's future teachers and their students. Thus, the success of an education program on a rural university or college campus depends greatly upon cultivating and sustaining positive community partnerships with a willingness to bear the financial hardship that often accompanies supporting programs with low enrollments - especially in specialty areas like special education or bilingual education (Bethune & Kiser, 2017).

Enhancing Student Learning through Museum Visits

Providing students with opportunities to connect concepts learned within formal learning environments to those that operationalize or exemplify concepts in out-of-class experiences can lead to greater mastery of material, higher student engagement, and more positive attitudes toward the content area (National Research Council, 2009). Such opportunities are especially critical in the Science, Technology, Engineering, and Mathematics (STEM) fields, as students often experience difficulty with translating abstract mathematical or scientific concepts or phenomenon to real-world examples. As informal science education institutions (ISEIs), museums

offer a "continuum of STEM learning experiences within local communities to support a range of youth interest in STEM, from drop-in spaces that foster awareness to immersive experience that deepen and extend youth learning" (Chi, Dorph, & Reisman, 2014, p. 2).

In 2014, the National Research Council's Committee on Successful Out-of-School STEM Learning composed a comprehensive report on the value of STEM learning programs in museums, zoos, planetariums, and other designed settings outside the formal classroom environment. In that report, Chi, Dorph, and Reisman (2014) conducted a literature review of peer-reviewed journal articles and books since 2009; they discovered that museums offer opportunities for a diverse classroom to expand on their knowledge and impact their learning as a whole. Similarly, an annual report published by the Association of Science-Technology Centers (ASTC, 2016) affirms the value of science centers and museum programming as "integral to the global educational infrastructure" (n.p.). ISIEs inhabit a unique position within this infrastructure, because they "transcend the boundaries between education and entertainment" and tap into visitors' motivation to learn based on their interests in the museum's features (Schwan, Grajal, & Lewalter, 2014, p. 81).

Experiential learning that support community partnerships with informal educational partners offers opportunities especially valuable in preparing preservice teachers in STEM content areas. In early and elementary education, preservice teachers often report a lack of confidence in their abilities to integrate science effectively into their classrooms (Dorph et al., 2011). As sites designed to serve diverse audiences with various programming types, ISEIs like museums "have potential to provide teachers ideas for pedagogy and student engagement, as well as depending teacher interest and knowledge of science" (Kisiel, 2013). Likewise, these community resources benefit from the feedback and knowledge of preservice teachers who are often enthusiastic about learning, passionate about the teaching field, and eager to make a difference. The project presented here showcases the positive changes that can generate when communities and teacher preparation programs work collaboratively.

Service Project Details

Project Site Context

This project takes place in a unique locale for faculty, program administrators, and students enrolled in Texas A&M University-Texarkana's teacher preparation program. Situated in the "Four States" region referred to as the Arklatex (comprised of northeast Texas, southeast Oklahoma, southwest Arkansas, and northwest Louisiana), preservice teachers complete their program and gain certification to teach in the state of Texas which adheres to the Texas Essential Knowledge and Skills (TEKS) standards. Upon completion, there is a reciprocity agreement for graduates who may want to teach in Arkansas (Common Core), Louisiana (Common Core), or Oklahoma (Oklahoma Academic Standards). As the largest (just under 70,000 residents combined) and closest city center for many in the region, Texarkana often becomes the primary go-to location for the rural school districts surrounding it. As a primarily rural-serving institution, the university's educator preparation program has started connecting students to experiential learning opportunities beyond and before student teaching, especially those that serve the community, to generate and maintain confidence in its program and its graduates.

Discovery Place, located in downtown Texarkana, offers activity centers to promote student learning and academic achievement by engaging each student in active learning experiences. The exhibits help learners make a connection between classroom concepts and real-world experiences or applications, particularly in STEM. The museum occupies two floors and offers a sound wall, active play area featuring a historically accurate replica of a 1900s mercantile store, a reading tree, living science lab, a tinkering studio marble wall, and a variety of smaller hands-on exhibits. Teachers from local districts can take field trips to the museum while an outreach program called Traveling Trunks allows teachers from various school districts to check out educational-themed trunks and have them delivered to their classrooms. The trunks contain props which teachers can use to enhance their classroom instruction. Yet, on the whole, the museum remains under-utilized by local teachers in Texas and Arkansas and neglected by teachers outside the local districts - especially those in Louisiana and Oklahoma.

Project Description

As part of a methods course on effective teaching in Mathematics, Science, Physical Education, and Health, the project team visited the Discovery Place museum to learn how field trips can enhance student learning. While touring the museum, the project team met the museum's director and learned of her challenges in promoting more educators to take advantage of museum activities and programs. Her concern coincided with what the project team had noted during their classroom observations and student teaching experiences: many area teachers restricted learning to activities and assignments inside the classroom. Rarely would teachers consider outside learning opportunities, citing (through their informal conversations) accessibility, cost, logistical or liability concerns, and educative value. Most of the area teachers did not see Discovery Place as an opportunity to "support a diversity of student interests in Science, Technology, Engineering, and Mathematics (STEM), from those who are not interested in STEM to those who seek experiences that deepen their STEM interest and conceptual understanding or that expand their skills and practices" (Chi, Dorph, & Reisman, 2014, p. 2). The project team identified the lack of explicit educative value as a primary contributing factor to the museum director's challenge and decided to partner with the museum to help the director cultivate the facility's future while simultaneously improving a current community resource upon which teachers could capitalize for the benefit of their students' learning.

Project Design & Objectives

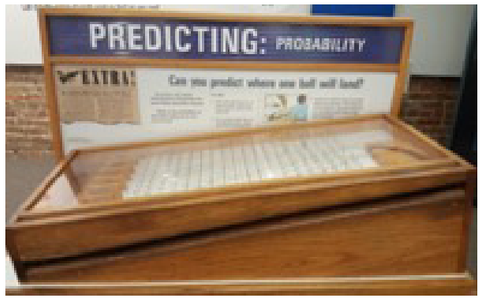
The project's goal was to help the director increase museum participation by local teachers and their students by improving the attractiveness of the museum as an accessible, economically feasible community learning resource. Recognizing that many teachers did not identify or take advantage of this community resource as living learning tool, the project team sought to bring more explicit educative value to the museum by aligning its STEM-focused exhibits to current educational standards. The project team believed that explicitly identifying the standards associated with relevant exhibits might improve teachers' abilities to incorporate museum activities into their lessons. Further, by helping the director redesign the museum's marketing to focus on specific educative alignments, the project team could also improve Discovery Place's visibility to teachers beyond districts situated in Texarkana.

Process

To accomplish their objectives, the project team began by identifying ten of the museum's hands-on activity exhibits that most closely aligned with STEM education standards in Texas and Arkansas, the two states with most immediate access to the museum. Using a spreadsheet program, the team catalogued each activity and its corresponding standards (see Figure 1 for an abbreviated example). The project team met with the director to provide their findings, at which point the director asked to expand the project to include aligning every activity in the museum with Texas and Arkansas state standards, and to also incorporate Louisiana Common Core and Oklahoma Academic Standards to help meet the director's vision of reaching teachers and students from the surrounding states.

After completing the expanded research and cataloguing, the project team then consulted with the director on ways to make the activities more accessible to teachers and their students as well as to the museum's daily visitors. The activities were relocated to the primary room to be easily accessible and readily available for teachers and students. The museum also renovated a room into a planetarium to follow along with the science activities and give the students a real scientific experience. To improve the explicit connection between the exhibits and the relevant educational standards, the

Figure 1: Examples of three activity centers with corresponding educational standards



Science

2.2E Communicate observations and justify explanations using student-generated data from simple descriptive investigations.

ELAR

2.3B Ask relevant questions, seek clarification, and locate facts and details about stories and other texts and support answers with evidence from text.

Social Studies

2.18B Obtain information about a topic using a variety of valid visual sources such as pictures, maps, electronic sources, literature, reference sources, and artifacts.

Science

2.6D Compare patterns of movement of objects such as sliding, rolling, and spinning.

Social Studies

2.20A Use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.

ELAR

1.10D Discuss how the author uses words that help the reader visualize.

Science

2.2E Scientific investigation and reasoning. The student develops abilities necessary to do scientific inquiry in classroom and outdoor investigations. The student is expected to:
-communicate observations and justify explanations using student-generated data from simple descriptive investigations.

Social Studies

2.18E Interpret oral, visual, and print material by identifying the main idea, predicting, and comparing and contrasting.

director is creating a link for educators to access the appropriate state's standards. The link will also be printed on the museum's flyer, Facebook page, and website. As the outputs from the project team's research and consultation remain at the discretion of the museum's director, the team is unable to track or assess the outcomes of their recommendations.

Significance

This service learning project impacted several constituencies on campus and in the community by demonstrating the importance of relationships among community, school districts, and the university. For example, the university discovered a new way to partner with the local museums system by tapping into experiential learning opportunities available to its undergraduate students. Currently, the university is approaching the end of the second year implementing a five-year Quality Enhancement Plan (QEP) focused on integrating experiential learning opportunities into the upper-division undergraduate curriculum. This project, completely student driven, provided the QEP team with valuable perspective on the ways in which experiential learning can derive organically from student experiences in addition to faculty-designed initiatives.

For the project team, the project was both educational and rewarding. They gained an in-depth review of the standards of the four surrounding states, identifying overlaps even among states that adopt different approaches to their educational standards. In the process, they had the opportunity to expand their own knowledge of new methods and tools to use in their future classrooms. This project afforded the team an opportunity to present their work at a state teaching conference during which they raised awareness about the need for greater community outreach to other districts. During the presentation, several attendees were eager to return home and create a working relationship with museums in their own communities. Finally, they experienced firsthand the value of a problem-based, collaborative experiential learning project that allowed them to connect what they learned in the teacher preparation program while helping a vital community learning resource solve a real problem.

Limitations

This project served two functions: the first, as an educational experience for the project team (conducting service learning with a local community organization) and the second, the project itself (improving the accessibility and utility of the museum's exhibits). Several factors limited both project functions. Because this project was developed and driven by the student project team, the planning stages moved very quickly into the action phases, reducing the team's ability to work with the director to emplace more formal assessment. From a research perspective, the most significant limitation then is the lack of a formal mechanism for assessing any improvements the research team helped make to the museum's accessibility for local teachers or learning for local children. Because it was beyond the scope of this project as a service learning experience, the project team was not able to observe or formally study learners interacting with the exhibits at the museum; however, their efforts have provided an excellent future research opportunity for a graduate research team at the university. When collaborating with others on a project of this size, timing is critical. Balancing the schedules of multiple team members and the museum director within the span of a single semester limited much of the team's communication to email, potentially reducing the impact of the collaborative nature of this project.

Implications

In many college education courses, preservice teachers learn about bringing real world experiences into the classroom but are often never given the opportunity to gain the necessary experience in doing so. Offering preservice teachers the opportunity to experience learning outside of the college classroom will help provide valuable knowledge that can be incorporated in their future classrooms. Reflection on project- and problem-based activities is critical to future application of learning (Strevy, 2014). In this case, the preservice teachers not only completed a reflection for their methods class, they also expanded and extended that reflective process by presenting to students and faculty during an Honors program colloquium and by articulating their goals, process, and results for this text.

The preservice teachers that participated in this collaborative, project-based experiential learning opportunity, as Eyler (2009) predicted, gained deeper understanding of science concepts by experimenting with the museum's activities, and they exercised their creative, critical thinking skills when adapting the museum's activities to fit the educational standards of several states. These real-world practices also assist teachers in gathering more confidence in their flexibility to meet the needs of their students' learning styles and "encourage

them in learning" (Gao, 2015, p.437). For those lacking confidence in STEM education specifically, ISEIs provide an authentic learning environment for experiential learning and inspire university-community collaborations.

Gao (2015) insisted that one of the best ways to prepare preservice teachers for the future is to have them work closely with different community partners who have mutual goals, so teachers can be better equipped for the learning challenge ahead. By reaching out to create partnerships with local businesses or organizations, preservice teachers are given the tools needed for success. The collaboration between the university, public schools, and local ISEIs forges a partnership that makes learning accessible outside of the traditional classroom. The community facilities provide resources, emphasize enrichment, ignite curiosity, and generate student interest in class content. Furthermore, teachers can create lessons based on the institution's activities to reach the students' diverse learning styles. In many cases, as in the museum partnership formed during this project, the facility may also offer the chance to bring its educational resources into the classroom when logistical or financial concerns regarding field trips are an obstacle. Such partnerships foster working relationships that enhance community members' awareness of local resources while providing enrichment for college education courses.

Conclusion

Working with a local museum helped the preservice teachers understand the importance of working with the community and incorporating local resources into the traditional learning environment. Across the grade levels, experiential learning motivates students to learn, engages them in the content, and raises metacognitive awareness through reflections that focus on the learning process (Strevy, 2014). Project-based learning, or PBL, has laid a solid learning foundation for both teachers and students. PBL enables students to be accountable for their own learning through authentic learning situations that require students to check for understanding through questions, learner-centered investigation, and, quite often, teamwork. PBL incorporates hands-on learning and real-world application. Service learning provides students with the opportunities to direct their own learning both formally and informally. It makes learning more meaningful, personal, and engaging and also allows students to connect classroom content to real world situations.

According to Griffin (2004), instruction that makes links between school and museum learning explicit, genuine, and continuous affords real opportunities for school students to have enjoyable learning experiences in both settings. Therefore, community partnerships with local educational resources provide both preservice teachers and classroom teachers the necessary tools to ensure success with experiential learning. Such collaboration gives teachers who feel they are not well equipped to teach STEM-related content inside a traditional classroom setting the support needed to teach the content outside of the classroom.

This project established relationships between the university, local school districts, and the museum; these relationships have enhanced the college education courses, provided experiential learning opportunities for both preservice teachers and local students, and highlighted the informative, interactive, and individualized learning activities the museum has to offer. Teacher preparation programs anywhere, from large urban centers to rural communities like ours, can foster productive relationships with community organizations to provide experiential learning opportunities for students - even undergraduate and graduate students. Meaningful, challenging, community-oriented experiential learning activities for preservice teachers better prepares them for addressing the needs and interests of their future students.

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Scott D. Wurdinger's *The Power of Project-Based Learning: Helping Students Develop Important Life Skills*

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In his book *The Power of Project-Based Learning: Helping Students Develop Important Life Skills*, Scott Wurdinger asserts that the system of higher education has developed an overemphasis on education's "what" (transferring information to students) at the expense of education's "why" (turning students into motivated, lifelong learners). According to Wurdinger, this inversion of focus has led to an expansion in bureaucracy, limiting the time available to college faculty to focus on their role in the institution: that of "creating a stimulating learning environment for students." Wurdinger observes that this is not a problem unique to post-secondary education, but that the development of numerous assessments which only "help students become better memorizes and test takers" is also stifling transformative and meaningful education at the K-12 level.

Wurdinger admits that he felt unengaged and bored in his own undergraduate education with classes that relied heavily on a traditional lecture method. It was only when he found opportunities for himself to go out and experience first-hand what he was reading about in his classes that he felt involved and excited about his own learning. He says that he also learned valuable life skills in the process, such as collaboration, time management, communication, problem solving, and responsibility. Since those experiences, he knew he wanted his career to focus on helping students become actively involved in their own learning so that they can find and follow their passions while in school. In that capacity, Scott Wurdinger is a professor of experiential education and leadership studies at Minnesota State University.

After this indictment of the education system in the first chapter of his book, he turns to project-based learning as a way to better engage students, citing studies on the positive relationship between project-based learning and deep learning and the development of life skills useful outside the academic environment. He notes from his own experience working with graduate students, undergraduates, and high school students that learners tend to respond with excitement at the opportunity to link their education in the classroom with their own interests. He recommends asking students to think about big-picture questions like what excites them in their career, what changes they would like to see in their community or on a global level, and for what they would like to be known by their peers. Having students consider these questions and using the information they learn about themselves helps them select projects which have personal meaning for them.

In the second chapter, Wurdinger provides a brief review of the literature surrounding the theory behind and evidence for the effectiveness of project-based learning. However, he does not dwell on this for a particularly long time and returns to practical considerations. As he points out, there is ample evidence of the usefulness of project-based learning in both K-12 and college environments, and his focus is on providing a practical guide to college instructors who want to implement it in their own classrooms. There are few such practical guides in existence for college instructors. Wurdinger cautions the reader that changing from lecture to project-based learning will require a shift in classroom culture that removes much of the control from the instructor. However, he provides some advice on managing this shift from his own experience, as well as how he handled concerns that arise early in the process, such as guiding students to pick appropriate projects and formats for presenting what they have learned, managing groups, and time constraints in classrooms using project-based learning.

The third chapter returns to one of the major themes in Wurdinger's book: that project-based learning develops important life skills. The U.S. Secretary of Labor's Commission on Achieving Necessary Skills (SCANS) issued a report in 1991 titled *What Work Requires of School*, detailing its findings on what skills employers found essential in their new hires from college and high school graduates. Wurdinger includes the complete list of these skills, some of which include creative thinking, problem solving, sociability, and integrity. Wurdinger notes that now, 27 years after the original report, educational institutions are still not doing enough to foster the growth of these skills in their students. Because students learn skills by practicing them, project-based learning ought to improve student employability by incentivizing the students' skill development as a direct consequence of the projects. Indeed, Wurdinger notes that this is the case, and provides statements from students who engaged in project-based learning and said they felt more comfortable with their ability level in those skills. As he provides examples of these students throughout the book, he also notes that, in many cases, these projects helped students find topics about which they were passionate and, in some cases, directly led to the students finding employment working in fields related to their projects.

The fourth chapter centers on a subset of project-based learning that Wurdinger has employed in his classrooms: place-based learning. Place-based learning involves having students pick projects that have some impact on their communities. This combines the pedagogical advantages of project-based learning with encouraging students to develop into active and involved citizens in their communities. In this chapter, Wurdinger tells the stories of several such student projects, including a class that set up a healthy snack shop in their school when they noted that there were few healthy options, in the process learning about nutrition and running a small business. Another student found a way to measure how electricity was used at the university and proposed a plan for decreasing wasted usage. This student organized a meeting with the vice president of facilities, who worked with him to install motion-sensing lights in most classrooms to cut down on waste. In the process, this student learned research skills as well as how to organize information and make a compelling argument in presentation format. These are just a couple examples from that chapter. It becomes clear over the course of the examples that these projects required a great deal of work on the part of the students as well as the instructor, but that students were excited and motivated to carry out projects they found interesting and relevant to their lives. Along the way, it is clear that the students also developed the skills named by the SCANS report mentioned in the previous chapter.

The next chapter focuses on how the progress of the students was tracked and how their projects were assessed. It is a chapter written with practicality in mind, using the example of one student, "AK," who designed an honors mentor program for Minnesota State University and was offered a job running this program at the University of Iowa when she presented it at a conference. Wurdinger makes it clear that it is important not to design assessment tools for the projects as busywork for the students. The assessment methods chosen should help provide structure to the project, help the student get feedback on their project while it is in progress, and help the student self-assess what they have learned at each point. Wurdinger advocates having students give oral reports to their class early in the project process in order to get feedback from their classmates to help guide their project in its early stages. This also helps the instructor assess early on if it is feasible to complete the project in the time allotted. Wurdinger notes that many students are particularly excited about projects which would require more

time than available in the class; in the spirit of allowing students to work on what they are passionate about, Wurdinger then allows them to be assessed on how much they can complete by the end of the semester and to continue the project after the course has concluded. This chapter provides the forms on which "AK" reported on her project while in progress, and one can see how Wurdinger encouraged her process of self-assessment.

Finally, Wurdinger provides a list of some of the institutions (both high schools and colleges) that have implemented project-based learning in their classrooms and key points about how their programs are structured to provide some insight into what institution-wide, project-based learning can look like.

The Power of Project-Based Learning: Helping Students Develop Important Life Skills by Scott Wurdinger fills an important niche in the literature. There are many research studies on the effectiveness of project-based learning, however guides for college educators to actually implement these methods are lacking. In this book, Wurdinger, with a constant eye towards practicality and drawing on his own experience in higher education since 1992, demystifies the process of introducing projects into the classroom. This book would make excellent reading for anyone interested in starting out in project-based learning, but unsure where to begin.

Ross Cooper and Erin Muphy's *Hacking Project-Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom*

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Cooper and Murphy's *Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom* (2016) is a concise guide to effective implementation of project-based learning. Cooper and Murphy's hacks sparked my mind with ideas for and arguments against a teaching delivery method unlike my own educational experience and well out of my instructional comfort zone. Clearly I am not alone in this reaction as each hack includes an "Overcoming Pushback" section that addresses the best arguments against project-based learning. One issue facing post-secondary educators interested in project-based learning is the issue of contact hours. Typical undergraduate courses are approximately fifteen weeks in length and meet for about three hours per week. Compare this with primary and secondary education classes that meet up to five hours per week for potentially twice as many weeks. Despite the unaddressed issue of contact hours Cooper and Murphy's hacks constitute the most generalizable, from primary/secondary to higher education, enjoyable, and easily digestible guide to project-based learning I have found.

As described by Cooper and Murphy, well–implemented project-based learning (PBL) experiences require a good deal of work prior to rollout, as well as potentially unanticipated work that arises throughout the project. This latter point is enough to cause anxiety for many instructors, but then again, effective lectures often require a good deal of work upfront as well as updating and spontaneous explanation if questions are encouraged. Perhaps one of the greatest challenges facing proponents of PBL is demonstrating that it may not actually be more work, it may just be different work. Work that is arguably more rewarding for students and instructors as it "not only [satisfies] what is needed for 'the test,' but [digs] significantly deeper ... [providing] your students with opportunities to uncover [knowledge] ... through exploration ...." (p. 26).

One of the best aspects of Cooper and Murphy's PBL guide is its format. I read Cooper and Murphy's hacks cover to cover; however, I easily image instructors successfully jumping in around hack 6, especially if they are familiar with "course goals" and "learning outcomes," which roughly translate to Cooper and Murphy's "high impact content" and "high impact takeaways." Additionally, each hack is organized in the same way: 1) a problem is introduced, 2) the hack is presented as a solution to this problem, and then my favorite sections, 3) "What You Can Do Tomorrow," 4) "A Blue Print for Full Implementation," 5) "Overcoming Pushback," and 6) "The Hack in Action," address potential questions and concerns that may arise while implementing PBL.

The first five hacks introduce readers to the concept of PBL and the pedagogic principles behind PBL strategies. At the worst of moments these hacks felt like slogging through a sales pitch; however, this may be due to my familiarity with PBL and eagerness for the actionable "hacks" that followed. The conceptual background knowledge presented in the first few hacks may be necessary for PBL novices to not only embrace the concept of PBL but to fully understand the nuances of the actionable hacks. There is also a sense, in the first hack in

particular, that Cooper and Murphy outsourced discussion of several topics by referencing multiple books as the source for additional details. As a result, several conversations felt unfinished. The last thing instructors need is a short book that requires several additional books to be of any use. Fortunately this was not the case with the remaining five hacks.

To be fair some of my issue with hacks one through five may have more to do with my own sense of impotence and frustration with inspiring students to want to learn. Luckily, hack 1 identifies the necessity and challenges of inspiring "a culture of inquiry and creativity" (p. 19) and student buy–in is addressed throughout the hacks. Additionally, this first hack introduces readers to several themes repeated throughout the guide, such as prioritization of knowledge and skills necessary for professional success in a nation where manufacturing jobs, requiring memorization and duplication, seem to be diminishing (https://data.bls.gov). Furthermore, at a recent conference symposium highlighting "STEM Workforce Development for a Modern Massachusetts" (Warner, Soares, & Wesley, 2017) a panel of Massachusetts STEM industry leaders conveyed a hiring preference for critical thinkers and innovators who, as Cooper and Murphy describe, ask "good questions" (p. 19). In terms of student learning and academic success, Cooper and Murphy astutely stress the importance of fostering student relationships with each other, instructors, and broader learning networks that include experts. PBL experiences incorporate networking and relationship building in a way that lecture–style classrooms simply cannot or, at least in my experiences as a student and instructor, have not.

Shared classrooms traditionally designed for lecture-style instruction pose an additional challenge to PBL in higher education. Nevertheless, instructors are encouraged in the first hack to organize classrooms, ideally with input from students, away from lecture-style rows of individual seats toward collaborative, grouped seating. Instructors are also encouraged to fill classrooms with materials that stimulate inquiry, a suggestion that resonates with developmental psychology theories of effective learning through "dynamic" interaction with one's environment (Piaget, 1961, p. 275). Lastly is the theme of learner–, rather than teacher–, centered environments, activities, assessments, and feedback that promote learning through creation, iteration, and "productive struggle" (p. 19). My favorite Cooper and Murphy suggestion relating to this last theme is the creation of a "failure board" designed to destigmatize failure (p. 20) and promote productive struggle, which allows students to discover important content on their own. I am again reminded of Piagetian theory, which suggests "every new problem provokes a disequilibrium ... the solution of which consists in a re–equilibration" (Piaget, 1961, p. 281). Setting the tone and creating a space for disequilibrium and re–equilibration may be paramount to successful PBL experiences and may be critical for the success of at–risk and lower–income students (Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018) who, being less familiar with growth mind–sets, may not see "struggles as learning opportunities" (Sisk et al., p. 2).

One of the more challenging hacks to apply to higher education is hack 3, which emphasizes the selection of "High Impact Content" that "lends itself to PBL" (p. 39). Read this as "slash and burn" your content, something higher ed faculty often are reluctant to do. It may be less painful to part with a unit or two, when one really considers which content a) "is essential to learn," b) "offers opportunities for exploration and creativity," (p. 40), and c) "promotes learning through transfer" (p. 48). Considering these points I am again reminded of Piaget, who may have been a PBL advocate before PBL was coined, when he wrote:

> From a developmental point of view, the essential in the act of thinking is not contemplation ... but the action of the dynamics ... for instance, to disconnect a motor in order to understand its functioning, to disassociate and vary a ... phenomenon, to understand its causalities. (p. 275)

Instructor anxiety surrounding content removal may be lessened when they realize that in PBL "essential" refers to content that students, who have successfully completed a course, should know and understand. It does not refer to basic facts necessary to understand more complex content. Or as Cooper and Murphy ask, "[is] everything you are teaching worth your class time?" (p. 41). Cooper and Murphy implicitly encourage instructors, whom I easily imagine to be those of us in the sciences (myself included), who have said "but there are so many facts to cover," to trust students to learn basic facts and vocabulary on their own. This basic content is acquirable through familiar teaching methods such as assigned reading and multiple–choice quizzes.

Cooper and Murphy argue that instructors who get to know students and tap into their knowledge of students will be able to anticipate which concepts students can learn on their own and which require direct–instruction. For example, in my biological psychology class we study the concept of epigenetics, which describes how experience and the physical environment influence biology. I consider this concept essential, in the vital knowledge sense, for psychological science students to learn. In order to grasp epigenetic mechanisms students need to understand basic neuroanatomy and neurophysiology, which are essential processes, in the basic knowledge sense of the word, that typically require direct–instruction. Major and minor divisions of the nervous system, on the other hand, are basic knowledge that students could extract via textbook reading and self–quizzing. I currently include all three topics in my lectures and in doing so spend too much time on basic knowledge while vital knowledge, such as epigenetics, receives only passing mention. In short, class time should be reserved for essential, not basic, content that requires direct instruction. If you are not convinced, spend some time with hack 4 in which Cooper and Murphy explicitly encourage instructors to trust that students will learn basic content on their own. You may realize, as did I, that your efforts to meet students where they are with difficult to grasp essential content have lowered your overall expectations. In other words, we may have been expecting too little of students in all content areas, including basic content, instead of just those content areas that are appropriately difficult considering grade level.

This brings us to hacks 7–10, which give instructors permission to directly instruct students on difficult concepts (the comforting reassurance of lecture slides!). Hacks 7 and 8 illustrate the usefulness of regular check-ins, or "conferences" (p. 97), and guidance through individualized mini-lessons that may be pre-planned "'just–in–time' instruction ... that can serve as benchmarks to help keep the class on pace," (p. 101) or spontaneous direct instruction for one or more students as they work through difficult concepts. These hacks envision a learning experience in which instructors no longer "simply react to finished projects" with "end–of–the–road feedback" that students may not be able to transfer to future learning or work (p.87). Instead, Cooper and Murphy advise "[making] feedback everyone's business" (p. 87). Effective peer–feedback and self–reflection, like many skills, may require a bit of upfront discussion, modeling, and reminders for students and quality "feedback should articulate how [students] are doing and help [them] to decide what [they] should do next" (p. 91). It should then be very clear to students and their instructors a) if students are learning, b) what they are learning, and c) if they are demonstrating what they are learning. One thing I have noticed is that students do not always know how or when to ask for help. A potential bonus to learning about and practicing quality feedback is that students may learn to ask effectively for timely help rather than not asking at all or waiting until mid– or end of semester when they may have fallen too far behind.

Hack 7 further challenged me to consider myself teaching exclusively through mini-lessons. I am already using 60–80% of the tips and practices discussed by Cooper & Murphy, yet I struggled to visualize myself teaching a class of thirty thorough mini-lessons and supervision of small group work. At some point in the previous eighty-seven pages, however, my thinking shifted and I stopped doubting the applicability of PBL to my classes. Instead, I envisioned myself using class time for conferencing, individualized peer– and instructor–feedback, and lecturing only when absolutely necessary. Letting students struggle productively and turn to each other and provided materials (i.e., the textbook, lectures slides)

for explanations: an active and engaging pedagogic experience that places students at the helm and me, their guide, on the side stepping in with direct instruction for only the most elusive of topics. Now a mentor, who does not need to lecture every class, I am able to focus on providing feedback and guidance while learning unfolds naturally. This is a tantalizing prospect that Cooper and Murphy, thankfully, offer clear advice: keep mini-lessons short, ten to fifteen minutes, which is feasible when one does not try to review all possible content but instead focuses on one to two "vital [concepts] students need to know to work more productively on their own ...." (p. 99).

Shifting responsibility for learning from teachers to students, PBL experiences have the potential to teach autonomy and collaboration. Consequently, PBL courses can seem like more work, at least initially, than lecture and exam preparation. When, however, was the last time you truly enjoyed grading exams or had the sense students understood and would retain course content based on exam performance? PBL by no means teaches to a test, and tests are rarely included in well–implemented PBL experiences, which may be the hardest sell of all for undergraduates who are increasingly preoccupied with "what's going to be on the test." These students seem simultaneously under– and overconfident in their academic and intellectual abilities. PBL experiences provide students opportunities to test their own knowledge and abilities and to practice and demonstrate scholarship and critical thinking. For these reasons alone PBL is a tool worth considering for higher education. If you do consider implementing PBL in your classes, take it from someone who has experienced both success and failure with well– and poorly–implemented PBL in her classes and read Cooper and Murphy's hacks, particularly 4 and 5, which differentiate projects from PBL experiences, or as I fondly call them "My First Mistakes in PBL."

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Bob Lenz, Justin Wells, and Sally Kingston's *Transforming Schools: Using Project-Based Learning, Performance Assessment, and Common Core Standards*

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Drawing on the example of the nationally-recognized Envision Education Schools, Bob Lenz, Justin Wells, and Sally Kingston provide a practical guide for educators who want to implement project-based learning (PBL) by blending the practice with Common Core-aligned assessment to create an environment that encourages meaningful learning. While *Transforming Schools: Using Project-Based Learning, Performance Assessment, and Common Core Standards* emphasizes high school redesign, it is relevant for educators at any level who aspire to reimagine America's schools to better prepare students for college, career, and life in the twenty-first century. Classroom practices that encourage thinking critically, communicating clearly, and solving complex problems are beneficial to students of all grade levels, including higher education. The book contains seven chapters followed by a substantial appendix of supplementary material as well as a companion DVD that shows how to integrate deeper learning strategies in the classroom and describes key elements of the Envision School approach. The videos on the DVD (which can also be viewed online) are referenced in specific chapters throughout the book.

Lenz, the founder and Chief of Innovation for Envision Education, is a nationally-recognized leader in high school redesign, deeper learning, project-based learning, twenty-first century skills education, and performance assessment. Lenz directed Envision's efforts to create Envision Learning Partners, which guides the national conversation on school reform and student access. Wells was a faculty member of the first Envision school. He helped to develop Envision's graduation portfolio and defense program. Kingston served as executive director of Envision Learning Partners.

The book begins with the affirmation that what is imperative to success is not what students know but what they can do with what they know. The introduction, "Why Learning Must Go Deeper," introduces the authors' concern that the world is changing and our schools, which have scarcely changed in the past 100 years, are not keeping up. Lenz, who founded the first Envision School over ten years prior to the book's publication, declares the text as a book about school design. Case studies of Envision Schools are cited to show the schools' success in preparing students. The organization Envision Learning Partners (ELP) was founded in 2001, the same year as the No Child Left Behind (NCLB) legislation. According to the authors, although NCLB demanded accountability, it left educators searching for an educational vision. The remainder of the introduction defines the competencies of deeper learning, a term that Envision Schools (and others) use to outline what students should know and be able to do. The practice of depth over breadth, backward design principles, and the philosophy of holonomy—a term based on the work of Arthur Koestler—are credited for evolving the school's concept of deeper learning. The

authors claim that one of the highest forms of learning is creation as it allows for the deepest expression of understanding. They believe that creation should always be the conscious end goal, and school design should pay equal attention to our student's present and their future.

The book answers questions about how and why Envision schools were instituted, and addresses concerns—shared by all educators—that can be alleviated by their design principles. Chapters one and two outline the goals of the Envision Schools and the remaining five chapters provide detailed methods to reach these goals. Each chapter builds upon the previous one to help readers understand the goals, purpose, and methods of the Envision schools. The first two chapters introduce the backward design of the Envision schools. "Mapping backwards" requires identifying a learning goal and then mapping out the steps to reach said goal. It requires examining acceptable evidence that students have attained desired understandings and proficiencies. Envisions schools started by envisioning the graduate. It is through this process that their Deeper Learning Student Assessment System emerged.

The structure of the Envision's deeper learning student assessment system is built around a culminating assessment, the creating of a portfolio and successfully defending the portfolio as a criteria for graduation. The goal of Envision schools is that all students graduate from college. The portfolio allows students to reflect upon the meaning of their work and teaches lessons that can be carried over into both college and the real world. The authors use several compelling analogies when discussing the designing of a standards-aligned performance assessment system. They ask readers to consider the test students must pass in order to obtain a driver's license—the process of getting behind the wheel with an assessor from the Department of Motor Vehicles. Students have to show they can drive by driving. The authors also pose a question about what makes a good athlete; their response explains that a player's standing is not based solely upon the games they win, but also by their performance. These parallels are used to show the significance of the portfolio assessment that requires students to demonstrate what they can do with what they have learned, shifting the focus of education from rote learning to higher-order thinking skills. Students are required to show and defend their mastery of skills. Graduates of Envision schools are ready for success in college and future careers because they know, do, and reflect. A high school graduate profile was created to identify the skills necessary for students to master in order to successfully defend a unified assessment, the portfolio.

The Deeper Learning Student Assessment System includes evidence of academic work, rubrics, and reflection. The portfolio is centered around five artifacts and based upon the core competencies of research, inquiry, creative expression, and analysis. The portfolio defense is a significant component of the portfolio assessment system. It allows educators to evaluate skills by observing them in action. Preparation of students for this summative assessment is a step-by-step process over multiple years. Performance assessments are built into the design of the school. Chapter 3 uses a case study, "The Campaign Ad Project," to defend the efficacy and to illustrate the features of project-based learning. The authors define project as "an act of creation over time," and they emphasize that "the desired goal cannot be realized in a single simple move." This chapter is primarily geared towards defining PBL and how it addresses the three main goals of teachers at Envision schools. Project-based learning is blended with Common Core-aligned performance assessment and is focused upon developing critical thinking, communication, and collaboration. Although the authors provide a specific case study, they acknowledge that there are many different ways to integrate PBL into a school's curriculum. The Campaign Ad Project that the authors use as an example was assigned during the fall of an election year, so its significance was immense. Revisiting the importance of a step-by-step approach, discussion of this project includes benchmarks and several formative assessments. This assessment design allows for feedback and revision, both vital to student success.

Implementing project-based learning is not without its challenges. It requires school-wide cooperation, commitment, and focus. Integrating skills authentically, demonstrating their importance, practicing them frequently, and assessing them rigorously are paramount. Transforming a school's values and mission requires a strong and omnipresent culture that is promoted and supported by all stakeholders. Referring back to the philosophy of holonomy, the school community must work collaboratively and develop a growth culture. The final chapter of the book, "A Call to Action," provides starting points for transforming a classroom, school, and school system. The need for changes in school culture and structure are emphasized. All stakeholders must be committed to the process. Teachers must be devoted to engaging students and compelling them to want to learn by helping them understand the importance of what they are learning.

Lenz and former colleagues, Wells and Kingston, provide a comprehensive guide to project-based learning that can be utilized to ensure deeper learning across all grade levels. College and career-readiness has been an incessant concern for decades. Many high school graduates are not prepared to meet the challenges of higher education or careers in today's global society. Project-based learning, driven by inquiry, gives students a platform to demonstrate understanding of content. The practice of project-based learning would be an especially powerful tool in higher education where students are challenged with directing their own learning to solve problems by exploring and developing their ideas. *Transforming Schools: Using Project-Based Learning, Performance Assessment, and Common Core Standards* is a valuable and accessible resource for implementing project-based learning.

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