Digital Art Making as a Representational Process

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In this article I bring artistic production into the learning sciences conversation by using the production of representations as a bridging concept between art making and the new literacies. Through case studies with 4 youth media arts organizations across the United States I ask how organizations structure the process of producing autobiographical digital art through a focus on representational tasks and how learning can be traced by examining youth artists’ representations over time. Using a distributed cognition framework I analyze data on the process of making digital art in terms of the macro and micro tasks performed in order to identify occasions for external representation construction and use across organizations. I then examine how individual youth engage in these macro and micro tasks by producing representations that demonstrate their understanding. These analyses show that youth media arts organization production processes engage young artists in a representational trajectory that begins with developing a story about the self, moves toward a focus on how the tools of the medium afford representation of that story, and culminates in digital representations that reflect an understanding of the relationship between story and tools.

Arts learning in schools has suffered from what Julian Sefton-Green (2000) has described as romanticizing creative production by children. The argument goes something like this: Children are inherently creative, and the role of educators is to encourage young people to express themselves through art. To criticize this
art is to criticize the children themselves. Proponents of academic and vocational approaches to schooling take this kind of production to be nonrigorous, lacking standards or relevance to important learning goals. Recent efforts to revive the value of arts and learning have pushed the arts as vehicles for success in traditional disciplines—playing music makes you better at math, doing drama makes you a better reader (Catterall & Deasy, 2002). The arts as academic disciplines are stuck between advocates who focus almost exclusively on the psychological benefits of art making, those who argue for the instrumental value of the arts, and critics who see this focus as nonacademic and therefore not belonging in schools (Fleming, 2010). The arts, Sefton-Green (2000b) argued, “are still in the process of restating their claims to be proper subject disciplines in this context” (p. 9). This lack of clarity has kept the focus in the arts away from learning, from asking what students learn from their participation in artistic production processes. As a result, arts-based disciplines fail to make their mark in formal learning settings. The devaluing of artistic production proves particularly problematic for young people who struggle with mainstream academics but flourish when engaged in artistic production tasks (e.g., Catterall, 2006; diSessa, 2004; Heath, 1993), especially in the context of out-of-school settings (Calabrese Barton & Tan, 2010; McLaughlin, Irby, & Langman, 1994; Soep, 2006; Wiley & Feiner, 2001; Worthman, 2002).

In this article I bring artistic production into the learning sciences conversation by using the production of representations as a bridging concept between art making and the new literacies. Through case studies with four youth media arts organizations (YMAOs) across the United States I ask how organizations structure the process of producing autobiographical digital art through a focus on representational tasks and what function these representations serve emerging artists. Using a distributed cognition framework I analyze data on the process of making digital art in terms of the macro and micro tasks performed (Spillane, Halverson, & Diamond, 2001) in order to identify occasions for external representation construction and use across organizations. I then examine how individual youth engage in these macro and micro tasks by producing representations that demonstrate their understanding. These analyses show that the YMAO production process engages young artists in a representational trajectory that begins with developing a story about the self, moves toward a focus on how the tools of the medium afford representation of that story, and culminates in digital representations that reflect an understanding of the relationship between story and tools. The process mirrors the progressive formalization of representations valued in progressive math and science education (Azevedo, 2000; Enyedy, 2005; Lehrer & Pritchard, 2002), which results in metarepresentational competence (MRC) that marks deep engagement with complex content (diSessa, 2004). Learning in and through artistic production is as deep and robust as the constructivist learning experiences espoused throughout the history of this journal.
ARTS LEARNING IN AND OUT OF SCHOOLS

The arts in education have suffered from a lack of definitional clarity and, as a result, a lack of credibility as serious academic disciplines. There has historically been a tension between liberal goals for arts education (which include self-expression, feeling, engagement, creativity, and ownership) and utilitarian goals (which focus on form, technique, and experience; Fleming, 2010). Recent scholarship has advocated for a balance between these perspectives that embraces self-expression but maintains some elements of formalism that allow for assessment and evaluation of student work in learning settings (Fleming, 2010; Sefton-Green & Sinker, 2000). In addition to defining the purpose for arts in education is a question of whether one ought to consider “the arts”—typically dance, music, drama, and visual art—as a singular discipline or as multiple disciplines (Fleming, 2010). It is tempting to group the arts together and to say of all what can be said of one, but although common threads tie these disciplines together, each subject also has a distinctive history and trajectory for learning (Fleming, 2010).

Much of the recent work on thinking and learning in and through the arts has focused on visual art as a discipline (Hetland, Winner, Veenema, & Sheridan, 2007; Sheridan, 2011; Yokochi & Okada, 2005). The appropriation of digital technologies into arts disciplines has hastened the call to rethink the traditional categorization for the 21st century (Fleming, 2010). Sheridan (2011) has argued that digital art production opportunities allow one to break out of these disciplinary boundaries and has described learning in the arts more broadly as “habits of thinking” embedded within cultural, contextual practices (Sheridan & Gardner, in press). Out-of-school arts organizations in particular have embraced digital art production as a discipline that affords both liberal and utilitarian goals for arts education. These organizations are examples of the “hybrid settings” that Calabrese Barton and Tan (2010) described: learning environments with set structures and rules for participation that maintain a decidedly youth-oriented perspective that is free from many of the pressures and constraints that K–12 schools are bound by.

Within these hybrid settings for producing digital art researchers have begun to outline what and how youth participants learn. Soep (2006) described “episodes of critique” as evidence of learning as young people produce digital videos and documented the ability to give and receive critique as an outcome of participation. In her work with an after-school game design and three-dimensional modeling program, Sheridan (2011) found that youth participants’ learning outcomes echo the studio habits of thinking found in more traditional visual arts classrooms, though the out-of-school context embraced envisioning possibilities, whereas classrooms embraced observation as a learning outcome. The DUSTY project, an Oakland-based after-school program focused on digital story production, focuses on the “folders of work” that young people produce as they create digital stories and describe how authorial decisions are made over time and how
these decisions affect the final product (Hull & Katz, 2006; Hull & Nelson, 2005; Nelson, Hull, & Roche-Smith, 2008).

Bringing digital technologies into the conversation on the arts and learning blurs the line between the traditional arts disciplines, a much-needed merger for the arts in learning (Fleming, 2010). In addition, the study of digital production as art begins to merge the arts in learning with literacy, specifically the field of “new literacies” (Lankshear & Knobel, 2003; New London Group, 1996). A new literacies perspective takes a decidedly production-oriented focus toward literacy learning and expands the modalities for expression to include a variety of audio-visual media. So what is literacy and what is art? In some sense, this question is answered by the way the learning environment defines its work with young people. The organizations with which I worked defined themselves as arts organizations and conceptualized their processes in terms of helping young people to become artists. My research focuses on the work these organizations do with young people, and so my analysis is structured in terms of teaching and learning artistic production.

THE ROLE OF EXTERNAL REPRESENTATIONS IN SENSE MAKING

Whether one considers digital production as art or as literacy, the concept of “representation” sits at the core of its practices. New literacies learning is defined as developing “understanding and competent control of the representational forms that are becoming increasingly significant in the overall communications environment” (New London Group, 1996, p. 61). In the arts learning world, producing art requires the “transformation of a material to a medium. Materials become media when they mediate . . . and to convert a material into a medium is an achievement” (Eisner, 2002, p. 80). In the learning sciences, the capacity to construct an external representation of a complex idea is the marker of intelligence across disciplines (Enyedy, 2005). Norman (1993) described abstraction and representation as the engines of cognition:

The ability to represent perceptions, experiences, and thoughts in some medium other than that in which they have occurred, abstracted away from irrelevant details. This is the essence of intelligence, for if the representation and the process are just right, then new experiences, insights and creations can emerge. (p. 47)

A distributed cognition perspective on thinking and learning can help to understand the role of external representations in sense making (Hutchins, 1995; Salomon, 1993). Distributed cognition shifts the “locus of knowledge” from inside the individual to within and among actor–tool–activity networks (Salomon, 1993). Understanding how people interpret and construct external representations using available tools over the course of systemic activity is a core aim of research.
described this research as “the examination of the role of material media in
which representations are embodied and in the physical properties that propagate
representations across media” (p. 266).

In a distributed cognitive system external representations function both as
tools to *think with* (Norman, 1993; Zhang & Norman, 1994) and as tools for
*expressing understanding* of complex concepts (Norman, 1983). Cox (1999) dis-
tinguished between external representations that are provided for learners to assist
in their understanding (presented or prefabricated representations) and the repre-
sentations that learners construct to demonstrate their own understanding or to
assist their own learning (self-constructed representations). Although much of
the research on the role of external representations in distributed cognitive sys-
tems has focused on learners’ use of presented representations, Cox argued that
constructing representations is of vital importance to understanding learning:

This activity represents more than a simple translation, for as Vygotsky observed,
when signs (language, diagrams, etc.) are included in an action, they do more than
facilitate manoeuvres that are impossible in the absence of the sign system. They
fundamentally transform action. (p. 347)

Reisberg (1987) described external representations as both *aides memoires*
(expressions of understanding that extend human cognition) and *aides pensées*
(tools with which to develop new understanding). In both cases “one can learn by
turning one’s [internal] representations into stimuli—i.e. by externalizing them”
(p. 288). How learners construct external representations of complex ideas and the
value of this activity in building a robust understanding of a concept or domain is
of great interest to educators and researchers who value a constructivist approach
to learning.

**Representations in Math and Science Learning and Instruction**

Producing external representations that demonstrate mastery of a topic is often
taken as evidence for learning in a constructivist-oriented curriculum. The learn-
ing sciences’ use of external representations for sense making in the context
of schooling has thus far been focused mainly on research in mathematics
(Enyedy, 2005; Lehrer & Pritchard, 2002; Lehrer & Schauble, 2000, 2003;
Zhang & Norman, 1994) and science (diSessa, 2004; Lehrer & Schauble, 2003;
Puntambekar & Goldstein, 2007). The ability to evaluate and construct represen-
tations in physics, for example, is considered a high-level skill and one that is
essential for students to master. diSessa (2004) argued that successful science
learning requires the development of MRC, which includes the ability to build,
use, critique, and judge the relative value of external representations for commu-
nicating conceptual meaning. He provided some evidence that students possess
an innate capacity to develop and display MRC in science and that these habits of mind can provide a link to what scientists do as part of their professional practice. Furthermore, he argued that working from students’ MRC may be more engaging for students than traditional science instruction.

Enyedy (2005) described progressive symbolization, the process by which teachers and students work together toward deep understanding of math concepts through the iterative development of external representations. He demonstrated the development of mathematical understanding using multimodal resources in service of a collective consensus and representational system. Whereas diSessa described MRC as developmental and, in some sense, innate, Enyedy described progressive symbolization as learned through the collective design of representational systems. In both cases the outcome of these learning experiences is both the development of external representations and an understanding of the role these representations play in communicating meaning. Most recently, Calabrese Barton and Tan (2010) argued for video production as evidence of learning, agency, and positive identity in science. Their work highlights how young people whose identities are considered incompatible with traditional school-based science identities communicate complex insights into science and express positive identification with science through the creation of digital videos. This research begins to unpack how representation in digital art can “localize the seemingly remote [scientific] concept” (p. 223) through “juxtapositions of scientific thinking with emotion” (p. 217). Their work, however, does not focus on the representational tasks involved in video production and how this process is related to students’ understanding of science.

External Representations and Artistic Production

The arts are often considered “enrichment” activities in schools. Despite their direct parallels with scientific investigation (Gardner, 1973) and the role that artistic and personal creativity play in building representations for sense making in science (Azevedo, 2000; Calabrese Barton & Tan, 2010; diSessa, 2004), the arts have not warranted the same prestige in discussions of formal learning. Scholars who study the arts and education have recently begun to take up the challenge of bringing the arts into the formal learning conversation. Hetland et al.’s (2007) work developing “studio habits of mind” describes learning in successful visual arts classrooms as evidence of 21st-century skills and activities that constitute evidence of success in formal education. Another approach is to use the concept of representation to demonstrate the similarities between learning art and learning in academic areas. From this perspective artistic production provides a rich context for understanding distributed cognition and the role of external representation (Eisner, 2002; Gardner, 1973). Like any representational domain,
“getting smart” in the context of producing art “means coming to know the potential of the materials in relation to the aims of a project or problem” (Eisner, 2002, p. 72). Art making is a creative process intimately tied to the production of external representations (Csikszentmihalyi, 1996). Hasirci and Demirkan (2007) described mental images and external representations as “essential in investigations of creativity” (p. 262). The capacity to build the right representation in the right situation is a marker of creative expertise (Hayes, 1989). There are strong parallels between the role external representations play in creative acts in art and in science. In both domains creativity requires convergent and divergent thinking; the ability to construct representations that are both unique and recognizable is the marker of an accomplished artist and/or scientist (Gardner, 1973). In fact, diSessa (2004) argued that designing representations is a fundamentally creative endeavor, “a venue in which creative and artistic skills are at a higher than normal premium” (p. 300).

Artistic production is thus primarily concerned with creating representations. Learning art, that is, learning how to construct and critically evaluate these representations, requires scaffolded instruction in the representational process. Arts-based learning environments engage participants in authentic production tasks guided by explicit pedagogical practices. Eisner (2002) described student artists in the context of formal instruction as “work[ing] meaningfully on the creation of images” (p. xii). Research on artistic production in youth arts organizations has demonstrated that youth are highly invested in the meaningful construction of images with explicit attention to how these products will be received by a public audience (Heath, 2000; Soep, 2006). This article discusses how to understand arts-based learning in terms of creating progressively more refined external representations over time and how arts organizations scaffold representation creation for students as a formal pedagogical process. I focus the analysis on youth arts organizations that offer explicit instruction (much like schools) toward the goal of sharing students’ art publicly (much like professional artists). It is in this context of these organizations that I demonstrate how the learning sciences discussion of external representation as evidence for learning expresses the creative and developmental aspects of artistic production.

RESEARCH METHODS

Although seminal research on arts-based learning has broadly considered the importance of representations in art making (Eisner, 2002; Gardner, 1982; Sheridan & Gardner, 2012), this research has not taken an explicitly learning sciences perspective on the art-making process in order to understand how representations are construction and what functions they serve. Furthermore, research that has explored the sociocognitive processes of artistic production has focused
on already accomplished artists to serve as models for how good art gets made (Yokochi & Okada, 2005). To fill in the gap between research on arts-based learning and research on cognition and art making, this research addresses two central research questions: (a) What are the representational tasks involved in producing autobiographical digital art? and (b) How do these representational tasks provide evidence for learning by artists in YMAOs?

Data Collection

To address these questions, my research team conducted four instrumental case studies (Stake, 2000) with YMAOs across the United States. Youth arts organizations work in a variety of media, including live theater, radio, digital story, film, and spoken word poetry. Although all of these media afford youth the opportunity to engage in the representation of self through art, we chose YMAOs that work in the digital media arts. This allowed us to hold the representational tools constant as we explored how youth constructed and used external representations. Table 1 briefly describes the four organizations.

At each organization we traced one production cycle, from participants’ initial entry into the organization to the final presentation of their work. In identifying a production cycle as the frame for our cases we created further consistency in our data collection not by the amount of time we spent with each organization but by the organizational structure provided for participants to produce their digital art (see Table 1). In order to capture the production cycle at every organization we performed a variety of qualitative data collection techniques:

<table>
<thead>
<tr>
<th>Organization</th>
<th>Location</th>
<th>Production Cycle Length</th>
<th>Type of Program</th>
<th>Time of Data Collection</th>
<th>Number of Youth Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appalachian Media Institute</td>
<td>Whitesburg, KY</td>
<td>3 months</td>
<td>Summer internship</td>
<td>Summer 2008</td>
<td>12</td>
</tr>
<tr>
<td>In Progress</td>
<td>St. Paul, MN</td>
<td>Varied</td>
<td>Ongoing</td>
<td>Summer 2007</td>
<td>10</td>
</tr>
<tr>
<td>Reel Works Teen Filmmaking</td>
<td>New York, NY</td>
<td>6 months</td>
<td>Semester</td>
<td>Fall 2007–Spring 2008</td>
<td>12</td>
</tr>
<tr>
<td>Street Level Youth Media</td>
<td>Chicago, IL</td>
<td>3 months</td>
<td>Summer internship</td>
<td>Summer 2008</td>
<td>12</td>
</tr>
</tbody>
</table>
• **Documentation of the process in action.** Most of this documentation was in the form of ethnographic observation, though we also collected video documentation at various points across the production cycle.

• **Artifact collection.** We collected all artifacts youth created around the digital production process, including application essays, journals, group brainstorming sheets, worksheets, edited/unedited video footage, and blog entries. We also collected curricular materials used by organizational leaders and individual workshop facilitators.

• **Interviews.** We conducted interviews with participants, organizational leaders, facilitators, and mentors.

Data collection was iterative; we used a constant comparative method across our case studies (Glaser & Strauss, 1967). We began with two open-ended case studies (Reel Works and In Progress) and then returned to the field a year later to conduct two more directed case studies based on our initial interpretations (Appalachian Media Institute [AMI] and Street Level). In our open-ended case studies we participated in as much of the production cycle as we could and collected all artifacts that seemed relevant. Although we did not initially conduct a full analysis of all of the representations produced, we did identify where opportunities for construction occurred to inform the design of our second round of case studies. In this second round we directed our efforts toward capturing youths’ representation construction—both in the process of constructing and in their use of these representations in the context of the production cycle. We also asked organizational leaders more pointed questions about the relationship between identity and representation in our second round of interviews.

**Data Analysis**

In a distributed cognitive system the way actors make sense of their work can be analyzed in terms of the tasks they must complete and the artifacts generated in the service of completing these tasks. Calabrese Barton and Tan (2010) have described out-of-school learning settings such as the YMAOs as sites that demonstrate the distributed, social nature of learning, especially as learning is connected to performance-based tasks. In order to analyze these learning opportunities I use Spillane et al.’s (2001) analytic method for understanding distributed cognitive tasks, breaking down the digital art-making process into macro and micro tasks. The distinction between macro and micro tasks rests on a temporal scale of description: Macro tasks describe the everyday work of practitioners across weekly or monthly periods; micro tasks describe how work unfolds in the context of practice. Macro tasks are composed of micro tasks. The two levels of analysis exist simultaneously to help make sense of practice: Macro tasks alone lack specificity, and micro tasks alone lack perspective. Using a macro and
micro task framework also helps to identify key functions of a learning environment. Curricula are often specified at a macro task level but guide instruction at a micro task level. Identifying networks of macro and micro tasks can give researchers a handle on both how learning is organized and how it unfolds in learning environments.

In my previous work I have documented autobiographical artistic production as a dramaturgical process—the telling, adapting, and performing of narratives of personal experience (Halverson, 2007, 2008, 2010). I have used this framework to describe the flow of work in YMAO processes over the course of a production cycle. According to Spillane et al.’s (2001) framework, these are considered the macro tasks of YMAOs. Using an open-ended process (Corbin & Strauss, 2008) to code observational data, interviews, and artifacts created during the production cycle across all four case studies, I coded all of the representational tasks we captured as one of three macro tasks: (a) telling stories and/or figuring out what story to tell, (b) adapting stories into digital representations, or (c) presenting digital products to an outside audience. Once I classified all data that concerned the building of external representations into these three categories, I conducted a second round of grounded coding in which I assigned the data to micro tasks within these macro tasks. Because tasks demonstrate distributed interrelationships among actors and artifacts in sense making (Spillane et al., 2001), I considered an activity a micro task if participants were required to produce a unique external representation as an integral part of the activity. I explored the micro tasks further in analysis by identifying relevant properties and dimensions (Corbin & Strauss, 2008) across organizations and by building theoretical conceptual matrices that highlighted analytic points of interest across the data (Miles & Huberman, 1994).

The next part of my analysis was designed to help me understand how individual artists engaged in the representational process over time. I used the micro tasks to identify the external representations youth generated as they worked on their art, then traced the evolution of ideas and modes across representations over time. This analytic process is similar to the way in which Enyedy (2005) traced and analyzed students’ progressive symbolization of mathematical concepts. He described his process as “go[ing] ‘backwards’ in time in an attempt to trace the origins of this intervention and ‘forwards’ in time to examine what subsequent impact it had on the way other students reasoned” (p. 437). Here I use my analysis of micro tasks to locate individuals’ representations from initial idea to final piece. These analyses demonstrate how the sequence of representations produced in the artistic process constitutes evidence for learning.

Limitations. The understanding that the young artists in the YMAOs we studied were engaged in a distributed cognitive process emerged over the course of our case studies. Although we did our best to capture as much of this process as possible, we do not have artifact and observational data for every participant in the
ART MAKING AS REPRESENTATION

11

artistic production process. As a result, the second part of my analysis focuses on youth participants for whom we have a rich set of representational data and who were actively engaged in the representational process. Therefore, the data examples I provide of participants’ representational processes over time are illustrative, not representative of all participants’ experiences. In fact, it might be argued that youth who produced and saved an extended series of representations produced richer products than those who did not. In our current design-based research work we are exploring what happens when we pay explicit attention to representations over time as a core part of the art-making process. It is not my intention to say that all youth artists in our study engaged in this representational process; rather, I want to explore what is made possible for youth artists through YMAO-designed practices. In future studies we will focus on individual youths’ representational processes in our data collection.

FINDINGS

This article answers two interrelated questions about the creation of external representations and their role in artistic production processes for youth. The first question (What are the representational tasks involved in producing autobiographical digital art?) focuses on the YMAOs and their instructional designs as the units of analysis. I found that organizations orchestrated student creation of external representations through a series of formal and informal assignment tasks. The second question (How do these YMAO representational tasks constitute evidence for learning?) takes the individual youth artists and their processes as the units of analysis. Using the findings from the first question, I break down how individuals work with the representational tasks to create their autobiographical art.

Organizational Level Findings: What Are the Representational Tasks?

In this section I first describe the representational tasks organizations designed and youth engaged in as they created digital art at the four YMAOs. Although I knew coming into the analysis that all of the micro tasks could be categorized as part of either the telling, adapting, or presenting of narratives of personal experience, I wanted to dig deeper to determine specifically how individual organizations worked with youth artists to accomplish these macro tasks. Deciding what story to tell, how to engage with the tools of the medium to represent that story, and how to best share this product with an audience seemed like a mystery; the goal of this micro task analysis was to unpack the broad instructional designs. Table 2 provides a summary of all of the micro tasks and their prevalence across organizations. In the narrative sections I reference the names of tasks with an individual
TABLE 2
Macro and Micro Tasks in the Process of Digital Art Production

<table>
<thead>
<tr>
<th>Type of Task</th>
<th>Format(s)</th>
<th>AMI</th>
<th>IP</th>
<th>RW</th>
<th>SL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro task: Telling stories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application essay and/or interview</td>
<td>Written text; oral conversation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Warm-up ideas</td>
<td>Written text; multimodal</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pitch</td>
<td>Oral presentation; PowerPoint or other</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>supplementary text</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First treatment/shooting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>script/shot list</td>
<td>Written text</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Macro task: Adapting stories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prose script</td>
<td>Written text</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rough cut(s)</td>
<td>Multimodal</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Macro task: Presenting final products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final video</td>
<td>Multimodal</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Artist statement</td>
<td>Written text</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Public showing</td>
<td>Multimodal; oral conversation; written text</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Note.* AMI = Appalachian Media Institute; IP = In Progress; RW = Reel Works Teen Filmmaking; SL = Street Level Youth Media.

data citation (field note, interview, journal entry, worksheet), though we triangulated the prevalence of these tasks using multiple forms of data. I then describe one representational task—the pitch—in depth in order to understand the role individual tasks and their accompanying representations serve in sense making and how this varies across organizations.

**Telling stories.** In the context of producing autobiographical digital art, “telling stories” as a macro task is accomplished when art makers are ready to begin using the tools of the medium to generate multimodal text for their projects. All of the organizations engaged participants in four micro tasks that resulted in these youth knowing what story they wanted to share.

**The application.** In three of the four organizations, youth were required to submit a written application. Applicants were given a series of guiding questions to respond to, including questions about what stories they might like to tell with film, as well as reasons for wanting to join the program. Two of the four organizations required youth to participate in one-on-one interviews with the program’s directors prior to beginning the process. At Reel Works youth had also written applications, so the interviews were supplementary. At In Progress interviews...
were the director’s opportunity to talk with youth about their goals and film ideas prior to their beginning the process.

**Warm-up ideas.** Although some youth came to their organizations having already decided what film they want to make, many did not. Youth produced a variety of artifacts that were “warm-ups” for their final product, including short essays in response to questions such as “Why do you like art and making stories? What are you going to do this year?” (In Progress, field note, July 31, 2007) or writing prompts such as “I really miss . . .” and “My greatest passion in life [is] . . .” (Reel Works, Fall 2008). Participants also produced more focused representations based on guided worksheets. Alternatively, youth produced mini-films in a short production cycle such as “community based interviews” (AMI, field note, 06/08) or “past assignments” (Street Level, field note, July 1, 2008). The resulting artifacts were multimodal, video-based projects that were created in a short period of time and were the subject of peer and facilitator critique.

**Pitch.** Across organizations youth were required to pitch their ideas to a critical group, either within their community or to some outside group. Youth produced a wide variety of artifacts during the pitch depending on the nature of the task as structured by the organization. The pitch is described in greater depth later in this section.

**First treatment.** Before participants began shooting their films they created a representation of their plan—referred to as a “first treatment” (Reel Works, field note, July 27, 2007), “shot list” (Street Level, journals, July 2008), “essays” (In Progress, field note, August 1, 2007), or “proposals” that included who they would interview, a shot list, b-roll footage list, why they wanted to make the film, and its importance (AMI, interview, April 2008).

**Adapting stories.** To distinguish between the telling stories and the adapting stories macro tasks I divided the work by representations that were created before and after the footage for the final product was shot. In some cases youth used footage they had created in their warm-ups for this final product, blurring the line between the two macro tasks. In addition, films that were heavily interview based had a clearer distinction between pre- and post-shooting artifacts because none of the dialogue was crafted in advance. For films with narrative elements, some of the adaptation work was accomplished in advance of shooting. Despite this messiness, there were two micro tasks unique to the adaptation process.

**Prose script.** Participants at Reel Works generated scripts for their films after they shot the majority of their footage, giving them a roadmap for how to
edit their films and a broad sense of how the final product would look. AMI had its participants create

paper edits . . . where you write down what you think your video will look like and what each part’s going to be like. Like some people do it minute-by-minute or just in minute chunks . . . like what scenes are going to look like and what each character’s going to bring. (AMI, interview, July 16, 2008)

Rough cut. Participants produced one or more rough cuts before they presented a final product. Typically these rough cuts were used in critique sessions with peers and/or mentors. Rough cuts are multimodal because they represent the film to that point—they may be missing certain key modes (like a soundtrack) or they may contain all modes in basic form.

Presenting products. A core component of any performance arts production process is the final presentation to an outside audience (Heath, 2000). Because audience is a critical component of artistic production, all of the micro tasks in the presentation function focused on creating a sharable product designed for outsiders. Three unique representational tasks emerged.

Final video. All participants produced a video or a piece of digital art, either alone or with a group. The final piece was the ultimate external representation—the permanent instantiation of how an individual or group of youth chose to share their story with an audience. In other work I have described how these final products can be analyzed as stand-alone multimodal representations (Halverson, 2010).

Artist statement. At Street Level youth created “artist statements,” or written text that accompanied their videos describing who they were and what their piece was about.

Public showing. In addition to completing a stand-alone piece of work, youth participated in a variety of public events where they had an opportunity to engage in a discussion about their work with audience members, in the form of either a gallery opening (Street Level) or a screening with a post-show “talk back” (all others).

The pitch: one micro task in depth. Although the micro tasks identified above were common across organizations (see Table 2) there was great variation in how each organization expected youth to accomplish these tasks. In order to demonstrate this variability, I have chosen one task and its accompanying representations to analyze in further depth. I have chosen the pitch because it was such
an important milestone for youth in the creation of their pieces. We as educators
do not often think about how artists (and youth artists in particular) “find their sto-
ries”; rather, we often focus our instruction on the technical aspects of creating the
piece and working with the tools of the medium. This focus remains despite the
fact that research on the creative cognitive process of talented artists has demon-
strated that crafting a global idea happens slowly over time as smaller ideas come
together (Yokochi & Okada, 2005). Table 3 provides a more detailed breakdown
of the pitch at each organization. The artifacts generated for these pitch sessions
provide opportunities for youth to engage with their film ideas by (a) expressing
textually and orally what story they want to tell and why and (b) engaging with
experts and peers through reflective critique. The differences in task and artifacts
created are isomorphic representations that are instantiations of the same abstract
goal (Zhang & Norman, 1994). I describe two organizations’ pitch processes in
greater depth to highlight some of the ways in which people and tools interacted
in the construction of students’ representations of story ideas.

The Reel Works pitch process is the most traditional example of pitching movie
ideas to sell to outsiders. Youth participants traveled to Time-Warner studios in
New York City to share their ideas with their peers, mentors, directors, and a panel
of professional producers. Youth were instructed to treat this meeting as if they
were selling their idea to producers, providing them with a context for their pre-
sentations. In addition, they were given a worksheet to guide their thinking about
the development of their ideas (see Figure 1). Some youth used the worksheet

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1 Noted radio and video documentarian Ira Glass describes the importance of finding a
story and how underrated this challenge is in a video posted on YouTube: www.youtube.com/
watch?v=3qmtwa1yZRM
directly, filling in responses to the worksheet questions and using their responses to make their pitches. Others used the questions on the worksheet as guidelines for the construction of a narrative description that they created in a journal. Youth used these artifacts to read from as they delivered their pitches, though they also spoke extemporaneously as they answered questions from the audience.
The worksheet provided space to reflect the content of the story: “This film (story) is about: The life of my grandfather; Through good times and bad, How I handle the ups and downs.” It also provided space to think about the representational medium of film: “In this film, I would be the narrator. I will also interview my parents and other artists who appreciate the art of photography like I do. There will definitely be music in the beginning of the film.” Finally, participants reflected on the meaning of their film: “As the Director, I want my audience to feel/think/understand . . . where I’m from, try and put theirselves [sic] in my situation, be inspired at the end of my film. I want people to go out and change their situations, my film should be influencial [sic].” The questions posed on the worksheets encouraged youth to think about the content of their film, their use of film as a medium, and why their film is important. This explicit attention to content, structure, and impact resulted in external representations in the form of written statements on students’ ideas, how they would be carried out, and the functions they may serve.

The oral presentation afforded youth the opportunity to engage in a reflective critique that pushed these ideas further. The critique sessions focused on both practical issues of filmmaking and the function of film as a medium in communicating a complex idea. For example, when pitching Rupture, described as “a story about how I reunited with my mom after being separated from her for 10 years,” the filmmaker, instructor, mentor, and an external expert had an extended exchange about how to construct this piece so that it showed certain universal themes yet maintained the student’s individual experience. The filmmaker ended her presentation this way:

And at times my thoughts and opinions will be heard in voiceovers. And the observational footage will be paired with the voiceover. The main story will be supported by interviews with three of my friends and their moms who share similar experiences about their own separations and reunions. And, the style will be intimate personal, such as shooting in their living rooms.

Her mentor both picked up on the personal nature of her narrative (through the use of voiceovers to express her personal opinions) and encouraged her to develop very specific interview questions to ask her mother in order to highlight what made their story interesting and unique:

And instead I might think very carefully about specific events or moments and asking people to talk about their memories of those . . . You know, or to hone in on specific moments in the story and use those to hold up the narrative and as points that you can interview people about.
The program director picked up on this suggestion and used it to relate back to how her individual story was nested in a broader narrative that many people can relate to:

It’s a great, it’s actually a wonderful suggestion because it really puts a very human you know um, base on your story. I mean you’re story is one that many, many people have experienced but when you bring us through the story through your eyes, of walking through that door of what you were thinking and then of what your mother was thinking as you came through those doors, could be really some remarkable moments where you find that you have more in common than you think on one level.

The opportunities for feedback and reflection in the Reel Works pitch process, along with subsequent assigned worksheets that asked youth to draw on this feedback, communicated the idea that shared representations were works in progress. The representation—in this case the worksheet coupled with the oral presentation—was an opportunity for reflection, a time to say, “Here is what I think my piece is about and here is how I intend to communicate this core idea using the medium of film.”

At AMI the focus of the pitch was for youth to sell their ideas to one another. Because films were made in groups, the pitch session served as an opportunity to select three ideas that the group would choose to make. Youth engaged in an extended brainstorm session in which they generated their film ideas and tried to draw connections across ideas (see Figure 2). Everyone had a chance to contribute their ideas, to describe the idea they contributed to the brainstorming session, and

![Figure 2](attachment:file.png)

**FIGURE 2** Appalachian Media Institute pitch brainstorm (color figure available online).
to indicate which of the ideas were their favorites. Butcher block paper was used to generate ideas and to draw connections across stories.

Once three ideas were selected through a blind voting process and youth were assigned to groups based on their own interests and mentors’ construction of productive teams, these new groups devised a proposal for their film. The proposal consisted of basic structural ideas, a list of who they would interview, a preliminary shot list, and a description of the film as well as an assessment of who the audience for the film would be. Similar to Reel Works youth, AMI participants were given a series of questions to answer about their prospective film; they used “sample proposals” as models to construct their own (AMI, field note, June 27, 2008).

In both cases the content of the pitches was constructed representations of participants’ ideas, although the structure for the representations was created by the organizations. By prompting youth with questions to answer, models to follow, and formats to fit ideas into, the organizations provided a structural scaffold within which participants could craft representations of their ideas. The pitch happens relatively early in the process, usually about one third of the way through the production cycle. At this point, youth are likely struggling with core questions around why their ideas matter and who these ideas may reach. Structuring the representational task in this way facilitates youth engagement with these questions and requires that they construct external representations in the form of text and oral presentations that describe their emerging understanding of the value of their ideas and how these ideas can be communicated to outsiders. Across the pitch meetings instructors and mentors used participants’ pitches to help youth think in depth about the generalizability of their individual narrative ideas.

There was a core difference, though, between the Reel Works and the AMI pitch processes. In earlier work we documented a reciprocal relationship between an organization’s art-making process and its conception of identity. Organizations that espouse an individualistic perspective on identity focus on stories as belonging to individuals and the development of expertise in art making as individualized. Likewise, organizations that espouse a collectivistic perspective on identity focus on community narratives and individuals’ roles in that process and see art making as necessarily distributed across participants (Halverson, Lowenhaupt, Gibbons, & Bass, 2009). In many ways the task of pitching a story mirrors this distinction. Reel Works espoused an individualistic model of identity that was reflected in the design of the worksheet to guide participants’ pitches and the structure of the pitch process. At AMI, a collectivistic orientation toward identity meant that participants were selling their ideas to one another in order to find the stories that spoke to them the most. The brainstormed ideas also reflected a group process toward finding and developing stories that were important to the community.
Individual-Level Findings: How Are Representational Tasks Evidence of Learning in the Arts?

In the prior section I examined how the art-making process could be understood in terms of macro and micro tasks and how the creation of artifacts—representations of ideas—lies at the center of these tasks. Although this analysis highlights the way in which YMAOs structure art making and how representational tasks are central to the instructional design, I am also interested in the role these representations serve in helping youth to understand the art-making process and to understand themselves. In order to explore the role representations serve art makers I present two individual youth projects from initial idea to final presentation. I have chosen these two examples because (a) we were able to collect a majority of the artifacts these students generated around the representational tasks and (b) the organizations these youth were from—Reel Works and Street Level\(^2\)—took a more individualistic stance on identity and therefore encouraged individual youth to produce their own art (Halverson et al., 2009). Analyzing the progress of representations in a group process like AMI or in a more open format like In Progress in which pieces are passed along from one youth to another is much more challenging and something I will explore in future work. Unlike the analysis of the pitch as a micro task, in which I highlighted how different orientations toward identity are differently captured in representation design and creation, here I hold the conception of identity constant (individualized) to trace how individuals work with the representational tasks over time.

Overall I found that building a trace of artifacts by individuals over time reveals that these young artists are engaged in *representational trajectories* that begin with a focus on the content of their stories, move to a focus on how the tools of the medium afford a representation of these ideas, and end with a consideration of the relationship between these two aspects of art making (see Figure 3). This trajectory is shaped by the organizations’ design of micro tasks—earlier micro tasks ask youth to focus on the story they want to tell, whereas later micro tasks focus more heavily on the tools of film. In the sections that follow I demonstrate how two youth from different organizations progressed through the representational trajectory of their pieces, using the artifacts they generated coupled with their oral reflections on these artifacts. By building and reflecting on external representations, these youth struggled with the relationship between narrative content and tools for expression. In the next two sections I present an analysis of two young artists and the development of their digital art through the representational trajectory.

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\(^2\)About 1 month after we finished our data collection cycle with Street Level the building that housed their administrative office burned down. We lost some of the process data that the program directors had collected and were planning to share with us, primarily video data of youth presentations and admissions applications.
FIGURE 3 The representational trajectory in artistic production processes (color figure available online).

Frank—Represent!. Frank’s representational trajectory is primarily chronicled through the journal that Street Level program directors required every participant to keep throughout the production cycle. Youth were asked to take notes in that journal on formal presentations and lectures, to brainstorm project ideas, and to track their progress toward their final piece. Because the culmination of the production cycle was a gallery show in which youth created installations of their work to share with friends, family, and the general public, attention was paid to both the final piece and how the final piece would be displayed in the gallery space. For this gallery show, Frank created the graphic design piece shown in Figure 4. This still image shows the way the piece was displayed on the wall of the gallery and includes the artist statement text (box on the lower right-hand side). There are three key elements to this piece: (a) a Photoshopped image of Frank in front of two flags, (b) a black-and-white line drawing of a person split down the middle, and (c) a series of names/nicknames printed on individual placards placed directly below the photograph and drawn images. I first describe the evolution of these three components of Frank’s work and then map the components onto the representational trajectory.

Frank da Tank. About halfway through the Street Level program, youth were asked to make a PowerPoint presentation that described an artist who was influential to them as well as their initial idea for their installation piece. Youth had been encouraged to use a professional artist as the inspiration that would guide their piece, so the presentation was designed for participants to begin to explore that connection. Although the video of the presentation was lost in the Street Level
FIGURE 4  Frank—Represent! (color figure available online).
Well I am Frank da Tank. i like screen printing it shows what i am who i am and what i am about making dighens and putting it on my clothe gives me owner ship of my clothe there is no ... Printing whats in his head out and shows it here

1. Well I am Frank da Tank.
2. I like screen printing.
3. It shows what I am, who I am, and what I am about
4. Making designs and putting it on my clothes.
5. [It] gives me ownership of my clothes
6. There is no . . .
7. Printing what’s in his head out here

It is unclear what lines 6 and 7 refer to, though it is possible that line 7 was the beginning of his description of the artist he shared with the group, as his artist of choice was someone who also worked in the screen-printing medium (field note, July 8, 2008). Of greater interest are lines 1–5. Two key elements of his initial project idea are expressed here: (a) “Frank da Tank” as an identity marker and (b) his use of screen printing on clothes as his medium of choice for representing himself. Both elements are assertions of personal identity, marked by the phrase “I am” (lines 1 and 3). Although no explanation is given for the meaning of “Frank da Tank,” it is clear that this way of describing himself—he uses this as the first marker of who he is and, as we will see, throughout the evolution of his piece—remains at the center of his representation. The concept of asserting personal identity through clothing design was appealing to Frank from the beginning of the program. During an early interview Frank was asked what he thought he would make for his final piece:

Um, for me, um, right now we’re looking for stuff, like, what we could possibly do. What I would like to do is probably, um, come up with my own designs of who I am and put them on clothes or something. (interview, July 14, 2008)

Both of the identity markers in this initial journal entry are clear assertions of how Frank sees himself and what he wants to express publicly.

The next substantive entry in Frank’s work journal is a two-page entry with a series of images and texts that become the outline for his final piece (see Figure 5). It is unclear how all of the elements of the pages are related to one another, but each is a specific representational choice that outlines a component of Frank’s
emerging understanding of how to represent himself. The first component is an image of a list (rather than an actual list) with instructions for what this future list will consist of: “List of names friends and family use to refer[ ]to me like ‘frank the tank’ and ‘papa skoons.’” The initial nickname in his first representation has remained; it is literally used again in this representation. More broadly, “Frank da Tank” has become a concept, the use of nicknaming as identity emerges as a method for Frank to represent himself. Although he has not determined the content of the representation here (except for the two specific examples), he builds a representation of a concept—the list of names that people call him—as a way to describe himself.

Another component of this entry is a line drawing of a tank accompanied on the next page by the text “also research what a tank is and sketch ones that you like.” It seems from these two components that Frank and his mentor considered representing “Frank da Tank” using images of a tank. At this point it is unclear whether the list of names that people call him or the concept of Frank as a tank is the primary representational idea. It is left open at this point for Frank to explore which of these concepts best suited what he wanted to express.

The next two pages of his journal are a list of these names; the pages are almost identical, though the first page is just a list of nicknames and on the second page...
he attributes (most) of the nicknames to a person or people. The following list combines the two pages:

- Frank da Tank – Rob Poblo
- Big Guy – Gwen
- Franky – Ever[y]body
- Kirby – Ed, Mike, Eric
- Spartan 47
- Papa Skoons – Robert
- Frank grimes – Sandra
- Dos Frank – Mrs. Mixsin
- Franklin – Gwen
- Frank furter – Gwen
- Frenchy

“Frank da Tank” still figures prominently in this representation; it is the first name on the list. “Papa Skoons” is also on this list. Although there is no reflection on the meaning of this list, it is clear from the representation before that he is trying to populate the image that he created to represent “what people call him” as an identity display. Images of tanks, however, never appear again in any version of Frank’s piece, further directing the piece toward others’ naming as identity representation.

This list makes its way into Frank’s final piece in a series of printed placards across the bottom third of his piece. Their attributions are gone; the audience for the piece likely interprets that these are names for the artist but not who made them or why. Our data collection process, however, afforded us the opportunity to have youth reflect explicitly on the meaning they attribute to their pieces. We talked to Frank about why he made the decisions he did and what he was trying to communicate with these decisions. The final piece takes the idea of naming and the social construction of self as part of a self-representation. These names are highly personal; they have little meaning to an audience that is not part of his social circle. In fact, the individual names are only connected through their presence in this piece of installation art and the fact that they all signify Frank in some way. Many of the names from the original list make it into the final piece, though a few are new and a few are left out. Table 5 shows a comparison of the two lists, coupled with narratives (where available) for why he chose this name for his representation.

The through-line for this aspect of Frank’s piece begins with his assertion that he is “Frank da Tank.” His next representation takes the idea of naming and abstracts to a list of what people call him, abandoning the specifics in favor of the idea of naming. This is followed by a real list of names and the social relationships that contributed to his names. In the end he chooses many of these names (and a few others) for his final representation. But these names are not random;
### TABLE 5
Names Represented in Frank's Final Piece and a Description of Their Origin

<table>
<thead>
<tr>
<th>Final Piece</th>
<th>Original List</th>
<th>Description (Through Interviews With Frank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank the Tank</td>
<td>Frank da Tank</td>
<td>I got that in school last year cuz I got into a fight and stuff happened. And, I didn’t go down because I was like “built like a tank.”</td>
</tr>
<tr>
<td>Francisco X</td>
<td>Frenchy</td>
<td>That’s the name that’s been given to me since birth.</td>
</tr>
<tr>
<td>Franky</td>
<td>Frenchy</td>
<td>That’s how everybody knows me.</td>
</tr>
<tr>
<td>Dos Frank</td>
<td>Dos Frank</td>
<td>That was given to me by my teacher, Mrs. Mixsin . . . He spoke German, and we would mess around like that. “Dos Mixsin.” “Dos Frank.”</td>
</tr>
<tr>
<td>Interviewer: So what does this mean? Dos?</td>
<td>Dos. I don’t know . . . We just thought it was cool.</td>
<td></td>
</tr>
<tr>
<td>Fronic</td>
<td></td>
<td>I got that at summer camp by a Polish counselor. He couldn’t pronounce my name, so he called me Fronic.</td>
</tr>
<tr>
<td>Frank Grimes</td>
<td>Frank Grimes</td>
<td>I got that from my friend Waffles cuz we were watching <em>Simpsons</em> one day, and she called me “Frank Grimes!”</td>
</tr>
<tr>
<td>Frenchy</td>
<td>Frenchy</td>
<td>That name was given to me by my little sister couldn’t, when she was like born like around 2, she couldn’t, uh, say my name right.</td>
</tr>
<tr>
<td>Kirby</td>
<td>Kirby</td>
<td>I got that from my friends because we went out to eat and I was really, really hungry. So, I ate a lot.</td>
</tr>
<tr>
<td>Papa Skoons</td>
<td>Papa Skoons</td>
<td>I got that in my computer class from my friend Robert. Whenever he sees me, he just goes, “Papa Skoons.”</td>
</tr>
<tr>
<td>Big Guy</td>
<td>Big Guy</td>
<td>I got that from my friend, Gwen.</td>
</tr>
<tr>
<td>Frankfurter</td>
<td>Frank furter</td>
<td>She, Gwen, gave me that name.</td>
</tr>
<tr>
<td>Spartan 47</td>
<td>Franklin</td>
<td></td>
</tr>
</tbody>
</table>

*a*His full last name was printed here.
each one stands in for a social relationship and a narrative. Taken together the names represent the way Frank sees himself through the eyes of the other people in his life.

**Border crossing.** Recall from Frank’s initial idea for his piece that he self-identifies both as “Frank da Tank” and as a screen printer (see Table 4). The largest image in Frank’s final piece is a screen print, a multicolored image of himself in front of two simplified flags, American and Mexican. Although his initial idea involved making his own clothes, Frank states that he “decided to scrap the whole clothes thing. It was basically my version of the American flag and the Mexican flag” (interview, September 3, 2008). He altered his medium from t-shirts to printed canvases representing two large, adapted flags. The idea for the dual flags is first seen in the sketch he created in Figure 5, below the list of names. He has drawn a basic black figure standing in front of a box that is half white and half gray. This image is accompanied by the text “border crossing from Mexico to USA.” Frank attributes his idea to describe himself as a border crosser to his father. In an interview with us when the piece was finished, he describes being stuck with his final piece, struggling to figure out how to represent himself through art. He tells us that his father asked him, “Why don’t you do something about you being Mexican American?” Not only did Frank embrace the idea, he also felt motivated by this contribution. He says, “That’s like, part of the reason I did this. Because of my dad. He helped me too” (interview, September 15, 2008).

Frank’s journal entries end with the list of nicknames, so the next representation of border crossing is the final piece (see Figure 4). However, our interviews with Frank reveal his understanding of how he got from border crossing to the representations of the two flags present in the piece. He describes beginning by “tak[ing] a regular flag from here and a regular Mexican flag and put[ting] them in the background” behind his photo. The simplified, adapted flags emerged from a suggestion from his artist-mentor—“[he] gave me the concept of make your own flag”—and an image from an album cover that he liked. He compares that flag to his own:

I had saw a flag that Trent Reznor did. He did his own flag that is basically one star . . . it’s kind of like this one but it doesn’t have red and white. It’s basically black. It’s all red. It’s like blood dripping down from the flag. I wanted to do that, but it kind of, it strayed from who I am. (interview, September 15, 2008)

In describing the flag from a Nine Inch Nails album, Frank identifies what he likes aesthetically about a self-made flag. The reason that he does not simply import this image into his project, however, is that “it strayed from who I am.” He recognized
the need to keep his representation of himself at the forefront of his representational decisions. So he chose an aesthetic that appealed to him and created a Mexican American border-crossing version of this image.

The image to the right of the full-color print in Figure 4 is a replica of the sketch used as the basis for this larger image. He describes this image in comparison to the large, color version as “basically the same thing, have to dealing with borders. Only it’s... it’s the same thing as this only it’s stripped down of everything.” He sees the two images as conveying the same basic meaning: Frank as border crosser. However, whereas the large image refers specifically to Frank’s identity as a Mexican American, this “stripped down” version conveys a slightly different meaning: “It can mean anything. I’m basically walking into anywhere. With the same concept of walking into different borders or different places. This basically shows I can... I am basically going anywhere” (interview, September 15, 2008). The initial sketch was originally created as a stand-in for what would be the full image of border crossing between Mexico and America. The final image included both the full Mexican American border crossing representation (full-color image of Frank in front of two flags) and the initial sketch. But as Frank describes the meaning of that initial sketch has transformed to represent himself as a border crosser more generally. He has come to understand and represent himself as someone who can “go anywhere,” a broader scope than his dad’s original idea.

Self-portrait. The final component of Frank’s piece that can be traced representationally is his use of a visual self-portrait. The second journal entry (see Figure 5) also contains a line sketch of Frank underneath the words “Find images that represent me??” This journal entry was written with the help of Frank’s artist-mentor, who was helping him through the process of creating this self-representation. The initial question here is posed as a general idea of images as representation. In his description of the process he went through with his mentor, Frank describes his struggle:

I was kind of straying from what this actually was [gesturing to his final piece]. I wanted to do different things about me. And [my mentor] told me, “Well, why don’t you just put yourself, why don’t you just take a picture of yourself? A picture of yourself basically represents who you are.” (interview, September 15, 2008)

Both Frank and his mentor took part of the task of representing Frank through digital art literally; they set out to create an image of himself (rather than the original “finding” an image suggested in the second journal entry) by taking digital photographs. The image of Frank in front of the two flags is one of the photos they took together. His description of the incorporation of this photograph alternates between a collaborative description of capturing the images and an independent description of choosing what to include: “We took about 100 pictures and I had
to choose the right one . . . we did a few inside and we did a few outside. And I chose this one.” Frank recounts the decision to include a literal representation of himself in his artwork, how it represented something, but not enough. He says, “And then I was kind of looking at it, and it’s like, ‘Alright, what else am I?’” Frank incorporates his mentor’s suggestion that a picture of himself represents him but also points out that he is more than just this picture, that an image does not equal an identity.

The final piece of Frank’s artwork is the artist statement, a small placard that all artists were required to include with their installation. Frank’s reads: “Francisco’s project is a graphic design piece dealing with him being a Mexican American, crossing borders each day going to different places with his art work and gathering all of his names.” Audience members could read this placard while viewing the piece, so artists had the opportunity to make explicit the core meanings of their work. As is clear from the statement, Frank reaffirms how different aspects of the piece reflect the ways in which he constructs his personal identity—his cultural identity as a Mexican American, his social identity as a border crosser, and his interpersonal identities as ascribed through “all of his names.”

This analysis traces each of the three key components of Frank’s piece from initial conception to the final piece. However, this division is more analytic than temporal; Frank did not conceptualize each of these elements independently. Reframing his artistic process temporally demonstrates his representational trajectory: Frank struggles initially to determine what his piece is going to be about by wrestling with which aspects of his identity he wants to “show.” He determines through conversations with his mentor and his father and through his own journal entries that he is interested in sharing a visual representation of himself alongside his identity as a Mexican American and a border crosser more generally and a representation of how his friends and family see him through the nicknames they have given him. Then he moves to a focus on how the tools of the digital graphic arts medium afford him the opportunity to represent these ideas. He spends time with the minutiae of the tools themselves before marrying his narrative perspective with the affordances of the tools, which results in his final piece, coupled with an artist statement that provides an opportunity to explicate this relationship to an audience. Figure 6 traces Frank’s representational trajectory from initial idea to final piece.

Caught in the Middle. Although the general micro tasks of artistic production in YMAO contexts are the same, as the example of the pitch as micro task illustrated, organizations use different resources in order to work with youth to accomplish these tasks. They work with different people, in different ways, and using different artifacts. As a result, tracing individual youth artists’ representational decisions is very much bound by the decisions organizations make about how to structure micro tasks. Whereas Street Level structured the art-making
process in terms of content (everyone created a piece of art that represented their identity), at Reel Works worksheets played a huge role in structuring micro tasks for youth producers. Reel Works staff handed out seven different worksheets for participants to complete over the course of their filmmaking process. Charmagne’s film, *Caught in the Middle*, is a personal documentary about her living situation. Charmagne spent the first 14 years of her life with her grandmother, but her mother now wants Charmagne to live with her permanently. The film documents a variety of perspectives on the relationships between Charmagne, her mother, and her grandmother as well as Charmagne’s perspective on how the decision of her living situation should be made. To document the development of this film we had access to four of the seven worksheets Reel Works staff assigned. Charmagne also participated in an application/interview process and the pitch process, so she generated additional artifacts for these purposes, for a total of six intermediate representations. In this example I trace the evolution of *Caught in the Middle* through the micro tasks Charmagne completed during the Reel Works process.

**Initial ideas.** Reel Works often has more applicants each production cycle than they can accept into their program. As a result, the initial application and interview play a role in determining who will be a part of the program. One criterion for acceptance is that youth have an idea for a story they want to tell. During this initial interview, when Charmagne is asked what story she wants to tell, she gives the program director three potential stories. Of those three stories, the first one is the kernel for her eventual film, a story “about my Trinidadian background and family.” In addition, Charmagne is asked to reflect on why she wants to tell a story and what she hopes her audience will understand. She says, “I just want them to understand my family and my background . . . I want them to know about me and my family.”

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3 A pseudonym.
Charmagne as photographer. Another component of the application and interview is to identify why Charmagne wants to be a part of the Reel Works program. Charmagne identifies her interest in photography and her belief that film is similar enough to photography that she could learn something new yet stay close to her interests and skills. This interest resurfaced as the Reel Works staff scaffolded youth into selecting the story for their documentaries. In completing the third worksheet youth were asked to “select your TWO BEST ideas and explore them by answering the questions below.” Charmagne’s first choice is tentatively titled “Through My Eyes/Lens,” a documentary that focuses on “my love for photography and how my family supports this. However, others say that its [sic] not something I can make money off of.” Her second story option was not available to us; either she did not turn it in or it was lost during the season. There are a few interesting features about this artifact: Charmagne embraces her identity as photographer, an aspect of herself that was not part of her original story ideas but rather a personal strength that she was able to identify from the start. In addition, she keeps her family present in this story idea despite its content focus on photography. This idea, however, is the last mention of photography as a component of her documentary. Although the through-line of family remains, her personal interest does not become the eventual focus.

My Trinidadian family. As I indicated earlier, Charmagne mentions her Trinidadian background and family as a potential focus of her film. She begins to explore this story further than her initial statement as early as the first worksheet participants were asked to complete. On this sheet, youth were asked to choose 3 from among 13 prompts to write a paragraph from. Charmagne writes two paragraphs, the more substantive of the two in response to the prompt “My family . . . ”:

There are many words that can describe my family. However, to sum up all those worlds I would simply say that we are a unique, loving, diverse, but slightly dysfunctional group of people. We may not be rich, but we always remain happy and hopeful. From what I see, this is what keeps us all together. Being hopeful. Having faith in God, and our meals really keep my family close. To me, their [sic] is nothing better than eating traditional Trinidadian foods like roti, oil down, and stew chicken with my family. Not only does it open up my already huge appetite but, it also adds to the time we spend with each other.

In this initial description Charmagne discusses her family from an interpersonal perspective (unique, loving, diverse, slightly dysfunctional), a cultural perspective (Trinidadian, religious), and a personal perspective (her own appetite and her own opinion on her family). The tone of this initial narrative is positive, one of overcoming adversity. She refers to her family as a unit, describing what “we” do; she does not discuss her relationships with individual members of her family.
The next time Charmagne discusses this story is in her pitch, the structure of which is described in an earlier section. The title she presents here, “Caught in the Middle,” is the title for her film. When presenting her idea, Charmagne reads from a script:

And [the film is] basically about the struggle that I face in choosing between my successful grandmother who raised me and my mother, who is on welfare and wants me back after 14 years. The question that I’m going to answer is, “How do I lead a successful life and maintain a positive relationship between my mom and my grandma and . . . and, um, when I have to choose between the two?”

As is evident from this description, Charmagne has changed the scope of her idea from a story about the cultural, interpersonal, and personal aspects of her family to a specific story about Charmagne wrestling with her relationships between her mother and her grandmother. The cultural aspects of her family are not highlighted here; the focus is entirely on these three interpersonal relationships. As part of her presentation Charmagne discusses the relatability of her story to an outside audience as “everyone who’s had to make a choice in their life.” This further emphasizes the shift away from family cultural processes to the challenges of relationships with specific family members.

In the next two representations of her piece (Worksheets 6 and 7) Charmagne hones the core idea of her film. Table 6 puts her descriptive sentence side by side across the three representations. Certain key words remain across the descriptions—choosing, grandmother, and mother are all present. The message becomes simplified, though, as Charmagne continues to construct what her story is about. Many aspects of Charmagne’s story are honed through her creation of these multiple written artifacts that accompany her filmmaking process, such as

<table>
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<tr>
<th>Pitch</th>
<th>Worksheet 6</th>
<th>Worksheet 7</th>
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<td>It’s basically about the struggle that I face in choosing between my successful grandmother who raised me and my mother, who is on welfare and wants me back after 14 years.</td>
<td>My film is about the pressure that I face in choosing between living with my grandmother and my mother.</td>
<td>The pressure that I face in choosing between mom and grandma.</td>
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I will do a walk and talk interview with my godfather, walking from my school to his home. He has always been a positive influence within my life as well as my family’s lives. He will talk about how he came into my family’s life and he will offer me advice about how to maintain a positive relationship with the women in my life.

Although my godfather is not my main subject, I have to do a walk and talk interview with him. He has always been positive reinforcement within my life as well as my family’s life. My mentor will help film this shot.

<table>
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<th>Worksheet #6</th>
<th>Worksheet #7</th>
<th>Film</th>
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<td>I will do a walk and talk interview with my godfather, walking from my school to his home. He has always been a positive influence within my life as well as my family’s lives. He will talk about how he came into my family’s life and he will offer me advice about how to maintain a positive relationship with the women in my life.</td>
<td>Although my godfather is not my main subject, I have to do a walk and talk interview with him. He has always been positive reinforcement within my life as well as my family’s life. My mentor will help film this shot.</td>
<td>Two clips from an extended stationary interview with her godfather, focused almost exclusively on Charmagne’s relationship with her mother.</td>
</tr>
</tbody>
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FIGURE 7 Evolution of the role of Charmagne’s godfather (color figure available online).

- The inclusion of other key family members in the film, including her sisters and her godfather
- An interest in a video diary-style component of the film
- Capturing her grandmother in the different spaces she occupies, including the day care center where she works and doing housework
- An interview with her grandmother and her mother at the same time

All of these elements make their way into the film in some way, though not always in the way she envisioned them in these representations. The evolution of her godfather’s role in the film is a good example of this. Figure 7 shows the three different representations Charmagne created around her godfather and his role in the film.

Charmagne initially has very specific ideas about both the content and the structure of how this interview should go. She references both what he will talk about (and uses the declarative “will” rather than the more open-ended “might” or “could”) and how they will film the discussion. The next representation looks very similar, though she has not included a description of what he will discuss. In some ways this discourse leaves open multiple possibilities for the role he will play in the film. The final film does not include a “walk-and-talk” interview but rather a stationary interview without Charmagne in the shot. And the clips Charmagne chooses to include focus on Charmagne’s relationship with her mother rather than his role in the family (as described in Worksheet 6). As she moves from emerging ideas to final product, she moves toward a focus on her relationships, regardless of which characters she highlights in the film.

**From content to structure.** The Reel Works process is designed for youth to attend to both the stories they want to tell and how the tools of film allow them to tell these stories. Just as one can see the evolution of Charmagne’s story by tracing the artifacts she produces in the micro tasks, one can also see how she
makes the transition from a focus on the story to a focus on the structure. When asked about her technical skills with film during her intake interview, Charmagne shares that she no experience with filmmaking:

I actually have no skills. I am not really a technical person but just the thought of making a film; it being mine was really cool. [I hope to learn] probably the technical side and lighting and learning how to interview people.

Charmagne is a participant with no prior experience making films, so all of her knowledge related to how to make the film and how the tools of filmmaking afford meaning making are being learned as a part of this production cycle.

Worksheet 3 is the first time Charmagne makes explicit reference to the tools of film. She makes three statements about structure: (a) “I will just be interviewing [my subjects],” (b) “In this film, I would be the narrator,” and (c) “There will definitely be music in the beginning of this film.” These declarative statements are the beginning of her understanding of the interaction between content and structure in the filmmaking process. During her pitch Charmagne moves to more specific descriptions of the tools of film she plans to use: “I’m going to use interviews of my mom, my nine-year-old sister, my godfather, and my grandmother. Um, I’m going to use family photos, music, and narration. Verité, b-roll, and statistics about women on welfare will also be included.” Although she maintains her emphasis on interviewing as a primary tool, she is more specific about how interviews will be used to communicate her message about her relationships with her family. In addition, Charmagne appropriates filmic discourse, using terms such as verité and b-roll, though she does not apply these terms to any specific aspects of her story.

One can follow Charmagne’s use of these two filmic terms through the next two worksheets as she begins to make sense of how these tools can allow her to communicate her story. She does not use the term verité again; instead, it is replaced with specific choices about editing and camerawork that give the audience a realistic, in-the-moment feeling. She expresses interest, for example, in a walk-and-talk interview with her godfather and a desire to create “video diaries . . . either on the bus or on the train going to my mom’s house.” These techniques represent tangible efforts to give the audience the “in your face” feeling that they are there and that events in the film are unfolding as the audience watches. Charmagne does maintain her use of the term b-roll throughout her worksheets. B-roll refers to secondary visual sequences that are not directly related to the audio. As she moves forward, she specifies that the b-roll will be her mother and grandmother doing housework as well as her grandmother at work in the day care center.

In the end Charmagne uses both of these techniques, though not exactly in the way she envisioned them. She includes a conversation between herself and her mother that is clearly unplanned as well as a few selections of her own video
diary-style reflections. She uses b-roll throughout the film, though most of it is shots of her family—mother, grandmother, sisters, and herself—as well as some establishing shots of New York City streets. We do not have an interview with Charmagne like the reflective interview we were able to capture with Frank, so I cannot include her perspective on the final piece and the way it embodies her idea. However, as is hopefully evident from this analysis, the choices Charmagne made about the content and structure of her film were scaffolded through the artifacts she generated within the Reel Works micro (and macro) tasks.

As with the analysis of Frank’s piece, the analytic categories used here to track the evolution of Charmagne’s piece do not mirror the temporal order in which her work unfolded. Reframing her work temporally reveals a similar trajectory of an early focus on the narrative elements of her film with a shift in the middle of the process to identifying the specific filmic techniques that will allow her to accomplish her narrative goals. Unlike Frank, who does not begin to consider his representational tools until he has settled on an idea, Charmagne’s work reflects a progressive approach to tool use; her early work with tools is the generic identification of interviewing, music, and a narrator as means of telling her evolving story, whereas her later artifacts point to specific ways she will communicate her vision, including the use of specific b-roll footage and the combination of audio and visual elements. The final piece reflects the marriage of her narrative choices with her work using the representational tools available in documentary filmmaking. Figure 8 describes Charmagne’s representational trajectory and highlights the similarities with and differences from Frank’s experience.

**FIGURE 8** Charmagne’s representational trajectory (color figure available online).

**DISCUSSION: PEDAGOGY, LEARNING, AND DESIGN**

**Macro and Micro Tasks as Pedagogy**

The data presented in this article outline both a pedagogical process for working with young people to produce autobiographical, digital art and evidence for how and what these emerging artists have learned as a result. From a
pedagogical perspective, analyzing the YMAO process in terms of macro tasks demonstrates that there is consistency in terms of how organizations structure the art-making process for young people; telling stories, adapting stories, and sharing products capture a core set of design features for guiding emerging artists. Although the micro task analysis demonstrates some variability in specific work that participants were asked to do, this variation is more analogous to curriculum design choices than differences in learning goals. For example, there was a range of formality in artifact format across organizations: Reel Works favored a worksheet-driven approach, Street Level designed a series of journal assignments, AMI designed opportunities for groups to create visual artifacts, and In Progress favored conversations and the generation of footage over written artifacts. Regardless of the specific artifacts produced in the micro tasks, all were focused on the broader macro task goals. The variability of micro tasks also demonstrates the link between instructional design and local community: The two organizations that worked in individualistic communities favored individually constructed artifacts, whereas the two organizations working in collectivistic communities favored group constructed artifacts (Halverson et al., 2009). In summary, the macro tasks identified consistency whereas the micro tasks identified variability and adaptability signifying attention to the needs of the community and designers’ preferences.

This analysis also starts to move the dialogue on the power of new media-based informal learning environments from ethnographic descriptions of emergent practices (Gee, 2003; Ito et al., 2010; Jenkins, Purushotma, Clinton, Weigel, & Robison, 2007) to insights into how to design learning environments with specific learning goals in mind. Initial work has focused on characterizing these environments, termed participatory cultures, as technology-rich social communities “with relatively low barriers to artistic expression and civic engagement, strong support for creating a sharing one’s creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices” (Jenkins et al., 2007, p. 3). As a learning scientist I am interested not just in characterizing these spaces but also in understanding how to design these experiences for learners. The macro and micro task analysis I conducted provides insights for those interested in how to design experiences for learners so that learners may become successful producers of digital artifacts that matter.

The Representational Trajectory

Shifting from pedagogy to learning, my second research question used the task analysis to trace individual youth through the artistic production process to determine what and how youth learned as a result of their participation. Building a trace of artifacts by individuals over time reveals that these young artists are engaged in representational trajectories that begin with a focus on the content of their
stories, move to a focus on how the tools of the medium afford a representation of these ideas, and end with a consideration of the relationship between these two aspects of art making (see Figure 3). The organizations spend a good deal of time working with young artists on what stories they want to tell, and both Frank’s and Charmagne’s early representations reflect a focus on “the story” and its relevant details (see Figures 6 and 8). Toward the middle of the process one sees an emphasis on tools of the representational medium, for example Charmagne’s use of technical filmic language to describe her progress or Frank’s abstraction from “Frank da Tank” to “list of names friends and family use to refer to me.” The appropriate use of tools must ultimately be recontextualized in the product itself—Frank and Charmagne had to make their own decisions about what words, images, music, and so on to include in their pieces. It is clear from tracing their process through the micro tasks that these decisions were not made haphazardly but rather were intentional redesigns drawn from their understanding of the function tools serve in communicating meaning. As Frank described, “I think that’s what artists do. They struggle with what their pieces are about. They struggle with who they are and how they’re going to show themselves.”

The representational trajectory seems analogous to Enyedy’s (2005) progressive symbolization as a pedagogical strategy for robust mathematical understanding and diSessa’s (2004) MRC as an outcome of participation in deep scientific inquiry. Emerging work in composition also indicates that recursive attention to the relationship between ideas to be represented and the tools of the medium that afford appropriate communication is a method for improving the quality of student writing (Magnifico, 2010). The building of increasingly complex representations over time that use the tools of the medium in ways that communicate the core meaning of an idea is a learning task that many learning scientists see as valuable: “Understanding and learning how to foster metarepresentational competence is an important area of educational research” (Enyedy, 2005, p. 428). My analysis demonstrates the development of MRC from both a pedagogical perspective and the perspective of those engaged in the work.

Art Making and Design

I have argued throughout that the line between art making and literacy is blurred when one takes a representational lens to art and a production-oriented lens to literacy. In their landmark piece the New London Group (1996) proposed the metaphor of design to describe the space where representation and production come together. Specifically, the New London Group referred to three key components of design: available designs, designing, and the redesigned. Available designs refers to the resources for making meaning within the context of a specific semiotic system. In terms of the digital art production process, one can understand available designs at both the macro level (what a particular genre of digital
Designing refers to “the process of shaping emergent meaning [that] involves re-presentation and recontextualization” (p. 75). Youth artists like Frank and Charmagne engage in this process of designing using the organizational micro tasks set up for them to constantly engage with the design grammar of the artistic medium and to make representational choices that take advantage of those grammars. Finally, the redesigned is the product of design, which, according to the New London Group,

is a new meaning, something through which meaning-makers remake themselves. It is never a reinstatement of one Available Design or even a simple recombination of Available Designs. The Redesigned may be variously creative or reproductive in relation to the resources for meaning-making available in Available Designs. (p. 76)

There is some debate over how closely learners should adhere to the conventions of the medium for representation. Sefton-Green (2000a) described this as the “paradox of genre . . . student’s work is regularly praised and vilified for the same reason: it can either be too imitative and therefore not original, or so idiosyncratic that it doesn’t follow a recognised pattern” (p. 219). The New London Group (1996) recognized this tension through the redesigned as neither “a simple reproduction” nor as “simply creative” but rather a taking up of both the affordances of the design grammar(s) and a rejection of the standard by making unique, personal choices. Thinking about the art-making process as design highlights the importance of encouraging the production of representations through micro tasks and how this production engages youth in both the mastery of design grammars and an understanding of how to use design grammars to maximum effect in communicating meaning.

In the cases of the YMAOs we studied, the subject of design was always personal identity. As Frank described, he could not simply aim a camera at an external subject and shoot footage. Rather, “With it dealing with identity, I really had to think about this: ‘Okay, what part of me do I want to show?’” At the organizational level, the structure of the micro tasks was designed for youth to consider progressive representations of self—from initial ideas to pitches, storyboards, and eventually final pieces of art. At the individual level, youth engaged in these tasks as a way to track their progress generally and to struggle with specific representational decisions—such as whether to conduct a walk-and-talk or still interview—through these micro tasks specifically. The end products (as one can only understand from tracing the process through) is young artists’ mindful engagement with the tools of digital art media to represent the complicated relationship between the way they see themselves, the way others see them, and the way they fit into the communities to which they belong. Seen through the lenses of pedagogy, learning, and design, artistic production provides the next frontier for how learning scientists ought to think about learning environments.
LOOKING TOWARD THE FUTURE

This research serves as an existence proof about the important role of representation in art making and the ways in which it resembles other domains in which representation is a valued aspect of the learning process. In recent years, romanticizing creativity has stopped researchers from theorizing the depth and complexity of learning to create and share a piece of digital art (Sefton-Green, 2000b), and this research was intended to bring art back into a serious conversation about learning. There are several directions this work can go, and I want to reflect on a few productive lines of research I intend to pursue. First, I am in the process of conducting a design experiment that engages college freshmen in the production of autobiographical, digital art. One of the aims of this experiment is to take a more proactive, designed approach to the development of students’ representational trajectories. Frank’s and Charmagne’s examples (along with several others from our data) have demonstrated that it is possible for young artists to develop MRC through art making. However, I am interested in determining whether designing for MRC can lead most participants down this path. I also want to understand whether one can use MRC as a series of formative benchmarks toward successful artistic production. Second, I am interested in whether these insights are applicable to other artistic media and other spaces. Work on “studio thinking” (Hetland et al., 2007) has documented the skills and habits of mind acquired in a good visual arts classroom in an effort to answer the question “What is learned?” through participation in arts activities. It will be fruitful to understand whether young artists engage in the same representational trajectory as they work in classroom-based arts activities in both narrative and non-narrative media. Finally, if I am to argue that the use of a representational trajectory toward the development of MRC is a viable learning outcome around which to design learning environments, it will be necessary to approach the issue of transfer. As diSessa (2004) pointed out, “Whenever representational practices are well tuned to their functional niche, they are likely to be quick, effortless, and inarticulate” (p. 325). Understanding how to unlink representational practices from their context—that is, helping youth artists to understand how what they do is like science and math and vice versa—is the next step in design for constructivist-oriented learning scientists.

REFERENCES


