In this chapter, we review research on how people learn disciplinary knowledge and practice in the arts. Learning in the arts is distinct from the other subjects discussed in this handbook (math, science, history, and literacy) for three core reasons. First, the arts are centrally a representational domain and learning in the arts involves becoming increasingly aware of how representational choices communicate meaning to different audiences (Halverson, 2013). Second, form and meaning are deeply integrated in the arts; artistic representations are saturated with meaning, and subtle variations in aspects such as line quality, tone, inflection, and tempo are considered consequential to that meaning. Third, work in the arts often involves explicitly exploring and examining identity and culture, because artistic cognition is intertwined with both. We argue that these three distinctive features of arts learning have potential implications for our understanding of learning more generally.

There is a long history of research in arts education (for reviews, see Deasy, 2002; Fiske, 2000; Gadsden, 2008). However, this chapter is the first review of what we know about learning in the arts from a learning sciences perspective. We consider four complementary questions:

- What do we know about the arts within educational contexts?
- What do we know about learning in and through the arts?
- What are the features of designed learning environments for the arts?
- How can an arts-based perspective contribute to the learning sciences?

To address these questions, we look at arts in K–12 art education and other environments identified as “arts-based” and the types of learning studied therein. Arts education is often associated with four primary disciplines: drama and narrative arts, music, dance/movement, and visual arts (Fleming, 2010; Gadsden, 2008). More recently, digital media arts have entered the conversation as both a component of contemporary practice in all the other art forms and as a fifth arts-based discipline in education (Pepler, 2010).

The desired learning outcomes of arts education across these five disciplines are for learners to be able to produce and critically respond to artworks. Learners develop the ability to represent ideas through techniques for manipulating diverse materials, and the ability to analyze and interpret the forms other artists have created throughout history and across cultures. In the visual arts, tools include two- and three-dimensional visual media from paint to sculpture, physical and digital. Theater includes any art form designed to communicate a story: staged theater, creative writing, performance art, and (more recently) digital video/audio narratives. Dance involves moving in purposeful and rhythmical ways and learning to choreograph the movements of others. Music involves learning to use, compose, and perform with tools such as instruments and voice and to appreciate the performances of others. The digital media arts typically refer to creating using digital technologically enabled modes for representation including video, audio, graphic design, multimedia, virtual design, videogames, and digital stories.

Learning in and through the arts often involves multiple art forms simultaneously—particularly in digital media arts. Hip-Hop, for example, stretches across the visual arts (tagging and clothing design), music (producing beats and rhymes), theater (live performance of storied music), and the digital media arts (recording and producing albums) (Hill & Petchauer, 2013). While traditional arts education has separated artistic media into domain-specific boxes, it is clear that contemporary learning in the arts is often a multidisciplinary act that requires understanding how the tools of a given medium afford representation and communicate meaning.

In the next section, we discuss how the arts have been studied within educational contexts, beginning with a brief history of the study of cognition and learning in the arts. We review studies of learning in each of the five art forms, and then identify and discuss four broad themes: creating representations, engagement in identity processes, language development, and creativity and design thinking. We then describe the key design features of studio arts learning environments: the role of audiences, critique, authentic assessment, and opportunities for role taking. Last, we discuss how these key design features can yield new insights and directions for the learning sciences more broadly.

### Defining the Arts within Educational Contexts

#### A Brief History of the Arts and Learning

Psychologists have been studying arts since the founding of experimental psychology itself, with early experiments on aesthetic perception conducted by William James and Gustav Fechner. At the dawn of the emergence of cognitive psychology, Goodman (1976) argued that cognition in the arts involved mental processing of symbolic representations. This influential work led cognitive psychologists to study how children develop the ability to read and speak those languages of art (Goodman, 1976). Across artistic domains, these researchers have shown how children create intuitive schemas...
and notational systems to bootstrap themselves to build more complex representations before using more formal or conventional musical notational systems, story structures, and visual schemas (e.g., Bamberger, 1991; Hanna, 2008; Karmiloff-Smith, 1992; Winner, 1982). For instance, Karmiloff-Smith demonstrated how young children learning to draw a figure or play a tune first develop behavioral mastery, but with implicit representations. Then, through a gradual systematic process she terms "representational redescriptions", the representations become increasingly explicit and accessible to learners as they manipulate the representational forms with greater flexibility, such as deciding to play a portion of a tune at a faster tempo for a particular effect, or changing the position of the arms on a previously rote drawing of a figure (Karmiloff-Smith, 1992). Many academic competences—such as literacy and numeracy—generally show linear progress with age and experience. In contrast, artistic development is more ambiguous. For instance, Gardner and Winner (1976) argued for steady development in expressiveness and inventiveness in metaphorical language, pretend play, visual arts, and musical composition until about age five, and then a downward trend through middle childhood as children become more literal and conventional, resulting in a plateau through adulthood without further training in an art form (Gardner, 1982; Gardner & Winner, 1976). These assertions about artistic development are not without controversy. For instance, looking at the same middle childhood drawings, expert judges in China who value a traditionalist approach to visual art see a growth, whereas judges in the United States and Europe are more likely to see a loss in expressiveness and originality (see Sheridan & Gardner, 2012).

One way to ground discussions of artistic development has been to look at the "end state" of expert-level ability in various art forms. Experts approach their art form in qualitatively different ways from novices—in particular, they think about the whole piece in relationship to its components with greater fluidity and flexibility (e.g., Ericsson, 1996). With advances in neuroimaging, researchers have identified neurological substrates for arts expertise. For instance, Sohso (2001) described evidence from neuroimaging data (EEG and fMRI) that suggests that novices tend to approach drawing as a motoric task whereas experts' brains process it as a higher-order task.

A key line of arts learning research has been to examine how learning in a particular art form transfers to non-arts skills, competences, or outcomes (Deasy, 2002). In meta-analytic reviews of these transfer studies, Hotlet and Winner (2000, 2001) found support for some instances of transfer, but primarily asserted that claims for transfer to non-arts skills widely exceed the findings.

This foundational cognitive psychological work has provided insight into the kinds of cognition involved in the arts, the development of artistic thinking, and the nature of expertise in different artistic domains, but less on arts learning processes, noncognitive learning outcomes, and how sociocultural environments shape arts learning. Contemporary arts research in the learning sciences is exploring how to weave these dimensions together.

**Disciplinary Research on Learning in the Arts**

Much of this research explored the cognitive structures and processes shared across the arts. In addition to this type of research, there is a substantial body of research on arts learning that is focused on each of the five distinct art forms. In visual arts, researchers have described how visual arts develop and integrate habits of mind such as observing, envisioning, expressing, and reflecting (e.g., Eisner, 2002; Hetland, Winner, Veenema, & Sheridan, 2013) and have studied giftedness in children and extraordinary artistic achievements to understand high-level performance and creativity (e.g., Gardner, 1993; Simonton, 1994). Arts education research has evolved to align with changes in conceptions of visual art, the art world, and practices that are prevalent in arts education. For instance, early accounts of visual arts development focused on representational accuracy (e.g., Lowenfeld, 1957), but soon after visual arts learning became conceptualized as facility with a symbolic and communicating language (e.g., Goodman, 1976) rather than a mimetic ability, developmental outcomes such as how flexibly children learned to use media and techniques to represent and communicate were increasingly studied (e.g., Golomb, 2002; Kindler, 2004; Sheridan & Gardner, 2012).

Research in the narrative arts has focused primarily on how young people learn to create and share original narrative art. Dyson's (1997) work with elementary schoolchildren has demonstrated that kids use dramatic play and their knowledge of popular culture as key tools for meaning making through creative writing. Research focused on older learners and creative writing explores niche communities such as fan fiction Web sites—and describes how writers iterate through composition (Magnifico, 2012), use the composition process for language learning (Black, 2008), and engage in 21st-century creative production activities (Jenkins, Purushotma, Clinton, Weigler, & Robison, 2007). Beyond creative writing as a narrative art form, research explores the dramaturgical process: the telling, adapting, and performing of narratives of personal experiences (Halverson, 2009, 2012; Wiley & Feiner, 2001). This work focuses on how young people extend their narrative production from the written word to multimodal forms of communication including live performance and digital production.

Research on drama in learning is often differentiated by the degree of spontaneity present in the composition process. The most informal, creative drama is defined as "an improvisational, non-exhibitional, process-centered form of drama" (Davis & Evans, 1987, p. 262) enacted in learning environments by field pioneers Dorothy Heathcote and Viola Spolin (Heathcote & Johnson, 1991; McCaslin, 1995). Research on process-oriented drama has
Cognitive scientists have studied music extensively. One stream of research has explored how children acquire skills to sing, play, notate, appreciate, and interpret the cultural forms of music to which they are exposed and taught (e.g., Bamberger, 1991; Stalinski & Schellenberg, 2012). Researchers have also characterized the effects of musical training, such as how music instruction impacts neurological and cognitive outcomes (e.g., Schlaug et al., 2005) and how receiving musical training earlier rather than later in life improves cognitive and neurological processing and integration of musical components such as pitch, rhythm, and synchronization (see Penhune, 2011, for a review). McPherson, Davidson, and Faulkner (2012) followed more than 150 children through their musical learning, showing how music education extends beyond developing instrumental skill to deeper, more conceptual aspects of musical understanding. They document shifts in motivation, emotional expression, and identity development as young music students weave together the different aspects of their musical lives. Given the centrality of music in the lives of adolescents outside formal education, research also documents more informal music learning, such as how playing music-based videogames such as Guitar Hero helps to develop music performance skills without formal musical training (Miller, 2009).

Hanna defined dance as “human behavior composed of purposeful, intentionally rhythmic, and culturally influenced sequences of nonverbal body movements and stillness in time and space with effort” (Hanna, 2008, p. 492). Neuroscientific evidence indicates that moving develops learners' capacity for conceptualization, creativity, and memory in the same way as engagement with verbal poetry and prose (Grafton & Cross, 2008). Hanna (2008) outlined the differences in knowledge and skills required for performing (learning/imitating someone else's dance) and choreographing (making up your own dance), and argued that these two tasks are substantively different teaching and learning enterprises. From a learning sciences perspective, dance provides an opportunity to engage with embodied forms of thinking and learning and to use the body as a conduit for the development of symbolization (Hanna, 1987; see Abrahamson & Lindgren, Chapter 18, this volume).

Learning in digital media arts is a natural topic for learning scientists, because the learning sciences are centrally concerned with how technologies are used in distributed cognitive systems. In fact, the digital media arts have reinvigorated an interest in the role of art making more generally as a path for productive learning. For example, Ito and her colleagues’ extended ethnographic studies of kids’ technological lives identified “creative production” as a core form of participation in the digital world (Lange & Ito, 2010). There is now substantial research on specific forms of digital art making including videogame design (e.g., Salen & Zimmerman, 2004), radio production (e.g., Chávez & Soep, 2005), video production (e.g., Halverson, 2013), and computational textiles (e.g., Buechley, Eisenberg, Catchen, & Crockett, 2008).

How do People Learn in and through the Arts?

In the following, we identify four broad themes that apply across all arts disciplines: creating representations, engagement in identity processes, language development, and creativity and critical thinking.

Creating Representations

Constructionism, a theoretical framework central to the learning sciences (see Nathan & Sawyer, Chapter 2, this volume), posits that learners create their own knowledge by building physical artifacts and that this gradually leads to the construction of conceptual representations. The sociocognitive approach extends Piaget’s original claim by proposing a distributed approach to conceptualizing learning, where teachers and learners work together to design and create an external, public artifact (Kafai, 2006; Papert & Harel, 1991). The externality of physical artifacts—whether sculptures, models of the solar system, or videogames—makes visible the understandings, discoveries, and misconceptions inherent in learners’ evolving designs, opening up the possibility for critique by knowledgeable others (Kafai, 2006). Just as representation is an integral process to art making, the design and critique of external artifacts is central in arts learning. Whether the artifacts are paintings, poems, lyrics, dramatic performances, or interactive games, art education primarily involves perceiving, creating, and reflecting on artifacts and the processes involved in making them.

Goodman (1976) argued that art making is a fundamentally representational domain. Producing art is a communicative act that requires learners to master the representational tools of the artistic medium. In learning sciences research, the capacity to construct an external representation of a complex idea is a marker of mastery in many disciplines (Enyedy, 2005; see also Eisenberg & Pares, Chapter 17, this volume). Tools for representation vary with the forms of language described earlier; dance requires bodies, digital media requires multimodal tools, and the visual arts require everything from paintbrushes to clay. To use tools effectively, artists must have an understanding of the design grammar within which they are working and have a sense of how the tools support communication within a specific context (Halverson, 2012). It is not enough to know how to use an audio editing tool like Garage Band; art makers must understand what forms of audio editing are expected and acceptable if they are aiming to produce a piece of documentary radio.
Halverson (2013) proposed that digital art-making processes can be understood as "representational trajectories" that culminate in the creation of digital artifacts. To successfully create a digital artifact, a learner must understand the relationship between the idea to be communicated and how the tools of the digital art medium can be used to communicate that idea. This process mirrors the progressive formalization of representations valued in math and science education (Azevedo, 2000; Entz, 2005), which results in metarepresentational competence (MRC) that marks deep engagement with complex content (diSessa, 2004).

Learning in the digital media arts has a close connection with learning in technology, because digital media arts production requires a fairly sophisticated ability to use computer technology, in some cases even computer programming (Clark & Sheridan, 2010; Peppler, 2010). Learning environments in STEM disciplines have begun to incorporate rich representational forms, for instance by incorporating digital video production into science inquiry as a method for measuring competence with scientific constructs and science identity (Calabrese-Barton & Tan, 2010). In learning to produce digital media arts, young people engage with technological tools that support the representation of complex ideas over time, and this is a goal of many reform-oriented learning sciences curricular efforts (see Songer & Kali, Chapter 28, this volume).

Engagement in Identity Processes

Studies of the role of the arts in learning have described the psychosocial benefits of arts participation in broad identity terms, such as how participation in arts organizations supports positive developmental trajectories for young people, especially those who do not affiliate with mainstream academic settings (Ball & Heath, 1993; Heath, 2000). Specifically, participating in arts-based activities supports identity exploration by "placing oneself in the center of a work as observer and actor" (Gadsden, 2008, p. 35). While there is evidence that this form of identity exploration is relevant for learners starting in early childhood, the primary focus of identity exploration work is in adolescence. For example, at Teen Talk, a theater program run through a Boys and Girls Club, McLaughlin and colleagues described the journey of one actress over the course of a given performance:

"During the next half hour Rosa is, in turn, a pregnant mother, the bereaved friend of a drunk-driving victim, and the child of abusive parents. When not portraying one of these characters she takes her turn as both backdrop and stagehand while other players act out scenes (McLaughlin et al., 1994, pp. 76–77).

Drama provides Rosa with the opportunity to experiment with potential selves: What would it be like to be a pregnant teen? Rosa is able to step into those shoes without actually having to go through a pregnancy. In addition, learners are free to take on roles that they would not likely be given the opportunity to take on in "real life." In their community-based theater work with youth, Wiley and Feiner described how one youth with multiple sclerosis had the opportunity to try on a different kind of physical self: "She relished the opportunity to shed her reputation as a klutz, and the rest of the group supported her in taking on the challenge of adapting a role with few lines of dialogue but tremendous physical presence" (Wiley & Feiner, 2001, p. 128).

Identity explorations through the arts have proven especially productive for populations who feel marginalized from mainstream institutions. Ball and Heath (1993) demonstrated that, through dance, young people embraced and expressed their ethnic selves. Halverson (2005) demonstrated that queer youth explore possible selves as they perform the narratives of their peers, literally trying on identities that they had never before imagined for themselves. Artistic production also supports youth as they engage in detypification, a mechanism for affiliating with a traditionally stigmatized identity in a positive way (Halverson, 2010a). Fleetwood's (2005) work with adolescents participating in digital media production demonstrates that art making encourages discussions about the construction of stereotypes, their function in art, and how these stereotypes reflect individuals' experiences.

Finally, participating in art-making processes can support both individualistic and collectivist conceptions of identity (Halverson, Lowenhaupt, Gibbons, & Bass, 2009). Researchers who study identity development tend to conceive of "identity" as a property of an individual (e.g., Fleetwood, 2005; Wiley & Feiner, 2001; Worthman, 2002). However, in some communities, the collective group itself has a prominent role in both the process and the products of students' art (Bing-Canar & Zerkel, 1998; Mayer, 2000). In more collectivist-oriented communities, groups (as opposed to individuals) often determine the topics of youth art and co-compose the products, taking over from one another based on availability, expertise, and interest. Halverson and colleagues provided evidence that adolescents use artistic production to explore collective identity development, specifically in rural communities that orient their young people toward community-oriented visions of identity. In their study, one artistic director describes youth film as "not only ... the story of the individual artist, but it also has this indigenous sense in that it is a collective story of the community and of the people, and of the timelessness of a lot of the stories that are within there" (Halverson et al., 2009, p. 32).

Language Development

While engaging in arts practice, arts learners work with the tools of the medium to communicate to an imagined audience. Across narrative artistic
forms, language is a core tool for communication, and participation in arts practice provides unique opportunities for language development (Heath, 2004; Soep, 1996; Worthman, 2002). Heath (2004) pointed out the wide variety of oral and written language activities that learners participate in while engaged in arts practice, including group composition, journal writing, and editing. Members of arts organizations learn to be flexible in their use of language, as the different roles they take on in performance and within the organization require a variety of language resources.

The narrative arts are most directly linked to the development of language. In theater programs where students create their own pieces for performance, they use language as a meditational tool for sense making and empowerment (Worthman, 2002) to construct a representation of self and/or community that can be shared with a public audience. As a result, the majority of their work focuses on linguistic decisions: Should a new character be included to represent a certain aspect of the narrative? Should an individual's narrative be sacrificed for a broader cultural point through the combination of multiple languages or through changing one of the characters' core features, like gender? (Halverson, 2010a). These questions make clear that there is a reciprocal relationship between the development of language and the development of self, as learners negotiate how to represent themselves through language.

The New London Group (1996) first argued that our conceptions of literacy should be expanded to include multiple forms of communication. The digital media arts include not only language, but many other modalities of communication: still and moving images, sound, and music. This shift in thinking has been accelerated by the increasing accessibility of simple digital media tools. There is ample evidence that learners build language skills through their participation in digital media arts learning, including digital storytelling (Hull & Nelson, 2005), filmmaking (Fleetwood, 2005; Halverson, 2010b; Mayer, 2000), radio production (Chávez & Soep, 2005), and appropriation—sampling and remixing media content (Jenkins et al., 2007).

Creativity and Design Thinking

Creativity is not unique to the arts; many national and international standards documents for STEM education describe creativity as a desired characteristic of learners across all disciplines (Sawyer, 2012). Here, we focus on dimensions that are central to inquiries at the intersection of the arts and learning sciences—the qualities of both individual and group creativity processes and experiences and insights into how creativity can be evaluated in designed learning settings.

Historically, creativity has been thought of as an individual trait (Sternberg, 1999; 2006). Csikszentmihalyi's (1990) influential work on flow shifted the focus from creativity as belonging to an individual, to identifying the qualities of subjective experience that have ties to creativity. Flow refers to the phenomenological experience of being deeply immersed in an activity, including a sense of intense focus, agency, lack of self-awareness, and a distortion of the experience of time (Csikszentmihalyi, 1990). Flow is intrinsically rewarding, and flow encourages the deeper and more sustained engagements that support creative endeavors.

While flow was initially conceptualized as an individual experience, artistic endeavors often involve groups and creativity often emerges from collaboration (Sawyer, 2003). For instance, Sawyer and DeZutter (2009) provided evidence that creative arts processes are distributed cognitive endeavors by tracing the development of group theatrical performance.

Creativity and design thinking share many characteristics. Research in creativity has focused more on original, novel outcomes and the kinds of thinking that cause or are associated with those outcomes, while acknowledging also that some artistic areas, such as traditional Indian dance, demand "vertical creativity": small innovations on a common artistic form (Keilänen, Sheridan, & Gardner, 2006). Research on design thinking has focused on the iterative process involved in planning, creating, testing, and revising ideas and products for a variety of ends such as coherence, functionality, craft, suitability for audience, along with originality. One of the key contributions of the learning sciences has been to clarify the different components of the creative process involved in design.

While the specifics vary across creative domains such as architecture (e.g., Schön, 1988), digital and video narratives (e.g., Halverson, 2012), engineering (e.g., Campbell, Cagan, & Kotovsky, 2005), and game design (Salen & Zimmerman, 2004), researchers have identified common aspects of an iterative process that moves from an initial phase of exploration and ideation—which often involves finding or describing a problem—to the construction of drafts, sketches, and prototypes that pose potential designs or solutions, to reflection on these through some process such as critique. This creative process is iterative, with a move toward a refinement of the design, often ending with some form of sharing the product either through use, exhibition, sale, or performance (Cross, 2011). Likewise, there are commonalities across design problems and domains in the kinds of thinking encouraged at different stages in the creative process. For instance, in the ideation phase, educators and researchers have highlighted the importance of thorough exploration. In their classic study in the visual arts, Getzels and Csikszentmihalyi (1976) found exploratory behavior before completing an artwork to be strongly associated with work that was judged to be more creative, and furthermore with more general judgments of creativity and artistic success in later years. Hetland and colleagues (2013) identified "Stretch & Explore" as one of the habits of mind repeatedly encouraged by visual art teachers through strategies such as generating multiple drafts, working from multiple exemplars, explicitly trying out different techniques, shifting...
points of view, and mid-process critiques of multiple versions. Likewise, studies of more structured design problems describe the need for educators to support learners past an “early commitment pitfall” by allowing ample exploration time with tools and materials before posing explicit design problems (e.g., Kafai & Resnick, 1996; Puntambekar & Kolodner, 2005). In engineering design, researchers identify an analogous problem of “design fixation” where designers fixate on a less than optimal design decision and fail to envision meaningful alternatives (Jansson & Smith, 1991; Purcell & Gero, 1996). To overcome design fixation and early commitment, learning environments should provide diverse exemplars and scaffolding tools that encourage multiple design generation (e.g., Puntambekar & Kolodner, 2005; Purcell & Gero, 1996).

### The Design of Arts-BaseJ Learning Environments

Hetland and colleagues’ (2013) intensive study of high school visual arts studio classrooms described three flexible studio structures that were characteristic of visual arts instruction: Demonstration-lectures, where problems are posed and tools and techniques are shown; Students-at-Work, where students work on the posed problem while the teacher circles around offering individualized direction and feedback; and Critique, where students and teachers pause to reflect on and discuss students’ work-in-progress or completed works. These structures were used fluidly in varying sequences, with the bulk of time spent in students-at-work. A fourth overarching structure, Exhibition, where works are created and curated to be shown to outside audiences, exists outside the classroom but informs work within it. Additional insights into design features of arts classrooms have come from the United Kingdom, where media studies have made their way into the formal curriculum; these studies describe attention to audience, the role of representation, and use of media language as core components of the designed space (Sefton-Green & Sinker, 2000).

In addition to these studies of school-based arts classes, there has been substantial study of arts learning in informal environments such as youth organizations, community centers, after school programs, and museums (e.g., Chávez & Soep, 2005; Halverson, 2012; Heath, 2000; Sheridan, 2011; Sheridan, Clark, & Williams, 2013) and in self-directed arts learning communities on the Internet (Jenkins et al., 2007; Lange & Ito, 2010; Magnifico, 2012; Sheridan, 2008). In both formal classrooms and in these informal arts learning environments, there are four features associated with effective learning that we discuss in the following sections: attention to an authentic audience, a focus on critique, authentic assessment embedded into both the process and the product, and opportunities for role taking.

### The Role of Audiences

Meaning is co-created by artists and their audiences. When people are learning to produce art, they often talk about how external audiences will receive the product (Halverson, 2012; Halverson et al., 2009; Heath, 2004; Wiley & Feiner, 2001; Worthman, 2002). How will the product be perceived and understood? What emotions, feelings, and ideas may the work evoke? In the arts, consideration of the audience is embedded throughout the creative process. First, how art is conceptualized is in part based on who the art is presumed to be for. Fleetwood (2005), for example, described her work with African American youth who employ visual tropes as “racialized” stereotyped images that make their social identities easily identifiable to an external audience. These visual tropes, while potentially offensive to community insiders, serve a function for unfamiliar outsiders. Learners choose whether to include these potentially offensive images in their artwork as they consider who the final audience for their work will be. The decision is made early on, while engaged in compositional decisions. Second, arts learning involves frequent peer and expert critique (e.g., Hetland et al., 2013), where at each stage of the work, the learner must explain and defend the evolving work to this immediate audience. Finally, the sharing of completed work with an audience often serves as an assessment or an evaluation of the work itself (Buckingham, Fraser, & Sefton-Green, 2000; Halverson et al., 2012).

### Critique

Studio art teachers dedicate large portions of instructional time to engaging learners in discussions of works-in-progress, specifically asking about the artist’s intent, talking about the apparent intent as represented in the unfolding work (which is often quite different from the artist’s intent), and providing suggestions for improvement (Hetland et al., 2013). Through critique, learners develop what Hetland and colleagues (2013) refer to as “Studio Habits of Mind,” which include engagement and persistence, envisioning possibilities, observation, and reflection. Soep (1996; Chávez & Soep, 2005) has worked across media — from the visual arts to digital video and radio — and has shown that when learners participate collectively in arts practice, they work together to learn the language of critique, developing a discourse similar to that of professional artists. These same conversations are apparent in communities of youth game designers as they evaluate the games created by other young learners (Peppler, Warschauer, & Diazgranados, 2010). Halverson and Gibbons (2010) found that arts organizations offer “key moments” in the artistic production process where learners must stop and talk about the idea they intend to represent and how they plan to use the medium to represent that idea. The use of critique as a form of authentic assessment has the
potential to transform the way we understand learning in many non-arts disciplines that involve the production of artifacts.

**Authentic Assessment**

A long-standing criticism of arts education is that there is no way to objectively evaluate what and how people learn. Some have argued that schools only value what can be objectively assessed, and this inability to objectively assess arts production has destined the arts to remain peripheral in schools (Eisner, 2002). However, in all arts disciplines, evaluation is central to the creative process. Sefton-Green and Sinker’s (2000) collection of essays offers examples of how creativity is evaluated across artistic disciplines including music, drama, and the digital media arts.

Arts-based learning environments design opportunities for feedback throughout art making, and to have learners’ finished works received by an external audience that is motivated to engage with the work. Each artistic discipline struggles with the question of how to evaluate arts learning and the relative emphasis to put on artistic process and products.

Process assessments include the critiques described earlier, “key moments” in art-making processes that afford reflection and articulation of progress (Halverson & Gibbons, 2010), and the documentation of work over time that can be used to create a post hoc construction of the art-making process. All of these methods point to the creation of a trajectory of participation that values progress, failure, iteration, and reflection as learning outcomes.

Treating process as a legitimate component of the assessment of learning is a major contribution of arts-based learning environments to the broader learning sciences discussion of innovative forms of assessment (see Pellegrino, Chapter 12, this volume).

Coupled with a focus on the assessment of process must also be a focus on what is produced. When creative products have been evaluated in research, Amabile’s (1982) consensus assessment technique (CAT) – where two or more experts rate the quality and creativity of diverse artistic products, and assessed for blind inter-rater reliability – has been an important and consistently effective tool (Baer, Kaufman, & Gentile, 2004). Expert judgment is also used in standardized arts assessments such as the Advanced Placement and the International Baccalaureate.

One of the challenges of assessing artistic products is that criteria and/or standards of quality in the arts are culturally situated and therefore often changing (Ito et al., 2008; Sheridan & Gardner, 2012). This cannot be avoided, because developing, understanding, and applying culturally situated evaluative criteria is often a marker of artistic expertise (Halverson et al., 2012). Sefton-Green (2000) argued that assessment begins when a piece of art meets an audience. Empirical studies of film audiences have demonstrated that audiences use consistent criteria to evaluate the quality of films, whether the films are produced by professionals (Sheridan, 2008) or by students (Halverson et al., 2012). These criteria focus on locating the artwork within a genre, evaluating how successful the work is in embracing the standards of the genre, and whether the filmmaker innovates at all within the genre. Simply put, one powerful method for evaluating artistic products is to share final works with external, interested audiences.

**Opportunities for Role Taking**

Earlier in this chapter, we described the important role that the arts can play in learners’ engagement with identity processes. One of the key psychosocial mechanisms for identity is role playing, both within the context of the performance arts and in the organizational work of many arts-based learning environments. Particularly during out-of-school time, learners take on varying roles within the environment, often assuming leadership and mentoring positions (Chávez & Soep, 2005; Heath, 2000, 2004; Jenkins et al., 2007; Sheridan et al., 2013). Many of these learning environments are communities of practice (see Greeno & Engeström, Chapter 7, this volume) where participants move from legitimate peripheral participants to central leadership figures over time (Wenger, 1998). Heath (2000, 2004) described the necessity of role taking for arts organizations that depend on artistic performance or showcase for sources of revenue that keep organizational practices alive. Without youth leadership across a variety of tasks, from ticket sales to marketing, the organizations would not continue to survive. Most arts-based production work encourages (and sometimes requires) learners to generate their own production ideas, developing reciprocal relationships with adult mentors who can offer professional expertise around idea development and use of tools for representation (Halverson, 2012). This form of role taking emerges frequently in arts-based learning environments, and requires negotiation as young people seek to balance participation in these settings with their prior experiences that separate adult-controlled and youth-controlled spaces (Ball & Heath, 1993; Chávez & Soep, 2005; Sheridan et al., in press).

**Contributions to the Learning Sciences**

We began this chapter with a focus on three concepts central to arts: the centrality and richness of representation in arts, the integration of form and meaning, and the examination and exploration of identity and culture in arts learning. Each of these concepts has both a cognitive and a sociocultural component, made seamless in arts practices, and the elucidation of each lends important insights to the learning sciences. Likewise, we have argued that the learning sciences perspective has added to arts learning research by integrating sociocultural theory, noncognitive learning processes
and outcomes, and explicit accounts of the design of learning environments into our growing understanding of learning and the arts.

In terms of representation, we see across the arts a consistent focus on how the tools of each medium influence the representations that are created, and how the generation of successive representations demonstrates a growing understanding of what is being represented. It is through this process that artists develop metarepresentational competence (diSessa, 2004) and through which they develop a sense of the social and cultural context for their work through critique and the presence of audiences. Learners' representational trajectories chart their paths from initial conception to final piece, highlighting how successive representations are both opportunities to assess progress and themselves and evidence of a growing understanding of the importance of representations for "getting smart" in the arts (Halverson, 2013).

Representations in art are relatively replete (Goodman, 1976) with form and meaning inseparable. In addition, art representations regularly shift with changes in arts practices, tools, and media. These features suggest a need for learning environments that are likely to be different than those associated with STEM disciplines. Key practices in arts learning environments — such as analyzing professional works of art in relation to the problems youth are working on, ongoing individualized and iterative support from teachers during the work process, and mid-process critiques — support youths' understanding and development of artistic habits of mind (Chávez & Soep, 2005; Hetland et al., 2013). As new media design tools — for video, interactive game design, or music — have become increasingly accessible, they are often used as tools for learning across the academic disciplines. Insights from traditional studio arts environments on how to support the design process in diverse media are critical, but often underused (Peppler, 2010; Sheridan, 2011; Clark & Sheridan, 2010).

Finally, identity plays an important though often neglected role in learning (see Nasir, Rosebery, Warren, & Lee, Chapter 34, this volume). We have argued that the arts add depth to our understanding of how learners engage with identity. Through artistic production, young artists explore possible selves and engage in detypification. Art making can potentially accommodate both individualistic and collectivist conceptions of identity (Halverson, 2009). Exploring possible selves is one form of role taking; another is the role taking that occurs as artists move from legitimate peripheral participants to central participants, and eventually become mentors (Sheridan et al., 2013). Arts environments provide opportunities to understand how identity is explored and constructed through participation in learning environments.

Learning scientist Seymour Papert said that watching an art class was the original inspiration for his influential writings on constructionism; he envisioned how other academic areas could attain the same level of engagement with an external, public, and evolving representation of learners' thinking that he saw as children carved soap sculptures (Papert & Harel, 1991). We see this chapter as building on Papert's initial inspiration, identifying further potential for the learning sciences and education from studying arts learning, and identifying ways a learning sciences perspective can broaden and enrich our understanding of arts education.

References


