A PRACTICAL GUIDE TO OPEN PORTFOLIOS

Maker Ed

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CHAPTER 1

GETTING STARTED

Portions of this chapter and other chapters are drawn directly from briefs in our 2015 Open Portfolio Project Research Brief Series, available at MakerEd.org/OPP. **The text is re-contextualized for this particular Practical Guide to Open Portfolios.**

Why Portfolios?

Historically, portfolios have been actively used by designers, artists, and engineers as a tool within industry and academia (e.g., admission to schools, securing employment, etc.). Others have used portfolios as a tool for learning and reflection, creating opportunities for examining both the whole of one's work as well as the learning process over time. No matter what the context, portfolios have proven instrumental for learners to develop their identities through the curation of their work and artifacts—be it within art, design, writing, engineering, and, especially now, anything that involves making.

Today, particularly within the K–12 educational environment and into higher education as well, there is a rising interest in revisiting the value of portfolios. Capturing and documenting one's work plays a strong role in enabling students to reflect on their own learning and development. Those artifacts can show a depth that grades may not capture or convey, especially important in display to parents, teachers, and other stakeholders. They are a way for youth to showcase their abilities, whether they be academic knowledge, socio-emotional capacities, or technical skills, all of which are often categorized into "hard" and "soft" skills. Portfolios may show a professionalism beyond the norm and ownership of one's work. A single project or artifact can prove that a student has completed something from beginning to end and can demonstrate his or her process, development, and skillset.

In today's digital age, it is particularly important to have agency over — and curate—one's own identity and work for display. In connection with the broader maker movement, known to be a generous community excited to share work and wisdom, portfolios are also an opportunity for students to curate their work, evolve their identities, and find a voice within their social communities. Having an online presence is an opportunity to build an aesthetic, contribute work to share with the greater world, access a genuine audience, even build a brand. These perspectives allow youth to step beyond the classroom — into their communities and the greater world — and see that their work is important outside a grade or a teacher's judgment. Portfolios also help bridge the gap between formal and informal learning, allowing for the collection and curation of learning across multiple settings and along a continuum of growth.

Most significantly, portfolios serve as a crucial tool among all formative assessment methods. They can provide a richness that captures depth of learning, voice, and skills that a flattened test score simply cannot show. They are a promising alternative to the limitations of today's standardized testing. And new technologies present particularly exciting opportunities to rethink and reshape this landscape.

In many ways, it's easy to explain why portfolios are important. It's less easy to actually facilitate the creation of them. And this topic remains the motivation for the creation of this guide.

Supported by the Gordon and Betty Moore Foundation and in collaboration with Indiana University's Creativity Labs, Maker Ed's Open Portfolio Project aims to develop a common set of practices for portfolio creation, reflection, sharing, assessment, and technology solutions for an open, decentralized, and distributed lifetime portfolio system for makers.

Phase 1 of the project, which took place between late 2013 and early 2015, situated our work and research within the historical landscape of portfolio use and particularly within the context of making-centered learning. While primarily focused on research, the Open Portfolio Project also seeks to link critical research to the realities of practice. As such, this guide highlights and zeroes in on what is most useful for practitioners—inside and out of classrooms—who are actively facilitating the creation of student-led, student-driven portfolios.

For more information and findings from Phase 1 work, as well as updates on our current Phase 2 work, please refer to MakerEd.org/OPP, which also offers the comprehensive set of the Open Portfolio Project Research Brief Series.

Portfolio Types: An Overview

Portfolios have often been described as a collection of artifacts that can be assessed for a variety of educational and professional purposes. In Phase 1 of Maker Ed's Open Portfolio Project, we first took a moment to categorize the various types of portfolios, including *traditional portfolios*, *e-portfolios*, *processfolios*, and *open portfolios*.

The table below[1] outlines these categories and the affordances of each. In some senses, the portfolios listed below may not be be as distinct as separate types, but rather, as dimensions of one another. Given both past and current conversations surrounding learning and education, alongside the affordances of digital tools, open portfolios draw elements from all types listed.

1. Drawn from Research Brief 1: "A Networked Vision for Sharing and Documenting"

Type	Description	Use	Considerations
Traditional	A physical sample of one's work (e.g., artwork, images, designs, papers, work samples, and/or other artifacts), compiled over a period of time.	Often used for the purposes of assessing performance or progress, as well as for college entrance or job applications.	Given the physical nature of many of the assets included, they can be difficult to share and face limitations in today's digital age.
e-Portfolio	A collection of electronic evidence assembled and managed by an individual, usually online. Such work may include inputted text, electronic files, images, multimedia, blog entries, and hyperlinks.	Can be considered demonstrations of a maker's abilities and as platforms for self-expression. If they are online, can be maintained and shared dynamically over time.	Some e-portfolio applications permit varying degress of audience access, which can include general posting to social media or more restricted access to personal contacts, potential employers, or admissions committees.
Processfolio	Designed to capture both the finished product as well as the process of creation over time.	Can present several unique opportunities to heighten learning by making the thinking around the process of creating visible.	Puts emphasis on "process," an important aspect of learning that often goes undocumented when the focus is on finished artifacts.
Open Portfolio	An openly networked, decentralized, and distributed portfolios system in which the maker maintains control of the content and curation process. Ideally, the platform would be a highly social, open environment and be synced across mobile platforms to enable easy upload, capture, and showcase of work work-in-progress, and processes of making.	Can be a central tool for lifelong learning and a viable alternative to contemporary assessment practices, while leveraging new technologies and skills.	Open online platforms can make learning resources abundant, accessible, and visible across settings.

Of important note, we envision open portfolios as learner-driven, learner-managed, curated collections of artifacts with connecting narratives. These artifacts are not necessarily elegant snapshots of a final, refined product, though they certainly can be; rather, artifacts of work can – and should – also include glimpses into the process and effort undertaken. There is much learning and growth encompassed into those in-between stages.

Digital binders of files and learning management systems that track assignments can support the development of an open portfolio, but they are not necessarily portfolios in and of themselves. Rather, they serve as steps towards empowering learners to design, collate, and create their own creative documentation of their voices, abilities, and interests.

Survey of Maker Sites and Portfolios

As making and maker education grow as a movement in education, industry, and other fields, we seek to learn more about spaces and places that value and incorporate making—particularly if and how they view themselves as educational spaces. Consequently, as part of Phase 1 of the Open Portfolio Project, we reached out to an array of what we termed "maker sites"—including school-based maker education programs, out-of-school-time settings, hackerspaces, and other community-based organizations with maker programming—to learn more about where they're situated, who they serve, and the kinds of activities in which their members regularly engage.

The survey answers and findings helped shape our current knowledge of where and how portfolios fit into making. In addition, we sought to better understand how portfolios connect to the current policy landscape (particularly the alignment with science, technology, engineering, and mathematics [STEM] fields). As the practices and patterns of maker-centered learning continue to emerge, we are noticing commonalities in what sites self-report about their spaces, programming, and audiences. An overview of the main findings are outlined below.

Diversity: Despite the origins and association with well-to-do hobbyists, making looks and feels very different from one place to another. The growing collection of maker opportunities help to shape the diverse definition that we innately love and celebrate. We see this in the variety of names used to describe a makerspace, the array of materials being utilized at each site, the various offerings and programs that each provide, and the diversity of race and ethnic backgrounds of the youth attending programs at these sites.[2]

2. For more information, learn more in Research Brief 6: "Survey of Makerspaces, Part I"

Alignment and integration: Sites spoke not only of the connection between making, numerous traditional subject areas, and Next Generation Science Standards (NGSS), but also of the "soft" skills that are developed through the vehicle of making. Such skills—such as creativity, innovation, communication, collaboration, critical thinking, problem-solving, and adaptability—are just as important as content knowledge and technical skills. Many sites reported that making does indeed align with standards and is crucial in developing the 21st-century skills our youth need to succeed.[3]

3. More insights available in Research Brief 7: "Survey of Makerspaces, Part II"

Value of portfolios: When asked about their thoughts on documentation and portfolio work, all sites stated that documentation was important to them. Survey responses even indicated that feedback and reflection practices were recognized as crucial to a youth's learning process. At the time of the survey, some sites had started developing steps for encouraging documentation and capture of youth work, while others already had a system in place. And yet others noted that portfolios were a milestone far into the future, with their current priorities and time spent more on the day-to-day operations of running a space or program.[4]

4. Check out Research Brief 8: "Survey of Makerspaces, Part III" to learn more.

Designing for Portfolios and Goals

Through our work in Phase I of the Open Portfolio Project, we studied a variety of schools and informal educational institutions to arrive at several ideas related to the effective design of portfolio practices. One particular insight continued to stand out: the need for portfolio development to simply be an ingrained part of the making process, instead of standing apart as an addendum. When educators set the stage by establishing expectations and creating time to capture photos and video, reflect, and share, youth will do just that. And in the process, their focus on making expands beyond just the product or project itself; it grows to encapsulate their efforts on both the making and the documentation of their work.

Before diving into practical tips, though, it is first crucial to consider what youth learning outcomes you, as the educator, are seeking to see and assess in both the learning and the portfolio artifact. Is it content? Is it soft skills? A mix of both and more? As with the development of any curriculum or lesson plan, working backwards helps to clarify what purpose a portfolio can serve. It also aids in identifying the indicators and evidence that demonstrate understanding of information, acquisition and familiarity of hard skills, and the development of soft ones.

How to Use this Guide

The remainder of this guide sets up a loose framework for how you may start to facilitate portfolios with youth, as well as how you might extend and deepen the work as you go. As with any learning, this is an opportunity to design the learning experience for your students. Consider how the elements tie together, which ones are most important to you, and how you can start small. The chapters in the guide are in an approximate chronological order (and priority) to how you may begin thinking about portfolios. While not necessarily a linear pathway or a step-by-step process, the headline topics do stitch together into a larger narrative and will help you pinpoint the main opportunities and challenges for your specific learning environment, goals, and audience.

Of note, there is not a full chapter on Assessment in this guide. Rather, assessment ideas and examples are integrated throughout numerous chapters, often focused on determining and identifying the outcomes and indicators of learning that we care most about. As an educational system, we sit at a time in which these questions – connected to standardized testing and authentic assessment – are ripe for redesign, rediscussion, and review. As such, we pose many questions and hope to learn from our research in the upcoming year – and from you too! Ping us with emailed thoughts to opp@makered.org or via Twitter with #openportfolios and @MakerEdOrg.

As an ongoing project, this Practical Guide to Open Portfolios distills our findings and insights AND serves as a point of an ongoing and exciting conversation around assessment and portfolios. We anticipate that this is the first version, and we plan to update and release this guide again in late 2017. At that point, assessment will likely warrant its own book!

PURPOSE, MOTIVATION, AND JUSTIFICATIONS FOR PORTFOLIO USE

We have found it important, early on, to clarify your intended purpose, as an educator and practitioner, for the portfolios being created. This clarity helps orient and guide your youth, stakeholders, parents, administrators, and other educators to best understand, implement, and support portfolio efforts.

In addition, included are examples of learning frameworks related to maker education and the 21st century skills they enable, as well as prompting questions to help educators consider how portfolios may reveal the development of those skills.

INTEGRATION AND LANGUAGE

For some, the act of documentation is seamlessly integrated into the design and display of artifacts, activity stations, and the physical space. For others, it starts as an internal process, then carefully spreads and engages with a wider audience. We explore best practices in how to support thinking with documentation and how to integrate it naturally into practice and how it grows into a full portfolio of work.

A common challenge is how to motivate youth to capture their work during the process of making and learning. We explore ideas around when to ask questions (or provide prompts) and what questions to ask; how to encourage reflection at various ages; and how to encourage the collection of the process, not just the final product. In addition, included are examples of learning and design frameworks within which to situate portfolio practices.

PORTFOLIO EXAMPLES

We recognize that seeing examples of portfolios is important to understanding how, why, and where they can be utilized in your particular environment. We share an array of portfolio examples, all either made solely by the youth or in collaboration with a facilitator: individual, longitudinal portfolios showing the work, evolution, and growth of one maker over time; group portfolios reflecting the work of a team, class, or club; and portfolios centered on one, in-depth project, either by one or many young makers.

In addition, especially with those portfolio examples drawn from our research field sites, we provide additional background context for the premise of portfolio creation, including educator intentions, the evolution of how portfolios have been facilitated and used in that space, and even anecdotes related to individual examples. A long list of questions at the beginning of the chapter is also available to help you think through the examples you're viewing. Whether you're giving the portfolio a cursory glance or spending a good amount of time digesting each, the questions hopefully guide your focus, enabling you to consider a variety of perspectives and important elements, as well as the portfolio as a whole.

TOOLS FOR CAPTURING

Key to capturing work and creating portfolios is the need for tools to document making over time. We highlight hardware and software tools for documentation, including do-it-yourself (DIY) documentation stations and how they may help young makers explore and start thinking about their own open portfolio needs and wishes. We focus on open, free, and accessible tools for use in any learning space.

This chapter is intended to provide ideas and options for how you might enable documentation in your learning environments. We are asked often and early about tools, and while we encourage taking a step back to initially consider the big-picture purposes and motivations of portfolios, we recognize the importance and necessity of tools – and platforms in the next chapter!

PLATFORMS FOR RECORDING, STORING, AND SHARING

Finding a platform that is accessible, digital, flexible, accommodating of different kinds of media, stable, archival, and ideally free is no small task. Ultimately, the best platform or combination of platforms for any space depends on what features and functionalities are deemed most important. While there may not be one magical, commercially available platform on the market to date, we highlight the variety of platforms that makers and learners use to display their work in an open and decentralized nature that allows for various levels of sharing and access.

DESIGN WORKSHOPS

This chapter contains a run-down of the design workshops we ran, as part of our initial phase of 10 field site visits, as well as part of national conferences and the beginnings of our second phase of work. The workshops continue to change and grow and have taken on new iterations in the recent past. Feel free to use this information to run your own workshops, whether with educators or youth (or a mix of both!). Their actions and reflections – and your facilitation – may inform and inspire your approach to portfolios.

Conclusion

While this work will continue to evolve, we hope this guide provides a strong foundation for portfolio creation and use in your space. Ultimately, as we make the case for open portfolios being a valuable, authentic means of assessing learning, we hope that you will continue to explore with us, provide feedback, and shape a youth's ability to not only archive work but also capture and show his or her voice.

CHAPTER 2

PURPOSE, MOTIVATION, AND JUSTIFICATIONS FOR PORTFOLIO USE

If you were to stare at two screens side-by-side, one displaying a list of subjects and grades and another showing photos, written paragraphs, hand-drawn sketches, perhaps even a video, which would provide you with a better understanding of the learner in question? From a student report card that shows a B+ for Physics, can you draw out subtle humor, a sense of self-awareness, or the skill and practice required to adeptly handle a power drill? The student's understanding of content and depth of knowledge that results in a B+ may even be vague.

The grade does point to the student's ability to do well on his/her work, but that "work" sometimes remains unclear. It could involve timely assignment completion and encompass a strong grasp of mechanical concepts, but it also may not.

Portfolios that display photographs, written reflections, drawings, etc can showcase a learner's abilities, interests, voice, and thinking in a way that test scores and grades cannot. Whether or not students excel at traditional academic assessments and high-stakes testing, their A's and D's may not accurately reflect who they are and what they have to offer: they are a valuable asset to a learning community, and they have innate drive and a capacity to learn. Portfolios, however, do have the potential for showing those skills and contributions, whether developed for college and career possibilities or just for oneself. Done well, portfolio creation is a process of self-reflection, can enable a deep understanding of curating what's appropriate for the intended audience, and allows youth to design and develop artifacts that articulate their evolution of learning, making, and sharing.

Purpose and Motivation

The Open Portfolio Project aims to develop a common set of practices for open portfolio creation, sharing, and assessment. It is a large goal, and the work digs into critical challenges and uncovers pockets of insight at every turn. Started in 2013, this research investigates the utility of portfolios as a central tool for lifelong learning and as a compelling complement and alternative to contemporary assessment practices for the broader communities of makers, K–12 education, higher education, and the workplace.

While these are the project's goals, it's important for educators to consider their own intended purpose for portfolios. Purpose drives motivation – for educators and especially for youth. The project's research in 2015-2017 uncovers more insights into purposes and motivations as well, which we'll be writing about in upcoming Research Briefs.

Based on the project work, we often see two distinct goals for portfolio creation by youth. They're distinct not because they don't connect to or inform one another but because the purpose may dictate what the portfolios look like and how to motivate youth to create them.

Though we elaborate on two below, it is equally important to recognize the value in creating portfolios simply for sharing with the wider world. Project-specific portfolios are often developed to support and inspire others to replicate the work. And peer review, especially as a part of formative assessment, is often a critical element of portfolio creation.

Portfolios can be:

- For oneself. There is a unique opportunity to save and archive one's work over time, and also be able to go back and reflect upon it. As educators, we can and should set the stage so that youth have pride in their creations and accomplishments, that they find it worthwhile to show it to others, that they see learning as an ongoing, often cyclical process. Portfolios that serve this purpose are ultimately a self-reflection tool.

- For assessment by others. When the intended purpose of a portfolio is for viewing by a teacher or administrator, a job recruiter, and/or a college admissions officer, youth develop yet another skill in being able to curate their work and present an appropriate and compelling identity to a specific audience. Outside of the portfolio as an artifact itself, the content within a portfolio can be used to gauge skill development, thinking and learning processes, even project management abilities. It can show depth of understanding, competencies, self-determination, and personal interests. Portfolios should integrate narrative threads that tells coherent stories about one's abilities and overall work.

Justification

As you engage with administrators and stakeholders to move forward with this within your own learning environments, we hope the following points will be useful for your proposals and reasoning for the value of youth-driven portfolios. Please, as always, don't hesitate to share your experiences with us as well! Email us at opp@makered.org, or post your thoughts via Twitter with #openportfolios and @MakerEdOrg.

- If access and pathways to higher education is a compelling goal for implementation of portfolios, consider that portfolios are increasingly being used to augment the college and university admissions process. Schools like MIT and others have added an optional maker portfolio to the entrance process, often agnostic of department or major. Students who have documentation of their work in high school, outside of test scores and grades, may have an advantage and be able to show a different strength or skill of theirs through a portfolio submission.

- Employers continue to review a portfolio of work as one of many elements for job or internship screening. Silicon Valley companies widely comment on the fact that portfolios and interviews speak to an individual's qualifications and potential contributions significantly more than their GPA. As such, schools that are helping youth to capture and curate their work establish a strong precedent and norm.

- By compelling and enabling youth to document and keep their work, throughout their K-12 experience and beyond, we are ideally instilling in them a sense of self-worth and reinforcing the notion of learning being a lifelong, iterative process. Their work is important, and it is worthwhile to both save and show off. These small steps can lead to the growth of an individual's confidence in his or her own abilities and contributions. Over time, the collection of items also helps them to reflect on their own progress, process, and growth.

- Digital literacy and online identity are important areas that receive spotty attention and instruction. The creation of youth-driven portfolios forces a conversation around online identity, in addition to consideration of the affordances and hindrances of the Internet and digital tools. Youth have an opportunity to (learn to) control and curate their online presence, and with open access to their work through portfolios, they will be able to return, time and time again, to review and adjust what they may want the world to see.

- Artists, athletes, writers, programmers, and architects, just to name a few, have often shown their work as a measure of their aptitude and mastery. Open portfolios extend those possibilities for learners of all fields, backgrounds, and interests and can also provide youth with an authentic audience for their work.

Assessment and Learning Frameworks

As mentioned in the Getting Started chapter, the discussion around assessment as a broad notion and specifically around portfolios as an alternative assessment tool is ongoing. We expect to add more to the existing research base throughout this project and to expand upon our writing in the next Research Brief series.

In our Open Portfolio Project Research Brief 7, entitled "Survey of Makerspaces, Part II," the analysis of data collected from our 2013 site survey showed that a significant percentage of makerspaces self-reported that they cultivate 21st-century creativity and innovation skills, communication and collaboration skills, critical thinking and problem-solving skills, and life and career skills. The sites surveyed, whether they labeled themselves officially as makerspaces, innovation labs, or the like, indicated that they actively engage their youth audiences in developing 21st-century skills, as defined by the Partnership for 21st Century Learning (P21), from once to multiple times per week.

If these skills and practices are being developed in makerspaces, those environments are also ripe for better emphasizing their value. Education has never been just about learning or memorizing facts; it's about learning how to learn, which is a basic necessity for any life or career path. In "Documenting and Assessing Learning in Informal and Media-Rich Environments" (2015), authors Jay Lemke, Robert Lecusay, Michael Cole, and Vera Michalchik declare that

> *"...the learning that matters is learning that is used. This type of learning plays a role in constructive activities: from posing questions to solving problems, from organizing a group to building a simulation model, or from exploring a riverbank to producing a video documentary. In all these cases, what matters is know-how... "* (15).

They also write, *"Valued outcomes include more than just acquired knowledge. The definition of knowledge for assessing informal learning should be broad enough to include know-how and know-who as well as know-that. The assessment should examine evidence that knowledge is being used (knowing how to take the next step in an activity) and that this use persists, grows, and cumulates over relatively long periods"* (92).

A portfolio is an assessment tool in and of itself. It can show growth, application of knowledge, integration of co-learners and peers, and self-reflection of one's own understanding.

In maker education in particular, a strong emphasis is on youth-centered, open-ended, and process-focused learning. What's emerged from the field thus far is the significance of non-cognitive skill development, mixed along with learning of subject content and interwoven with growth of technical skills too. Included below are a few solid examples of learning frameworks related to maker education and the 21st century skills they enable, as well as prompting questions to help educators consider how portfolios may reveal the development of those skills and learning.

In "The Learning Practices of Making: An Evolving Framework for Design," Lisa Brahms and Peter Wardrip, researchers and learning scientists with MAKESHOP at the Children's Museum of Pittsburgh, identify and elaborate on a number of common learning practices of making. This term and the practices are "intended to guide discussions across settings about making as a learning process by identifying ways to conceptualize, support, and assess such forms of learning through design" (5). They list the following as key learning practices that one might observe at MAKESHOP, and within their framework, how those learning practices influence the design of space, activity, and facilitation and vice versa. These were developed with a museum context in mind and may translate to other educational spaces as well.

These may be practices that you pinpoint in your educational program and space too, and if so, what indicators might show that youth have developed fluency in these areas?

Inquire
Tinker
Seek and Share Resources
Hack and Repurpose
Express Intention
Develop Fluency
Simplify to Complexify

Similarly, the Exploratorium's Tinkering Studio in San Francisco has developed Learning and Facilitation Frameworks that include "dimensions of learning" and the indicators and descriptors that connect to each.

The Tinkering Studio's dimensions of learning are:
Engagement
Initiative and Intentionality
Social Scaffolding
Development of Understanding

These, like the learning practices from the Children's Museum of Pittsburgh, start to help articulate the learning that maker education—and related approaches, environments, and experiences—can enable. In turn, we can also begin to investigate how they may show up in portfolios and documentation.

The work will ideally enable educators and youth, in all communities, to create open, youth-centered portfolios that clearly demonstrate learning and growth, while contributing to the larger discussion of approaches to learning assessment.

Shifting Tides in Education

Paper-based portfolios have played a critical role in fine arts, architecture, engineering, and a number of other fields for decades. Today, with the flexibility and widespread usage of digital and online tools, we have an opportunity to learn from past portfolio efforts and grow the utilization of portfolios across even more personal and professional environments. Their potential as a tool that captures the learning process, no matter the educational setting, is more promising than ever. Though subject content continues to be a focus of schools, there is a strong and increasing realization that soft skills (or 21st century skills), such as collaboration and critical thinking, are more important for a youth's future success than memorizing facts. As that shift progresses, we will need to also evolve our assessment of learning.

As young individuals develop and learn to curate their online persona, their work becomes a part of a collection of a greater community, whether of their school, neighborhood, or after-school program. Maker culture is not just DIY—it's also do-it-with-others. As such, the nature of sharing has changed. Makers document and share their work, with a regularity that matches today's tendencies to share via social media and online channels. Individual portfolios are representations of one person, and taken collectively, they can personify a group, a collaboration. Together, they can simultaneously emerge from a community and also inform it. There are innumerable, valuable lessons to be learned from a worldwide community of learners and doers.

In 2013, Dr. Dawn Wendell, the then-Assistant Director of Admissions at MIT, announced that MIT would provide an option to submit a maker portfolio as part of a student's college application process. In the years since, that effort has spread and a newfound push has followed, whether as part of the White House National Week of Making, the broader work of the MakeSchools initiative, or the Coalition for Access, Affordability, and Success. As higher education and industry consider how to adjust their processes and culture, so too do the institutions and communities that feed into them.

An Ongoing Investigation

There are often more questions than there are answers, but we are thrilled to have the opportunity to dive deeper into an area that has potential for great impact. As the project continues, we will work to translate research to practice and vice versa, linking critical insights and questions. We also recognize that a balance between quantitative and quantitative assessment will be needed; that the persistent questions of time and resources come into play in every discussion; and that the portfolios should serve to close the opportunity gap, not widen it.

And as such, it is crucial that portfolios are a tool that all can create and utilize. While we call out the affordances that digital tools can offer, our work also aims to showcase the possibilities of low-tech and no-tech tools. Capturing the process of learning and making doesn't have to require three iPads. It should—and can be—accessible, relevant, and impactful to individuals of all demographics and communities.

CHAPTER 3

INTEGRATION AND LANGUAGE

Something we've come across in our all field research thus far is the common challenge that documentation disrupts the flow of work. Especially when learners are engrossed in their projects, absorbed in simultaneously figuring things out and making something new, the last thing they remember to do is jot down reflections or take a photograph.

There's the feeling, from both educators and students, that capturing work is extra work. Further, the additional task of determining what to do with those artifacts—and when—makes the process feel more cumbersome and even overwhelming when considering the enormous constraints of a school day or standardized requirements.

We recognize the difficulties. We also see the immense value. Without documentation, what goes on in an educational space stays in that space. Lessons learned are not captured, and time for reflection is less prominent. Documentation can further not only the growth of a student's work as well as the understanding of his or her own learning but also the development of his or her own identity and role within a larger community.

Many portfolio practices of the past focus in on the final product. There is often a clean, refined, and elegant snapshot of the final piece, accompanied by an artist statement or short reflection. The idea is that the work itself and the reflection thereof can give insight into a learner's understanding and their appreciation of their learning. While these are important elements in and of themselves, there remains much more that can also be captured throughout the process. Capturing a work-in-progress can show an understanding or the finding of a personal design process, demonstrate science and engineering practices as dictated by the Next Generation Science Standards (NGSS), reveal persistence or resilience through challenges, show the various thoughts involved in solving a problem or putting together a plan of action, and/or unveil the understanding of specific concepts—and even more, the application of them. Not all of these crucial cognitive processes are, however, obvious in a final product snapshot.

It is, without a doubt, not easy to capture the process of work. As mentioned earlier, adults and youth alike claim that it can disrupt the natural flow of work. As such, our research finds that automating the documentation of processes and products is a critical piece that needs to be addressed. Some of today's tools do automatically save versions of work over time, so it might be helpful to consider how we save "versions" of our work with tangible, physical tools and materials or of our conversations with a group of peers. For those examples, there is rarely an easy, embedded way—without thinking about it first—to record and collect data. Setting up habits helps overcome those barriers, and taking advantage of both digital and non-digital tools can ease the difficulty.

Of note, we purposefully use the terms "document" and "capture" interchangeably. We recognize that their definitions are different, but there's been good debate on what to call the activity and on which term is most effective, interesting, and conducive to actually doing it. For many, "document" or "documentation" sounds dry; it harks feelings of nitpicky transcription of minutiae that is only useful in equipment manuals. "Capture" seems more exciting, broad, open to interpretation, active— but also possibly too narrow of a timeframe or without context. We want both the sweeping, big-picture understanding of a learner's work and processes as well as the details that make it unique and specific. You may find that there are better terms beyond these two, and if so, let us know!

This chapter specifically addresses the evolving and ongoing ways in which documentation—and ultimately, the youth creation of portfolios—can be integrated into any learning experience, lesson plan, or project. Additionally, we bring to light a few examples of frameworks and language used by educators to make documentation a thoughtful and seamless part of any workflow.

An Integrated Practice

The start of forming portfolio practices doesn't need to be a massive undertaking. However, there does need to be a strong, consistent expectation that documentation of work is an integrated (and integral!) component of the work itself. If it falls by the wayside once or twice, it will continue to be pushed to the back burner whenever convenient.

A big question that often gets asked is what youth should capture, or better yet, what is important enough to go into a portfolio. Like most questions, there isn't one good answer, but we've seen a number of examples that demonstrate various approaches and subsequent great results.

A good way to begin is to create expectations for capturing work for one particular project. Create consistency, set up stations, situate some good prompts, provide platforms or tools, and emphasize the importance. Rinse and repeat. At the conclusion, students will have completed two projects ultimately: the project itself and an entirely separate artifact—their project portfolio. Both are clearly connected to one another and can help unwrap the learning that occurred.

In designing any sort of learning experience, consider the following components in setting up both strong expectations and easy ways for documentation to happen.

CONSISTENT TIME & SIMPLE PROMPTS

Perhaps it's easiest to start by building in a short amount of time into the end of any class period, activity, or project for documentation and reflection. When the habit is developed that these are pieces of every experience, youth will expect it.

One high school classroom teacher used to ask his students, every few weeks, to spend 30 minutes reflecting and writing, with specific prompts. But the experience felt disconnected, less meaningful than intended, and required extensive prompting and motivating. Even the adult facilitators, who attempted to model behavior and documentation practices for and alongside youth, tried and failed to keep a journal when it wasn't an ingrained part of the everyday process.

Educators mention that pre-created prompts have worked well in certain circumstances and less so in others. Prompts like "What challenge did you overcome?" or "What was your original design?" may provide direction, but answering overly crafted questions may feel a little empty or artificial; what if students haven't been able to overcome a challenge just yet? What if students don't recognize that it was a challenge to begin with? There's a balance to strike between encouraging documentation and generative reflection, while also providing enough structure to start.

Particularly good for long-term projects that span multiple class periods or meetings, what's been effective, across a number of formal classrooms and afterschool programs, are personal websites or blogs where students are simply asked, regularly, to make note of "where they are right now." They can take a photo or screenshot, make a sketch, or take a video of their work at that moment, in the project's current state, and spend five to ten minutes writing about what has happened since the last time they wrote about it. It may start small, short, or slow, but with a consistent pattern of documentation and reflection, students are able to capture the work that it took to get from one point to the next. With this small, persistent practice, a body of work is created by every learner over time. After a week or two, perhaps more, learners can look back at their stories and start seeing how their making and learning unfolded. Just imagine the rich stories they could tell after one month of regular documentation like this!

If the frequency is too high, even setting regular opportunities once a month to capture, review, and reflect on one's work within one class or multiple classes is a good step forward. Youth commented on the artificial feeling that arose whenever they crammed, at semester's end, to find and select their "best" pieces of work for a portfolio. Instead, build it into normal practice to collect, then curate.

Even in short bits of consistent documentation and reflection are insightful nuggets that will innately appear. Youth begin to write about how they got started, where they got stumped, what materials they employed, who played a role, when they broke through, what they liked or hated, what other inspirations came into play, what they referenced, and what next steps they plan to take. Personalities, interests, humor, even awareness of their own learning show up as well.

If there is time to fill out a worksheet, there is time for active documentation. Across any subject and grade level—whether it's elementary schoolers making a diorama or high schoolers modeling a cell structure with craft materials—students can take a photo, make a sketch, or write or say a few sentences. With younger students, it may be necessary to create sentence starters and have them fill in the blanks, but these can remain straightforward and simple, such as: "Today, for my project, I worked on _____."

DOCUMENTATION STATIONS & FEEDBACK PROCESSES

If youth are more comfortable documenting and reflecting in pairs or groups, an exciting way to extract similar levels of thoughtfulness is to have them interview one another. It helps for one person to talk aloud while another transcribes. Or it encourages conversation between the two or three of them. Sometimes, a "confessional video booth" adds an element of whimsical fun and technological innovation while also allowing youth to reflect and communicate in different ways. A simple corner, shielded by curtains and set up with a recording device, serves to provide a little privacy and fun.

As we've done in a variety of educator workshops, documentation stations – of the DIY variety – are set up around the space. Egg cartons that function as tablet stands, Lego contraptions that hold a smartphone, a tabletop foamboard photo booth where photos can be elegantly taken: these are all straightforward stations, created by youth and educators alike, that help make documentation more of the norm.[5]

5. Read more about documentation tools in our Research Brief 3: "DIY Documentation Tools for Makers".

As more artifacts are created and collected, have youth review and comment on one another's work. Consider examples from writers, artists, and architects. They accumulate a body of work over the course of time, as do all students, and they set aside time to intentionally review and reflect on their work. Embedded in their practices are opportunities to iterate and critique one another.

Innate to the overall process of documentation is convincing youth that their work – and the process it takes to get to an end result – is worthwhile. Consider how much pride comes about in looking back at old essays, diary entries, video recordings of school plays and performances, and past craft projects. It helps to have that particular artifact to really showcase the evolution.

Over Time:
Time Capsule of Accomplishments

Not working on projects? Some schools—and individual classes within schools—are starting by requiring students to put up and store all work on a website or digital platform. This may simply feel like a binder of work, digitized.

It's actually a great place to start. Digital binders of work can be more easily shared and accessed by students, teachers, parents, and other stakeholders. Anecdotally, one high school student mentioned that he rarely clicks on the Chemistry section of his individual school-based webpage to refresh his memory and understanding of chemical properties or molecular bonds he learned the year prior, but he does periodically look back at his lab reports with a sense of accomplishment and pride for how much work he actually completed.

This compilation of work is significant. As more and more is captured and stored—whether official classroom assignments or extracurricular projects done at home, with friends, or as part of out-of-school-time opportunities—youth begin to have records of their work to select from. When the time comes to advance from middle school to high school, to apply for a scholarship or internship, or to even just reflect on patterns of interests and strengths, youth will be able to choose and curate from their collection to present themselves in the most accurate and useful way.

Framing, Language, and Prompts

In February 2016, Maker Ed led a 2-day Portfolio Workshop for approximately 60 educational practitioners from around the nation, spanning public school teachers and administrators to librarians and afterschool educators. When asked to discuss how they prompt youth to capture, curate, and organize their projects, a wealth of discussions ensued.

In addition to ideas for language and prompting, many of the discussions coalesced around a bigger picture frame for how to structure and scaffold the creation youth portfolios. These ideas were generated from just 1-2 hours of conversation, and two particularly interesting ones are distilled below.

ROLE, AUDIENCE, FORMAT, TOPIC (RAFT)

One of the frameworks to help organize portfolio creation that was suggested by the educators at our practitioner's workshop was the RAFT writing strategy (Role, Audience, Format, Topic). RAFT helps youth understand their roles as writers, the audience they will address, the varied formats to consider, and the topic they'll be focusing on. By adapting this strategy for portfolios, educators can encourage youth to consider these important aspects before diving in.

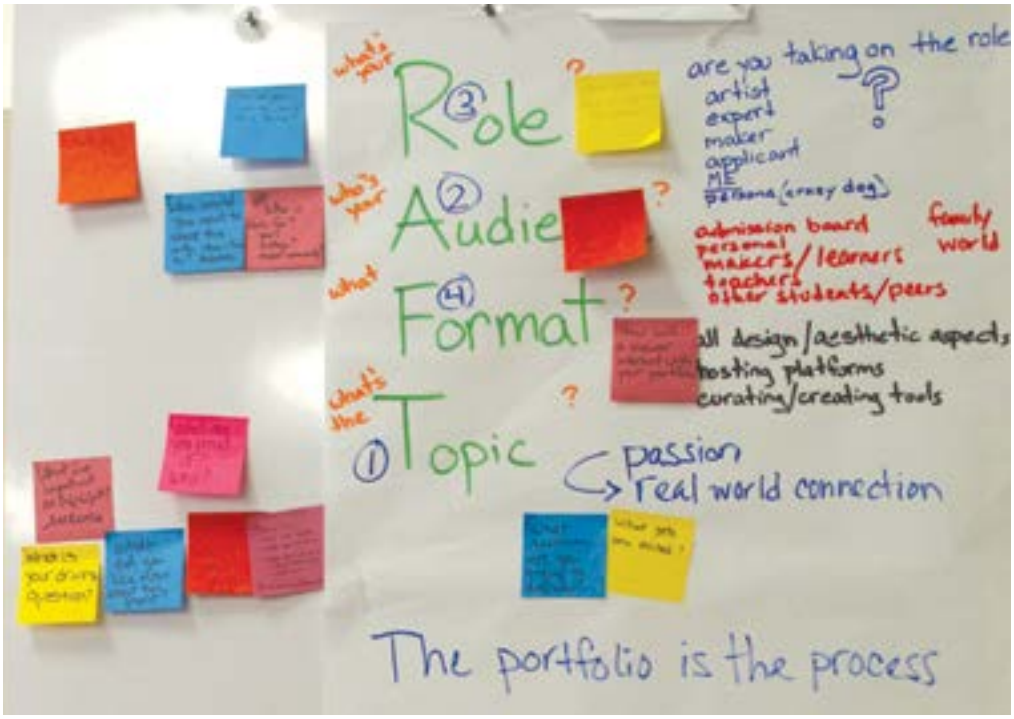
Consider the following:

Role: What is your role? Are you taking on the role and identity of a student, expert, maker, applicant, or some combination?

Audience: Who is your audience? Who would you want to share this with? Is this portfolio for personal use, adult makers, teachers, peers, an admissions committee? What might they (or you) be looking for, and how can you show it? How much time and effort will your audience put forth into looking at your portfolio? How will a viewer interact with your portfolio?

Format: What format will it take? How important are the design, aesthetics, hosting platform, and curation? Should it be interactive? Static? Will you include text and/or multimedia?

Topic: What is your portfolio about? What do you want to others to know about you and your work?



21ST CENTURY SKILLS

Another framework idea was centered around 21st century skills, including creativity, collaboration, and critical thinking. In addition, workshop educators included categories of inter- and intra-reflection, communication, and audience. Questions and prompts related to these areas help youth think through their work and the process of portfolio creation as well.

Creativity:
Did the teacher give you a constraint?
What changes did you make to your original design?
How has your design transformed?
What tools or materials did you choose and why?

Critical thinking:
What new ideas came up in making your portfolio?
How did you get started? How did you get past challenges?
What would you do differently next time?
What do you want others to see from your portfolio?

Collaboration and inter-reflection:
Did you receive help at any point? From whom?
Did you help anyone else? Provide them feedback?
Did you work with someone and share ideas? How?

Intra-reflection:
What does your portfolio say about you?
What part of your portfolio makes you feel good?

Communication:
How will you show or present your portfolio?
What would a friend/employer/stranger learn about you from your portfolio?

LANGUAGE

Whether you use the RAFT framework, the 21st Century Skills framework, or something different altogether, it is important to think about the variety of prompts that allow youth to further their thinking and self-reflection at various stages of portfolio development. Try out some of the following prompt ideas when encountering the various stages of the portfolio creation process.

To gain insights into a student's thought process while they're in the midst of their work:

- What are you working on?
- I've never seen [X] before. How did you come up with that?
- What are you trying to figure out?
- What do you want your object to do?
- How did you select tools/materials?
- What do you need to finish to be proud of your work?

To encourage sharing and collaboration:

- Did you ask for feedback?
- What are ideas that others have contributed or suggested?
- What was someone else's idea that you built upon?
- How did you help your group? How did your group help you?
- Can you show [other youth] what you are working on?

To encourage reflection on the growth that occurred during times of struggle:

- When you got stuck, what / who did you turn to?
- At what point did you have to pause to research or learn more before moving on?
- Was there a time you doubted you would finish? Why? How did you make it through?
- Did you ever feel like giving up? Why? What did you do next?
- When did you get frustrated? What did you do?
- What was difficult while making _____?

To tease out more aspects of project creation:

- Tell me about your project. Why did you choose it? Why do you care about this? What were you inspired by?
- Where did you get your ideas? Why is your design/idea important or special?
- Describe a big moment that moved your project forward?
- If you had more time, what is one thing you would change? Do next?
- What are some mistakes, pitfalls, or challenges that others can avoid if they were doing this project?
- What questions came up when making your project?
- When did you make a revision and why?
- What was a surprising moment?
- What are you proud of and why?

To help curate and organize content:

- Why do you think this is important to present?
- Pretend you are an alien seeing this portfolio for the first time. What you do you know about this person? Could another peer (younger than you) understand this portfolio?
- What do you hope your audience will concentrate on most?
- Will the audience know how to navigate your portfolio? How could you test that?
- Will the audience by intrigued? Compelled to spend time looking at your portfolio? How could you test that?
- How can you capture your personality through a story? Does the design of the portfolio portray your personality?
- What is this page about?

To guide students around design and aesthetics:

- What do the photos, colors and fonts convey about your work?
- I wonder if you used ____ [photo, video, etc], how that would change the tone?
- Think of websites you visit often, what's your reaction and experience like when viewing it?

We hope that these will spur other ideas for how you can continue to experiment with prompting youth to fully integrate the process of documentation into your learning experience.

CHAPTER 4

PORTFOLIO EXAMPLES

Often, the best way to begin envisioning what type of portfolios might work best for the youth in your space is by looking at examples of ones already online. Here we present you with an array, specifically chosen to show the diversity, but naturally there are countless others.

For the sake of organizational clarity, we've parsed the examples here into three categories:

- Individual portfolios (belonging to one person)
- Group portfolios or blogs (belonging to a class, club, or team)
- Project-specific portfolios (focused on one project in particular, either by a team or individual)

Keep in mind that this way of organizing portfolios doesn't necessarily zero in on the "product versus process" distinction that we called out in earlier chapters. It may be helpful to not only consider the above categories but also additional elements, such as the intended audience or the emphasis of product over processs (or vice versa), to best understand and digest the portfolio examples.

Many of these examples come from the field sites that have taken part in our research project thus far. Feel free, however, to look at sample portfolios of your own – whether from your networks of educators and students, or even from your broader maker community. One of the exercises we've interwoven into our research is asking educators to pull out elements of professional portfolios that they like and dislike. In doing so, they are reflecting on what they deem to be the best indicators of learning and/or what they anticipate teachers, administrators, and other stakeholders as wanting to see. You can ask the same question(s) of students and allow youth opinions to help you design your own framework and portfolio expectations.

TRY THIS!

On your own, with fellow educators, and/or with your students, find a few examples of professional portfolios. What do you like or dislike about them?

When reviewing, consider:
A esthetics
Usability of the site
Variety and consistency of content
Accessibility

Within each of these portfolio examples, though they come from different contexts and students, consider the following questions, formatted as a separate two-page guide, as you look through them:

GUIDING QUESTIONS for PORTFOLIO EXAMPLES REVIEW

Guiding Question	Notes
What does the portfolio tell you about the learner? What else do you want to know?	
What do you see of the youth's voice, choices, interests, and abilities?	
What do you think the purpose of the portfolio is?	
Is there a clear narrative that pulls the separate sections, pages, posts and/or media together into coherence? What story does the portfolio tell? Or does the portfolio feel more like a collection of artifacts? How might you encourage your youth/students to find the right balance and curate carefully?	
As an outside viewer, are you able to see an evolution of thinking and learning?	
Is the site intended to serve as a portfolio for high-stakes admission to college or career opportunities? Or is the purpose of the portfolio more intended towards providing a dedicated space for capturing and reflecting on the youth's work?	
Imagine you were a college admissions officer, a recruiter, teacher, parent, afterschool educator, and/or administrator. Depending upon role, what might you like to see more of in the portfolio? And what areas could be abbreviated?	
What might you suggest if you were provide feedback to the individual? Would it relate to the portfolio's overall purpose, its aesthetics, its content, or something else entirely?	

Guiding Question	Notes
Does the portfolio provide a sense of the youth's process? Or does it mainly focus on the final product?	
Does the portfolio take advantage of the affordances of digital tools and platforms? Is there a variety of multimedia formats included, and what does each uniquely show? Or are there possibilities for improvement in this area?	
Is it obvious when or where an adult facilitator or educator provides instruction, scaffolding, or structure? When and where does it vary? How? What works best?	
If a group or collaborative portfolio, are you able to discern the unique contributions of each individual? How important is it to identify the individual pieces? How might you think about the individual's work if the project(s) AND portfolio are collaboratively created?	
What learning outcomes are you seeking to identify and measure within the portfolio? What are the indicators of skills like critical thinking and collaboration? Or of effort, persistence, and mastery?	
What barriers do you foresee for a learner (or an educator) to create a portfolio like this? And how could those barriers be lowered?	
Overall, given your reflection on these examples, how might you design a portfolio experience for your youth that enables them to create and consider the key elements – and cohesive whole – of a portfolio?	

Individual Portfolios

DIGITAL HARBOR FOUNDATION

Digital Harbor Foundation (DHF) is an afterschool tech center for youth located in the Baltimore, Maryland, and is one of the first sites the Open Portfolio Project team visited initially in the summer of 2014. DHF continues to be a field site for the second phase of the Open Portfolio Project work.

DHF has tried out a number of platforms and tools and are currently hosting student portfolios on WordPress. They've tested everything from Evernote to Tackk, thinking constantly about the platforms' ease of use and interface. Digital Harbor's educators have put forth considerable and concentrated effort towards setting the stage and designing their youth experiences to emphasize and promote portfolio creation. Their considerations reach beyond the individual too, to consider how portfolios reflect the work being done within their space, as a community. Though no one will pretend that it's been a simple process, they have seen some rich reflection and learning take place.

Currently, each portfolio features four content-area tabs: Home, Portfolio, Who I Am, and Blog. While there is a general and simple template design that runs across all the sites, streamlining the options, students are at liberty to customize some features, including the banner color at top, banner image, and font used throughout, enabling them to express their individuality.

The Blog section generally contains all their project thoughts and reflections, while the Portfolio tab is where they can pull pieces from the blog that they're especially proud of, allowing them to play the role of curator and strive to include works they'd like to keep in their portfolios. Notable in these pieces is the ease and conversational tone with which the youth write, developing their comfort level in sharing their works and thoughts with a larger audience. Students also embedded their posts with a mix of images, graphics, videos, and even digital pictures of handwritten journal pages.

REFLECT ON THESE

Here are five examples. Take a look at them using the guiding questions from above!

- Caleb B. (About Me page)
- Sage O. (multimedia, interested in film)
- Claire S. (coder, digital fab)
- MyCo L. (blogging with voice)
- Ethan M. (more in-depth posts and portfolio page)

HIGH TECH HIGH

Southern California's High Tech High network of schools is known for its integrated project-based curriculum and student exhibitions. A strong presence in San Diego, it is situated across 3 campuses and 13 schools and was recently featured on the documentary "Most Likely to Succeed." The high schools within the High Tech High network have a portfolio system that runs across all four grade levels. Notably, individual staff digital portfolios are linked from the staff pages, sending an important message about the intrinsic value of portfolio work at this institution.

Portfolio pages are predominantly built via Google Sites and Weebly, with a few on Wix, offering students a wider range of templates and customizations. Youth are deputized to create a look and feel to their portfolios that is reflective of their work and personalities. Customizations vary from color, font, and imagery to navigation bar location and look. As well, while many are organized at the top level by school year, others are organized by subject area, projects, internships, and biography. Enabling students to take greater control of the look of their page creates a better likelihood that students will have a sense of ownership of their portfolios and value investing time into it. Below are several examples of student and teacher portfolios.

REFLECT ON THESE

Teacher portfolios:
- Scott Swaaley
- Mona Kiani

Student portfolios:
- Rihanna H.
- Harrison C.
- Indika Y.
- Sophia C.

HIGH TECH HIGH: HIGH TECH ELEMENTARY CHULA VISTA

One particular elementary school teacher at High Tech Elementary Chula Vista facilitates and supports the creation of individual portfolios for his young students. These are predominantly reflection-based digital portfolios, hosted on Google Sites, and to protect each student's identity, the students pick a nickname for themselves. While these portfolios may not show student projects, per se, they enable youth to become comfortable expressing themselves in an outward-facing digital format, and they encourage the act of reflection. These are both important skills that build metacognition and lay the foundation for further portfolio in the upper grades, building onto the student-led presentations and exhibition work that High Tech schools promotes.

The portfolios are all based on a basic template, but once again students have the ability to customize certain features, like background color. Each profile picture is a hand-drawn self-portrait, as is the banner image on each student's homepage, bearing the self-chosen nickname, which becomes an interesting exercise in reflecting on one's identity. There are also standard tabs in the left rail, which include Academic Reflections, Project Reflections, Monthly Reflections. Below are two samples, one from a student at his past school and one from a student at his current school.

REFLECT ON THESE

- *Second grader portfolio:* Crazy Dog (nickname)
- *Fourth grader portfolio:* Gamer Tamer (nickname)

Because these portfolios are created by young elementary schools students, much of the language is obviously similar. The teacher scaffolds much of the student writing by providing sentence starters, and students then complete the sentences and paragraphs with their own constructed thoughts. As the academic year progresses, students are encouraged – and time is set aside during class – to read, review, and comment on one another's portfolios. In addition, students may choose to add in pages and sections about projects and interests of their own. Some link to a video of a classroom presentation that they led, or others want to write (and post photos) about their pets or extracurricular activities and interests.

This High Tech Elementary Chula Vista teacher has a healthy sampling of his students' portfolios on his site (some publicly visible and others not), which also represents his own personal portfolio. He also has a link to a permission slip for parents, through which he explains the benefit of portfolio work and providing youth with an authentic audience, describes how nicknames are used, and then allows parents to choose which level of sharing they want to permit for their child. He also offers links to written and video tutorials for creating Google Sites with students (on Google Docs and YouTube, in line with utilizing the complete Google for Education suite).

All student portfolios for this class are physically displayed in individual frames on the wall outside the classroom. In each frame is the student's hand-drawn portrait, the nickname, and a QR code to the portfolio website. This particular display is a unique tangible way of sharing digital work and given the number of visitors that High Tech High schools receive, help to promote student work in a more public way.

PITTSBURG HIGH SCHOOL

At California's Pittsburg High School, students in select classes, including Architectural Design and Robotics Technology, maintain Weebly-powered portfolios. Embedded with Google Slides, videos on YouTube and SchoolTube, SketchUp design files, images, and even Scratch screenshots, each multimedia portfolio is customized though color and font choice, images, and layout, providing a window into each student's unique aesthetic and interests. A directory of these portfolios is hosted on a Google Doc spreadsheet.

While most of each portfolio features individual thoughts, reflections, and projects, some link off to group projects that have their own custom websites, like this one named the Foil Monster, built collaboratively by six students in hopes of presenting it at Maker Faire.

REFLECT ON THESE

Below are four sample individual portfolios:

- Ashlynn B.
- Emmanuel G.
- Zoren M.
- Tania G.

MONTICELLO HIGH SCHOOL

Monticello High School, part of the Albemarle County Public Schools in Charlottesville, VA, instituted school-wide portfolios for its 9th and 10th grade classes in the 2013–2014 academic school year, and now all four grades employ digital portfolios. Monticello employs a common set of guidelines available to all but mandating very little, leaving the implementation to individual teachers, specific departments, or even distinct classes. As such, portfolios at Monticello take many forms, ranging from genre-specific to individual to project-specific. Implementation also varies, from consistent portfolio work to more irregular entries. Below is an example of each.

Genre-Specific Individual Portfolio: Keenan started his own SoundCloud site for his Monticello digital music class, initially serving as a sound portfolio to showcase his projects throughout the semester. He continued to build on his page, and though he graduated last year, he now has close to 14,000 followers and is working in the music industry.

Individual Academic Portfolio: Class of 2017 student Ella C.'s academic portfolio, built on Google Sites, as all Monticello academic portfolios are, is a collection of three years of reflections and projects, most attached or linked in Google Docs.

Project-Specific Portfolio: Also belonging to Ella C., this page is an example of a portfolio-based multi-genre final project that all 9th grade English students complete at the end of the semester. Based on the Weebly platform, the student was able to customize this page with color, font, and image choices to create a mood for the project.

BAY AREA VIDEO COALITION

San Francisco-based nonprofit new media center Bay Area Video Coalition offers a number of innovative programs for youth, teaching audio, video, and design skills, as well as preparing youth for entrepreneurship and professional development. As such, the individual portfolios that emerge from the program tend to become true reflections of the youths' passions, personalities, and aesthetics, often indistinguishable from portfolios of budding professionals. Two examples are below.

BAVC alumnus Mandy V.'s portfolio has a crisp layout that displays her actual client projects as a UI/UX designer, alongside her own creative videography projects (hosted on Vimeo and embedded on the page), as well as anecdotal information about her hobbies and interests. Alternately, like many visual professionals, she also has a portfolio on Behance.

Built on the Pathbrite platform, Desmond H.'s portfolio features a slick, highly visual layout that hosts samples of his work in video, graphics, and sound, each with text descriptions that appear when you hover over the graphics.

Group Portfolios/ Blogs

Rather than creating individual profiles, one way to get started featuring the projects and progress youth are making is to set up a site to serve as a group portfolio, for either a team, club, or class, for example. In some of these instances, adults are most often the ones doing the actual uploading. Nonetheless, these sites allow for students to proudly share their work with others outside of their group, to reflect on work over a period of time, and to have an authentic audience, especially where comments are enabled.

Group portfolios and blogs are especially interesting because they may show work that is individually made, then collaboratively organized. Or they may display projects that are based on collaborative efforts from the beginning. In addition, these types of portfolios provide insight into the work and identity of a group and community, painting a picture from parts of a whole.

DREAMYARD PROJECT

The largest art organization in the Bronx borough of New York City, the DreamYard Project offers area youth a wide array of programming opportunities across a number of art forms, including theater, poetry, dance, visual arts, photography, video, music and audio production, fashion design, and engineering. One intent of the programming is to help youth develop the skills to be "leaders and innovators of the 21st century," and as such, they encourage documentation and portfolio work. The DreamYard Art Center has a Tumblr aggregate page that hosts links to other Tumblr aggregate pages for each of their art form-specific programs.

For example, the digital music page – an example that shows text not as the foundation of the content – is a collection of posts from the BeatYard program, which also links off to a SoundCloud page where some of the youth-created sounds of the program are hosted. The photo/video link leads to the aggregate page of the DY MovieMakers program, which has student YouTube videos embedded, hosted on DreamYard's YouTube channel. Other pages, such as the ones for the Bronx Art Collective (visual arts) and the Bronx Poetry Project offer a collection of embedded images (including digital pictures of handwritten poetry in journal pages) and videos showcasing student work. All hosted on Tumblr, these pages allow students to have a public-facing platform for sharing their work outside the group.

BAY AREA VIDEO COALITION

BAVC offers an interesting model of featuring youth video work on their main BAVC YouTube channel, alongside their own facilitator-created videos, some organized in playlists according to the program they were created in, for example, Next Gen. In the YouTube descriptions, the youth who produced the pieces are always given clear credit. What this does is offer youth work a wider, authentic audience, as well as a way to reference and embed their work on the platform of their choice in the future. There is also an aggregate page on BAVC's website that pulls and features just youth-created media.

STORMING ROBOTS

New Jersey-based robotics engineering and program Storming Robots, is geared toward youth in grades 4 through 12, and many of the youth who enter the program continue on for a number of years. Teams have their own online portfolios that reflect their projects and progress over the years. One example is The Dimensions Team, comprised of three young roboticists (13 and 14 years old). Their page features their bios, achievements, as well as robot and software highlights, written from the team's perspective.

SORENSON UNITY CENTER COMPUTER CLUBHOUSE

Salt Lake City-based Sorenson Unity Center is home to a tech clubhouse for youth, part of The Clubhouse Network, a collaborative program of the Museum of Science, Boston and the MIT Media Lab. The mission of the Clubhouse is to provide underserved youth the opportunity to gain experience, skill, and confidence in working with technology. Likely, because of the connection to MIT, the Clubhouse maintains a collection of youth projects on the Build in Progress platform. Through its layout, this site inherently celebrates process over product, inviting the sharing of each step along the build. While most of the assets and text are clearly uploaded by facilitators, some projects, like this remixed soft circuits project features youth reflections, written in their own words.

Project-Specific Portfolios

LIGHTHOUSE COMMUNITY CHARTER SCHOOL

Oakland, CA-based Lighthouse Community Charter School (LCCS) serves a full K-12 audience in a low-resourced community. Educators at LCCS have been experimenting with documentation for roughly the past four years, particularly within classes and activities related to maker-centered learning. While they are currently regrouping and in between platforms, examples of their documentation work can be seen via the Creativity Lab site. Linked from that page is an aggregate page of project-based portfolios by high school students. Each project, such as the Van de Graaff generator and the dog house, are updated by various team members, sometimes including images and videos, all hosted on WordPress.

Also accessible from the Creativity Lab page is a series of Project Guides in the form of hand-drawn project how-tos created by facilitators, organized by ideal age group. As well, though not updated recently, a short example of a class blog for the Making class can be seen, hosted on Tumblr and featuring student reflections written in their own words. LCCS has since stopped using Tumblr because of the inappropriate content that they host, which forces the site to get blocked by the school's network.

MENLO SCHOOL

Located in Silicon Valley, Menlo School is an independent 6–12 college prep school with an extensive tool shop and focus on hands-on learning. The Menlo School Applied Science Research site features a collection of readily accessible resources, project ideas, and student work, including a directory of tool safety guides. The list of student project each link off to a page with a short description and a link to a full PDF of the project, hosted through WordPress.

Conclusion

The examples showcased in this chapter are diverse and complex: they represent a range of educational environments, age levels, skill levels, interests, and ultimately, work. And behind each portfolio is much invisible influence, to which we, as viewers, are often not privy to.

The intent of the examples is not to overwhelm you with examples, but to help you reflect on your ongoing practice in both creating and facilitating the creation of portfolios with youth. In reviewing these, are there key themes that emerge or that are important to you and your students? Are there surprises that strike you that you've never considered?

One of the most compelling findings in our research, and in working with educators to discuss and debate the extremely subjective question of a "good portfolio", is the generally agreed upon sentiment that a portfolio should ultimately have clear narrative threads. This narrative thread may not be initially evident (or front-of-mind) as a student documents, creates, and compiles, and it's sensible and smart to develop a simple repository to store a vast collection of work. Nevertheless, in the process of curating artifacts, reflecting upon one's work and its meaning, and establishing the identity that he/she wants to present to an intended audience, a young individual weaves a story, and the portfolio serves as evidence of the tale.

CHAPTER 5

TOOLS FOR CAPTURING

Now that you've determined the main purpose you hope portfolios to serve in your environment, it's time to consider what tools you already have, which you may be able to acquire, and which of the many freely available online tools and apps would best serve your demographic and purposes.

In our survey of 51 sites for our Open Portfolio Project, when asked to identify the biggest barriers to documentation and portfolio work, folks most often responded that they needed time, training, cameras, lighting, laptops, staff, and a reason to justify taking the time. As one educator put it, "There just isn't time for everything!"[6]

Not surprisingly, the sites that are paving the way in this exciting new field are also the ones who had taken the time to determine the importance of documentation, set clear goals for what they'd like to accomplish, and reported that their site's access to internet, cameras, and computers is good. However, many more sites were starting to get the wheels turning by using what they have to help youth learn and value documentation practices. High tech offerings are not imperative to teaching metacognition skills.

Another takeaway from our surveys is that much of the documentation that is currently being done at these sites is done by adults with the purpose of promotion and sharing knowledge with the community, both of which are important endeavors. Here, though, in the light of portfolio creation, we focus on putting the lens, so to speak, in the hands of the youth. To that end, we highlight tools and platforms that make documentation accessible to the youth themselves, from the youngest to the oldest.

In a few instances, we offer "Field Notes", which include commentary we've gathered from users, especially educators, at youth-serving organizations.

6. Learn more in our Research Brief 3: "Survey of Makerspaces, Part III".

Low Tech/ No Tech

Even if your goal is for the youth in your space to have a digital, self-curated, and reflective collection of their works, processes, and skills, but you are lacking in digital tools like laptops, cameras, smartphones, or tablets, you can get started with the most accessible and approachable tools available: a notebook and a pen. The act of recording ideas, experiments, successes, failures, and iterations — combined with the inherent opportunities for reflection that they provide — create artifacts of learning through process and help teach documentation skills that can later be applied to the digital realm.

Readily accessible tools like notebooks, pens, markers, pencils, graph paper, and posters should not be overlooked as powerful tools for documentation and self-reflection. The obvious perks are that they're affordable, have a low barrier to entry, and don't require an internet connection. Plus, the only power source they need is the endless creativity of a young mind. As a matter of fact, one of the schools in our survey, Lighthouse Community Charter School, experimented with online platforms Tumblr and WordPress for hosting student portfolios, but for the time being, as they take a moment to refine their goals and ask the right questions for their institution, they've returned to paper journals. As well, the pages of a journal can be made into digital content to later share online by simply taking digital photos.

Sticky Notes

The humble sticky note has been helping plan projects, organize thoughts, and visualize solutions for many a year, and there's nothing quite like it. Whether it's the compact size, impermanent nature, or convenient adhesive strip that makes it such a useful tool, it certainly couldn't be any more accessible. Some favorite uses are storyboarding, summarizing, commenting, and reflection. Digitizing and capturing sticky notes can be as simple as snapping digital shots and tagging to categorize. Not surprisingly, there's a Post-It app for creating and organizing entirely digital sticky notes.

FIELD NOTE

It's fast, flexible, and creative. One challenge is taking pictures and digitizing the physical artifacts. Sketching in Google Docs, capturing in the Post-It app, and scanning sketches can help. Lead by example and model the behavior of documenting using sticky notes for early sketches. Using a creative process like Stanford University's design thinking can help with iterations, learning forward, and reflecting.

High Tech/ Digital

Digital cameras have come a long way in the last decade in the way of affordability and ease of use. While there are a few sites we surveyed that have digital cameras on hand for the youth to use, most were employing the impressive capabilities of the high-quality cameras built in to today's smartphones, tablets, and laptops. Some sites provided these tools for students while others celebrated their BYOD (bring your own device) environments. Since these devices can capture high-resolution images videos, and audio, plus offer wi-fi connectivity and support easy transfer of digital data from one device to another via apps, they've become the most widely used.

Among the issues associated with collecting these digital assets are data storage, organization, and capturing clear and useful shots. Maker Ed's Youth Makerspace Playbook offers a photo and video shot list with helpful suggestions to encourage a variety of useful and versatile moving and still images, reproduced verbatim here:

- Setups: Materials and environment "before" shots, including the space and tables
- Wide-angle context shots: Where is this happening? What does the whole environment look like?
- Medium and small-group shots
- Close-ups of hands working with tools and materials, as well as of facesshowing emotion
- Table-level shots showing work and faces in the same shot
- Overhead shots
- Documentation of other forms of documentation (How very meta!)
- Before and after pictures of the space: Helpful for maintaining organization by providing an image of how the space should ideally be left after an activity while celebrating the creative chaos of making

Storage Considerations

Art classes have always had to get creative to make space for physical portfolios of artwork, many of which may have been large. Portfolios in the form of digital content can also take up a great deal of space (on a computer, server, or in the cloud), which can quickly become an issue.

For this reason, many educators rely on online file storage services like Google Drive or Dropbox (described below), opt to employ content-specific hosting platforms like Flickr or SoundCloud and then pull that content into a blogging platform like WordPress, or use platforms intended for portfolios that offer large or unlimited amounts of data storage. A number of these options is discussed in detail below. The alternative is to employ locally networked hard drives, which then become an issue of how many terabytes of storage will be necessary as well as a question of how students can extract their assets and data off the drives to take with them. In any case, it's helpful to determine which storage solution you'd like to use before you start accumulating unmanageable amounts of digital data.

Organizing with Tags

Once you have the data storage solution that works for you, think about developing a system of tags to apply to the images, videos, graphics, and other assets the youth create. Tags are essentially keywords used to classify content, the metadata that accompanies content and helps maximize its searchability.

Tags can useful in categorizing and identifying in a multitude of ways. Across in-school classes, tags could include the course number or class period, the academic subject or grade level. Tags can indicate the name of a project, the tools or materials used, the focal point of the asset, even contextual clues. Tags are by and large built into the core architecture of most, if not all, the platforms described in the next chapter. Creating and implementing a system of tags is a perfect project for youth and facilitator collaboration.

Documentation Stations and Stand

Amazing things happen when you put cameras in the hands of youth and you will no doubt find yourself delighted by the fresh and interesting perspectives they provide. However, often at odds with documentation is that the act of making can be so engaging that documenting it seems like an interruption or is often forgotten. As well, holding a camera steadily to get a clear shot can also be a challenge. These two issues can be addressed with the use of documentation stations and camera stands.

Consider creating a dedicated corner with a camera and stand (and perhaps even a light box) set up, where kids can take their creations at various stages of completion, to snap a quick photo or shoot a short video. At the DIY Girls after-school program, for instance, they've created a "Maker Talk" booth in a corner behind a curtain. Girls are encouraged to take a moment to sit in front of the camera and answer questions provided, which include: What project did you work on today? Did you have any challenges? What are you most proud of? What do you want to make next? An alternative is to encourage youth to interview one another, which could be less intimidating for those who are more shy or who are customized to group discussion.

The argument can also be made for having the tools of documentation not tucked away but readily available in the same spaces that making is happening. To that end, stabilizers and mounts can come in handy to hold cameras steady and have them in clear view so documentation is not forgotten. There are a plethora of DIY solutions for inexpensive mounts. Four of these, which were particularly easy and inexpensive to make were outlined in the Open Portfolio Project Research Brief 3: "DIY Documentation Tools for Makers":

- Egg carton tablet stand
- Poster board smartphone stand
- Smartphone Lego back cover
- Dinosaur smartphone stand

Even a simple four-sided white box with two sides open can serve as a space where a photo or video of a project-in-progress can be quickly taken. There's also Spin, essentially a DIY turntable that allows for the capture of a 360° view of a project-in-progress. Here are a few other simple DIY solutions with full how-tos from around the web, none of which cost more than $30 to make:

- Adjustable, overhead camera stand arm
- Articulated camera mount from an old desktop lamp
- $14 camera stabilizer
- Cellphone stabilizer for less than $10
- Photography light box
- PVC overhead camera mount

Lights

Often, the difference between a hazy, unclear shot and one that truly captures the moment and shows important details is lighting. Studio lights are available inexpensively online and even having one is better than none. Even clip-on lights, diffused by a piece of white fabric, paper, or tissue paper, work well for adding to the clarity of almost any shot.

CHAPTER 6

PLATFORMS FOR RECORDING, STORING, AND SHARING

Amid the sea of options available for creating digital portfolios, the hardest part is sifting through the choices, deciphering the differences, and deciding which is best suited to the youth in your environment.

Here we break down and categorize the tools and platforms most often used by educators (to our knowledge). While this is in no way an exhaustive list, it offers a solid place to start exploring your options. If there are other tools and platforms not mentioned here that have worked for you, we'd love to know about them. Share your thoughts via Twitter, using #openportfolios, and tag @MakerEdOrg!

One quality that all the options in this list share is that they're all offered for free in some capacity. Most also offer "pro" accounts for a fee in exchange for more capabilities, but we refrained from covering any that didn't offer a free version. As well, it's safe to say that all also have accompanying apps that can be downloaded, easing documentation from a variety of mobile devices.

Some platforms allow for easy export of data; some are less transparent about how to do so. Some, like GitHub, epitomize and practice open-source development, while others are more proprietary. We obviously care about the ease of use, the open-ness with which you can access data, and the privacy control you have, but it's ultimately up to youth and facilitators to determine the level of importance of each. We point it out periodically to help you more deeply explore your options.

Bear in mind that no matter how fine-tuned and intuitive the user interfaces for these platforms may be, every new platform and tool introduced into your space will require a certain amount of training and familiarizing, for both the youth and facilitators. Taking this into account, allotting time, and providing training will increase the chances of adoption and maximize the potential of the platform.

As is it with all software platforms, consider the life of these applications too. We'll see tech companies come and go, so it's important that youth and educators not only learn how to use Platform X but also understand the skeleton framework and key elements of how to create a website or portfolio.

In the descriptions below, you may see stats about parent companies and number of users. These are included to give you insight into how well these tools and platforms pair with other tools and how popular they are (usually testament to their ease of use). For some, we also include "Field Notes", which are anecdotes, insights, and comments we've heard from users on the ground in youth-serving organizations across the country.

The options we outline are organized by general category, all of which can be utilized toward portfolio creation:

- **Content-specific sites** support a particular medium, whether pictures, videos, sounds, design files, or code, which can then be embedded on another website or webpage: Vimeo, YouTube, Flickr, SoundCloud, Thingiverse, GitHub
- **Classroom collaboration tools** support the creation of documentation pages that can be shared, collated, and collaborated upon: Tackk, Evernote, Hackpad, Google Docs
- **Website/blog creation tools** support the making of individual or class websites that can be embedded with content pulled from content-specific sites and other storage hubs: WordPress, Tumblr, Weebly, Blogger, Wix
- **Project-based sites** offer specific templates for uploading step-by-step instruction or steps along the way of a build: Instructables, DIY.org, Build in Progress
- **Portfolio-specific sites** were created specifically to facilitate portfolio creation: FreshGrade, Pathbrite, SeeSaw, Behance
- **Fun digital tools** make the process of creating multimedia storytelling assets—like screencasts, stop-motion animations, animated GIFs, and voice over video—easy and accessible to students of all ages: Jing, JellyCam, Ubersnap, Adobe Voice, Shadow Puppet Edu, Screencast-O-Matic
- **Storage tools** offer space on servers and in the cloud for storing digital data: Dropbox, Google Drive
- **Google for Education** is Google's full suite of apps available for educators

WHY OPEN?

To pull directly from the Open Portfolio Project Research Brief series, *"we conceptualize an open portfolio as an openly networked, decentralized, and distributed portfolio system in which the maker maintains control of the content and curation process. The ideal open portfolio platform would be able to share and exchange information (i.e., a highly social, open environment) and be synced across mobile platforms to enable easy upload, capture, and showcase of work, work-in-progress, and processes of making. Open online platforms can make learning resources abundant, accessible, and visible across settings. Open portfolios seek to revisit the utility of portfolios as a central tool for lifelong learning and as a viable alternative to contemporary assessment practices, while leveraging new technologies to help address the shortcomings in prior educational initiatives."* [7]

7. Drawn from Research Brief 1: "A Networked Vision for Sharing and Documenting"

This conceptualization is both ideal and lofty, but as youth and educators – across K-12, higher ed, formal, and informal learning environments – create portfolios and push for them to be accessible, social, and useful, the likelihood increases that quality, open platforms will be made available to suit and respond to demand.

We believe that open portfolios help youth develop and hone 21st century, digital citizenship, and metacognitive skills. Being able to be comfortable presenting their projects and processes in front of a larger audience online (and receiving feedback and encouragement) can also help build confidence, preparing youth to thrive in the largely digitally driven higher education environment and workforce. To that end, while many of the platforms and tools presented here offer options to keep portfolio work private, most encourage making works publicly visible and joining the global community of makers online.

Also, truly open portfolios are not solely tied to proprietary software or a private institution, enabling portfolio creators to take their assets with them beyond the program at hand and build on them throughout a lifetime of learning.

This process of creating a digital portfolio encourages a level of analysis and reflection to be able to curate the collected artifacts into a certain identity. Youth are deputized to think about what persona they want to present to whom, as well as what their digital footprint and persona might look like.

Content-Specific Sites

YOUTUBE [youtube.com]
Launched in 2005 and now owned by Google, YouTube is arguably the largest video-hosting site in the world with 1 billion unique visitors a month and 100 hours of video uploaded every minute. The maximum file size you can upload is 128 GB and the maximum video length is 11 hours. To upload videos that are more than 15 minutes long, you must verify your account. Because it's owned by Google, along with it comes more "Google juice" (higher ranking in search results) and smoother integration into the Google suite of apps.

FIELD NOTE

People love YouTube because there is a massively dedicated community of users, followers, and commenters, offering an authentic and engaged audience. Sometimes commenters provide surprisingly constructive feedback and encouragement.

VIMEO [vimeo.com]
Created by a group of filmmakers in 2004, this video-hosting site tends to feature more artistic films than its free-for-all cousin YouTube. A basic account is free and provides and upload limit of 500 MB per week (up to 25 GB a year) and up to 10 videos per day, basic privacy controls, and basic stats. You can also create one channel, one group, and three albums. The perks are that there are no ads and your videos join a community of 100 million users.

FLICKR [flickr.com]
Owned by Yahoo, this image-hosting site touts benefits when it comes to photo management and sharing. By organizing your images into albums and using notes and tags, the information you add becomes metadata that is then searchable. Flickr also allows you to give permissions to others to help add notes and tag your photos, taking the burden off of whoever is uploading the images.

Though the site is open to any kind of content, Flickr encourages and enforces their rules for setting appropriate filter settings for adult content. If you don't set the correct filter, your account will be moderated, you will be warned, and your account could be deleted if you don't comply. A free account affords you 1 TB of space. Each photo can be up to 200 MB. They do also support video uploads, but videos can't be longer than three minutes or larger than 1 GB.

SOUNDCLOUD [soundcloud.com]
Launched in 2008, SoundCloud is a social sound platform that supports music and podcasts. A free account allots you three hours of upload time a month, with basic stat displays. Your tracks can then also be easily embedded on blogging platforms. The biggest perks of this site are its extensive community of over 150 million registered users and over 175 million unique monthly listeners and its social aspect. You can "follow," message, and comment on other sound creators, as well as get your creations out to the world.

FIELD NOTE

SoundCloud is essentially "the" site for audio creators.

THINGIVERSE [thingiverse.com]
Owned and created by 3D printer company MakerBot, Thingiverse is a robust repository for 3D design files with a strong emphasis on sharing and remixing. All designs are encouraged to bear a Creative Commons license and be made freely available to the community. You can upload your 3D design files and the community can download, comment, and offer their own remixed versions of your original design — and of course you can do the same. The site is home to roughly half a million 3D models and counting.

GITHUB [github.com]
Boasting a community of more than 12 million people, GitHub is the largest web-based code-hosting service, featuring a whopping 31 million project. With code and files for everything from emoji to 3D models to web application frameworks, the site is free for users posting public projects and there's a charge for hosting private repositories. GitHub encourages collaboration and iterations with features like revision control, bug tracking, feature requests, task management, and wikis for every project.

FIELD NOTE

GitHub's interface is a celebration and epitome of showing process; every change and iteration can be tracked so the user can see exactly what was edited and improved upon.

Classroom Collaboration Tools

EVERNOTE [evernote.com]
Designed for taking notes, organizing, and archiving, Evernote is a cross-platform app that enables users to create "notes," which can include text, a full webpage or excerpt, photos, voice memos. Then these notes can be tagged, annotated, commented on, and compiled into a "notebook" that is shareable. Notes can even have attachments. Optimizing organization heavily relies on clear use of tags, so it may be helpful to determine a set of tags for your group to use first. Evernote Basic is free, suitable for the occasional user, and supports syncing across devices. The big perks are its collaboration and sharing capabilities and the fact that students can own and take their portfolios with them.

FIELD NOTE

Evernote's look and feel may be a bit difficult to customize. This could explain why several educators noted that the platform wasn't at all popular with the youth, who found it "superfluous and external to their workflow." It's also not really shareable online and can be costly to maintain, depending on the desired plan.

HACKPAD [hackpad.com]
Acquired by Dropbox (and now includes Dropbox integration), Hackpad is a a web-based real-time text editor optimized for collaboration. A "pad" is a content page, while a series of pads can be tagged and compiled into a "collection," and collections can be added to your team's "workspace." Members of your team can take collaborative notes, share files, and leave comments, all attributed to each user. The data lives in the cloud so it's accessible from anywhere and updated in real-time. Hackpad is free for public use and charges $2 for private space. You can also embed pads on your website.

FIELD NOTE

High school classes have utilized Hackpad for sharing project and process notes, and teachers delight in being able to identify the text by author. One of Hackpad's biggest competitors, obviously, is Google Docs. See below for more notes into the entire Google Suite.

TACKK [tackk.com]
An incredibly simple cloud-based online tool for tracking thoughts and ideas, Tackk users can make quick, customizable, multimedia webpages (called Tackks on the site) with minimal effort. Pages can be made public or kept private and can include text, photos, graphics, audio, videos, and embedded Google maps, enabling multifaceted reflection. The site automatically saves content as you create it, it's free to use, and it supports embedding roughly 300 different apps. Each user's Tackks are aggregated on their user page, and you can "follow" them as you would on a traditional social network. You can even transfer ownership of a Tackk, a nod to collaboration. As well, Tackk Stream is the comment thread at the bottom of each Tackk that could also act as a solid collaboration and feedback tool. Students can even collaborate with others who live across the globe.

FIELD NOTE

The Tackk platform seems to be moving away from the educational focus it once had and toward a social media-centered direction. This has opened up youth portfolios to outside social media streams and comments, as well as spam. Open commenting cannot be disabled. On the flipside, the platform is really simple and straightforward, allowing for polished, creative posts with minimal effort.

Website Creation

WORDPRESS [wordpress.com]

The most popular content management and blogging system on the internet, WordPress powers about a quarter of the top 10 million websites and is free and open source, testament to its intuitive interface, ease of use, template offerings, and opportunities for customization. WordPress needs to be installed on a web server, either as part of a hosting service like WordPress.com or on a computer running the software package found on WordPress.org. Going through WordPress.com is free, but users are limited as to what they can do. Sites can be password protected if the desired audience is limited.

Powered by WordPress, Edublogs.org was designed specifically for educators and offers templates for blogs, e-portfolios, and websites. Using Edublogs is free, but hosting through CampusPress (which offers fully customizable WordPress platforms for your entire school or other educational institution) requires a fee. With it comes support, training, and additional tools. They are host to roughly four million WordPress sites for education.

FIELD NOTE

Akin to software like Photoshop, WordPress is super robust and strong but may be really overwhelming at first because it's so dense and requires that youth have a basic understanding of how to navigate the backend of a content management system. However, one perk is that pages are outward facing and can be shared.

TUMBLR [tumblr.com]

Owned by Yahoo, Tumblr is a free microblogging and social networking platform that celebrates multimedia short-form blog posts which can include text, photos, videos, MP3s, and more. Tumblr is host to over 277 million blogs and has 555 million monthly visitors. Because Tumblr is built on the philosophy of free expression, whatever form that may take, it also contains a great deal of adult content (anywhere between 5% and 22% of Tumblr sites, depending on the source). There is a "safe mode" that can be enabled to ensure that users can opt out of being exposed to this content, but many educators have shied away from the site because of this reason.

FIELD NOTE

Tumblr follows a pretty strict blogging layout, so the look is hard to drastically change. Some folks have noted that Tumblr is really easy for mobile upload of content, but more difficult if uploading assets from a computer.

WEEBLY [weebly.com]

Featuring a super simple drag-and-drop tool, Weebly is a web hosting and building service suitable for kids of all ages. There are no HTML skills necessary, and assets like pictures, videos, and maps can be dropped into pages just by dragging them over to the interface. The site has it's own unbranded audio and video players so content doesn't need to be hosted on another site (like YouTube or SoundCloud) to be embedded. The service is free, hosting is included, you can choose from over 70 templates, and there are no ads (they make their money off of pro accounts). Weebly is also web-based so there's no software to install. And finally, students can get comments and feedback from their peers and the sites can be password protected if necessary. Check out their special Weebly for Education page for education-specific offerings.

FIELD NOTE

Many students enjoy using Weebly because the interface is intuitive and easy to use.

WIX [wix.com]
Offering the only drag-and-drop cloud-based web development platform with HTML5 capabilities (meaning you can get fancy), Wix is a free service that offers premium packages (mostly beneficial to those who want to start e-commerce sites). They have 77 million users in 190 countries. Hosting is free, and in 2015 Wix launched WixEd, a free online school for website design. Of the hundreds of designer-made templates they offer, there's a healthy array of ones intended for educational use.

FIELD NOTE

Even though a number of educators use Wix for student portfolios, their Terms of Use state that users need to be at least 18 years old.

BLOGGER [blogger.com]
Launched 1999 and acquired by Google in 2003, Blogger is one of the oldest blog-publishing services with sites most often hosted by Google at blogspot.com. While it is simple to use, the customizations and templates are a bit limited. Each account is allotted 1 GB of hosting space for free and you can link your Blogger account to your G+ account for more storage. The interface allows for multi-user blogs and offers drag-and-drop tools.

Portfolio-Specific Sites

DIY.ORG
Situated as a "safe online community for kids to discover new skills," DIY.org is a youth-centered site that features hundreds of readily available skill builders and interactive challenges, in addition to the sea of kid-created projects presented through videos, pictures, and words. Every member has a portfolio, where all the projects they've posted about are aggregated. Peers can comment and favorite posts, providing valuable feedback and encouragement. DIY.org's moderators enforce their "be nice" policy and help members learn new skills by offering tips and tricks.

FIELD NOTE

One educator shared, "A customizable version of DIY.org would be excellent. DIY is a great platform, but the projects are not always a good fit for our people, situations, and context."

INSTRUCTABLES [instructables.com]
Launched in 2005 by MIT graduates and later acquired by Autodesk, Instructables is the world's largest collection of user-contributed how-tos. With 30 million users each month, they offer project tutorials on wide range of subjects and complexities, from costumes to robots to furniture, food, and everything in between. Kids can either browse for projects that spark their interest, or take their documentation skills to the next level by contributing their own step-by-step tutorials. Regular memberships are free, and Instructables offer teachers free pro memberships (which offer perks like PDF downloads, private projects, and all steps viewing).

BUILD IN PROGRESS [buildinprogress.media.mit.edu]
A project from the Lifelong Kindergarten Group of the MIT Media Lab, Build in Progress is a platform for sharing projects as you're developing and building them. The site is a celebration of process, trial, and error. This emphasis on making as a pathway is even reflected in the layout. Unlike Instructables, which focused on the step-by-step, Build in Progress focused on the story of the making process. Each member has a unique username but multiple people can collaborate on the project documentation. That project can then live on the aggregate page for the user or, say, the class or makerspace. Modifications, remixes, and sharing of projects are also encouraged.

FIELD NOTE

As of September 19, 2016, Build In Progress entered an "indefinite hiatus," as described by its creator. Though the site still exists, its next step may be an open-source version, available to all to build their own platform. Stay tuned for its next iteration, and read more about its history and future at "Build in Progress: Closing Down and Opening Up" [https://medium.com/mit-media-lab/build-in-progress-bids-adieu-2ae0e6cfd82c#.mkihgr26y]

Fun Digital Tools

FRESHGRADE [freshgrade.com]
Created to be simple to use across mobile devices, this digital portfolio creation and assessment tool is free for teachers, as well as their students and the parents. Teachers can use FreshGrade to set up their classes, add all their students, then capture learning evidence through pictures, videos, audio, and notes. For example, a teacher might shoot video of a student reading aloud at various intervals throughout the school year, add them to the student portfolio, and then use those videos to assess reading development.

At any time, the teacher can also send email notification to a child's parents when new assets are uploaded, and parents can comment on assets. FreshGrade can also be used to send assignments and class notifications, and it includes a built-in grade book. Using the student app, kids can view their learning evidence, add comments and reflections, and also self-document their learning. The app is so easy to use that it's suitable for students from kindergarten on up. While the service is free for teachers, students, and parents, there is a premium model offered to districts, providing a big picture of the district's collective progress.

PATHBRITE [pathbrite.com]
A free online portfolio creation tool with a drag-and-drop interface, Pathbrite allows students to easily make multiple portfolios to showcase their processes and projects. Images, videos, documents, and other digital media can be dropped directly into Pathbrite or imported from other locations online, such as YouTube, Vimeo, Google Drive. Then they can be resized, rearranged, and captioned. There are a number of templates available to work from, and the end result can be shared on any device.

Portfolios can either be kept private, made public, or there's an option to share directly using email or the URL. Pathbrite also provides analytics so users can see what pieces of their portfolio are getting the most traffic, and facilitators and peers can offer feedback as well. The implications for a classroom environment are obvious, as evidenced by the fact that Pathbrite is used in hundreds of schools, albeit only about 20% of those are K-12.

FIELD NOTE

We're not sure why it hasn't been used as widely as expected. It was all the rage a few years ago, but the uptake and uptick seems to be slow.

SEESAW [web.seesaw.me]
Offering a host of creative tools, online portfolio creation tool Seesaw enables students of all ages to document their learning. Kids can create project pages to add to their Seesaw journals, and are free to use photos, videos, drawings, text, PDFs, and links, as well as import assets directly from many other apps like YouTube and Instagram. Seesaw also has built-in audio recording, drawing, and caption tools, and on iOS devices, it has a "recordable whiteboard" that allows students to combine audio and drawings to create a video explanation of their work.

Using Seesaw Blogs, teachers can set up class blogs to share portions of student portfolios, and with Seesaw Connected Blogs, teachers can connect to and collaborate with other classrooms around the world, helping students develop "digital citizenship skills." Seesaw even offers QR code sign-in for the youngest students and email/Google account sign-in for older students. A free account affords teachers 10 classes of journals, unlimited storage space, unified portfolios for each student in the class for as long as they attend that school, and parent access to portfolios for the past 12 months. There is even a bulk download tool that allows students to export their journals to take with them when they no longer attend that school.

There are pay options as well for those who want more, and there's also Seesaw for Schools, which is school-wide digital portfolio system that includes 100 classes per teacher and unlimited parent access to portfolios.

FIELD NOTE

Because Seesaw is easy to use and only take a few minutes to create an entry, but because it's app-based, youth need access to smartphones or tablets, which not everyone has.

BEHANCE [behance.net]
A portfolio-creation tool and showcase owned by Adobe, the Behance network is largely used by creative professionals to create, host, and promote their portfolios. Many businesses and secondary schools (like the Rhode Island School of Design) use their services, and clients looking for talent will often browse portfolios in search of skill and style. The site is free to use and there are no limits on the number of projects a member can create or the amount of media users can upload.

Project-Based Sites

JING [techsmith.com/jing.html]
Created by software company TechSmith, this simple screencasting tool lives on your computer desktop and makes it easy to capture and share screenshots as well as videos up to five minutes long. You can even narrate over what's happening on your screen using your device's built-in mic. Once the capture is complete, there are a number of options, including saving the file to your computer or uploading it to your private Screencast.com account, which produces a link you can share via email, Twitter, instant messenger, etc.

Though this tool was not made with kids in mind, the educational applications are obvious. Jing also enables you to add text and arrows to your image or video. For more complex editing options, including fancy borders, blurring out sensitive information, or saving in a different file format, TechSmith offers Snagit, which is free for a 30-day trial period only.

FIELD NOTE

Fun for kids and simple to use. Eventually your free space will fill-up. Then, you either delete stuff in your Jing library or buy Pro.

JELLYCAM [ticklypictures.com/projects/jellycam]
UK-based maker Chris Dennett created and freely offers this super simple stop-motion animation app that enables you to make short animations using webcam snapshots or uploaded images. Any audio in MP3 format can be added to the video, which the app saves in .flv format. The layout is intuitive enough for even absolute novices to experience the magic of creating stop-motion animations. The app is available for both Mac and Windows and just requires the free Adobe Air package installed first.

UBERSNAP [ubersnap.com]
It doesn't get much simpler than this animated-GIF-making app for iOS devices. You can easily make GIFs from video or stills, but there's no audio included. The Singapore-based team focuses their more complicated efforts on their print offering. You can order a print of your GIF—made from slicing up frames of the GIF, digitally interlacing them back into an image, and overlaying the image with a lenticular sheet, giving it the illusion of moving.

The analog counterpart to Ubersnap's fancy prints? On GifPrint.com, you can upload a GIF and the site will slice it into printable sheets of frames, which can then be put together to make a flipbook!

ADOBE VOICE [standout.adobe.com/voice]
At the core, this free offering from Adobe is a voice-over-video app for iOS devices. Intended to be incredibly straightforward, the app allows you to choose from a huge collection of images or use your own and then arrange the images and simply speak over them as Voice creates a video. You can also add music in addition to your voice. The classroom and portfolio opportunities seem obvious and endless.

Adobe offers Voice along with Post (for making social graphics) and Slate (for making webpages) for free, acknowledging their potential in classroom settings with their Guide for Schools and Educators.

SHADOW PUPPET EDU [get-puppet.co]
A fun tool by the makers of the SeeSaw portfolio site, this free multimedia storytelling app enables kids to easily overlay graphics, voice, and text on images and videos, creating sharable narrated slideshows, presentations, or videos. They can even search for and include maps, satellite images, and photos from educational image sources like the Library of Congress and NASA. There's a specific education-focused version of the app that comes complete with Common Core-aligned activity suggestions.

SCREENCAST-O-MATIC [screencast-o-matic.com]
This super simple screencast recorder allows users to create screencast videos up to 15 minutes for free. Longer videos require a pro account, which is a modest $15 a year. The recorder allows you to choose between recording from your screen, webcam, or a split screen of both. The audio is recorded over the mic on your computer. When the video is done, there's the option to save the file, upload it to the Screencast-O-Matic site, or directly on to YouTube.

Storage

DROPBOX [dropbox.com]
Strictly a file-hosting service, Dropbox offers users 2 GB of space in the cloud for free, along with file synchronization across devices. Users create a special Dropbox folder on their computers and then can access the files from anywhere on any device via the app, as well as via the Dropbox site. When a file is shared with a number of users, anytime anyone makes edits or additions, the file is updated for everyone. For more space, Dropbox charges $10/month for 1 TB (1,000 GB).

GOOGLE DRIVE [google.com/drive]
One of the most popular file-hosting services, Google Drive is offered as part of Google's full suite of apps, discussed below.

Google's Full Suite

GOOGLE FOR EDUCATION [google.com/edu]
Google for Education offers a full suite of cloud-based apps only available for not-for-profit educational institutions in the United States. The suite includes: Google Drive, Classroom, Docs, Slides, Sheets, Sites, Gmail, and Calendar, along with an admin console that has domain and user-management features.

Google Drive is a file storage and synchronization service through which users can store files in the cloud, as well as share and edit documents, spreadsheets, and presentations. Google Classroom helps teachers create assignments and provide feedback and valuable information. All three enabling collaboration in real-time, Google Docs is a word processor, Google Sheets is a spreadsheet app, and Google Slides is a visual presentations app. Google Sites is the easy-to-use website creation tool, and naturally Gmail and Calendar are self-explanatory. Each user is given 15 GB of storage, shared across Drive, Gmail, and Google Photo, their photo storage app (also free), which is intended to take the place of their Picasa service.

Depending on whether you're looking to use e-portfolios for storage, workspace, or showcase, Google offers a guide to how to mix and match the apps in their suite. Additionally, because the G+ communities and YouTube are also Google properties, these apps work seamlessly across all, as well as with the popular and inexpensive Chromebook laptops that many institutions employ.

FIELD NOTE

Google Sites is actually not super user-intuitive, especially because users need to comprehend some of the back-end infrastructure in order to be able to easily access/edit it. So while it's good for allowing variation, it's a bit challenging because none of the UI/UX is particularly smooth. One educator even commented that it "causes heartburn for most kids (and the templates aren't very appealing)."

On the flipside, one of the biggest pluses is content mobility beyond the institution or programming, meaning that youth can easily transfer out their portfolios and continue to build on them. As well, with Google Drive, students can have personal logins and access to their own private folders, but the upload speed is slow for large files.

Case Studies: Choosing and Customizing Tools and Platforms

There is no best tool and platform across the board; there are only the tools and platforms that are best suited to the needs of your space and youth. Through our site surveys as part of the project, we've learned that for all of the sites who have been actively engaging in documentation and portfolio work with youth for a number of years, the process has been one of exploration and discovery. Educators have tried various solutions in a quest to find the ones that are most accessible, engaging, and conducive to seamless integration in their space. Here we take a closer look at two sites and highlight their journeys and methods, with special attention to purpose of documentation in their space, current and past platforms, tools, and integration method.

DIGITAL HARBOR FOUNDATION (DHF)

In 2013, the founders of DHF transformed an abandoned parks and recreation center in downtown Baltimore into a tech center for youth. They've been thinking about and experimenting with portfolio work for some time now. Here's what educators and administrators at DHF shared.

Purpose of Documentation:
"The purpose is to have a reflection of their work in order to encourage an iterative design process where they receive, give feedback, and share their projects with peers. Another purpose is to have an actual representation of the work that they complete while in our programs so that it could be used for school applications or job resumes."

Current Platform: WordPress
"We went with a simplified WordPress solution because it gives us an authentic blogging/documentation experience for our youth and control over the environment. We love that WP allows us to publish directly to the web so we can share as we like/need to with various stakeholders and that the youth can share really easily with anyone they choose. This allows for more use of their portfolio beyond just our space and programs—they can share with teachers, parents, and include on applications for high school or college. One of the drawbacks of this platform is that youth need to have a basic understanding of how to navigate the backend of a content management system, but we find that most are able to pick it up pretty quickly and we give them plenty of practice."

Previously Tried Platforms: Tackk and Evernote
"Last year, we used Tackk, and we really loved that platform for simple and straightforward content creation using a drag-and-drop interface that allowed for polished and creative posts/pages. Eventually, Tackk added in a bunch of social network-type features and made open commenting a feature that we weren't able to disable."

"Evernote was our first portfolio solution. We liked this solution because we were able to create templates that the youth could use/copy to format their artifacts in a similar way each time. The youth didn't like this platform and we didn't like that it wasn't really shareable online. It was also costly to maintain as our number of youth grew."

Tools for Capturing and Storage:
"We use MacBook Air laptops in our space, and each youth has access to one every day for use during our programs. The youth also have access to iPads for documenting, which they use sometimes. Most often, they are just using their personal phones and emailing themselves photos or videos they capture with their device. Once they have it in their email, they can download it and save it to their local account on the computer or Google Drive and then pull it from there to upload to their webpage. There really isn't central data storage right now. We don't use a resource drive or server for all of their data at this time. It's all directly uploaded to WordPress."

Integration:
"We have a standardized procedure in all Middle-High programs. In Maker Foundations, our entry-level course, the youth have a 'portfolio reflection' section that they must complete at the end of each two-week skill module. For our Member courses, the portfolio reflections are built into the projects. They complete the project and then also complete the portfolio entry for the project. The time is then built in to the module/lesson, whether it be 30 minutes at the start or end of a session or on their own time if they didn't complete it."

Words of Wisdom:
"There's no right way to do this—just start where you are, use what you have, and try something! If it doesn't work out, you can make adjustments or change directions completely, but the important thing is to just begin documenting. We have taken a lot of 'wrong' turns and tried things that didn't work out anything like we thought they would, but that has ultimately led us to learning a lot and experimenting with new approaches, and we have landed at a solution we are fairly happy with—for now anyway!"

"You also don't have to have it all figured out ahead of time. With our first foray into portfolios using Evernote, we came up with this fairly elaborate system for managing and more strict guidelines for posting and number of required artifacts, etc. Ultimately, our youth hated it and never used the portfolios. This time around, we stood up a WordPress site for each youth two days before programs started and just said, here are some goals we have for posting frequency, types of posts, etc. We moved forward to just try it out, and it has been one of our more successful attempts. There is still plenty of room for improvement, but we have something that works for now, and that is the most important thing."

MONTICELLO HIGH SCHOOL: ALBEMARLE COUNTY PUBLIC SCHOOLS

Located in Charlottesville, Virginia, Monticello High School instituted school-wide portfolios for its 9th and 10th graders in the 2013–2014 academic year, with every subsequent new class joining the program. Now, with all four grade levels engaged in portfolio work, they've learned some valuable lessons along the way. They, like DHF, will also openly admit to ongoing challenges and struggles. Here's what educators and administrators at Monticello shared.

Purpose of Documentation:
"A couple things: one to start getting ahead on the next generation of accountability. We're seeing a trend in Virginia to move away from standardized testing and toward more alternative assessments. We see portfolios as another way for students to share what they've learned. Second, we have children that create things that will be helpful in their post-secondary efforts. We felt like a lot of this work was going for a loss, and helping students archive their work will help them with creating product portfolios later down the road for whatever purpose they need."

"Students do phenomenal work that they are proud of, and it is often lost or discarded. Parents may keep work, particularly when students are younger, but how do students look back over a period of time and reflect on their growth as a learner or go back to something that they worked on previously and refine it? If we create authentic experiences, students would go back. Then, too, it helps students develop stronger reflective skills. This is a huge area for growth, not just in Monticello, but across the board."

Current Platform: Google Sites
"We use Google Apps for Education, so it was an easy choice from a cost and integration standpoint. Ultimately we were deciding at the school level how to move forward, so we were pretty much boxed in to free or existing services. The learning curve for posting content in Google Sites isn't ideal. We ultimately set up templates that mitigated some of this, but it's not perfect. It probably inhibits a percentage of students that would otherwise curate their portfolio. One of the key deciding factors with Google Apps for Education is the mobility of content post-graduation. The intention is to build in some time in senior-level courses to provide direct instruction on how to transfer out. Next year's rising seniors will be the first that have been involved with a concerted portfolio effort all four years."

Tools for Capturing and Storage:
"Every student has a laptop and students also have their own devices. The library also has free access to a variety of tools of creativity, and there is a TV production studio in the school."

"We direct students to store content in Google Drive."

Integration:
"We keep our curating instructions on a public website, providing basic, standard guidance, but very little is mandated. We believe that innovation happens organically and the change becomes cultural. We asked, how do we build and develop the capacity of people to value portfolios? We would rather wait and have a cultural shift than have a mandate that is superficial."

"The most important thing that we did when we initiated a cross-curricular team of teachers as both a support and an oversight committee. The team had a diverse group of teachers with strengths in multiple areas. … Teachers saw a unified team who responded to their concerns and questions, one that could help manage the 'big picture' and the smaller details."

Words of Wisdom:
"A school-wide effort takes a lot of TLC. Before we even got into the nuts and bolts, a lot of time was spent on exploring 'why'. Once that felt good, then moving forward felt a lot less like compliance and more purposeful."

"The teachers who were the most successful purposefully carved time to have students reflect and archive. We had a requirement for teachers that they needed to provide two opportunities per semester for students to capture and reflect on their work. Many did this weekly to make it a natural part of what students did, and it showed in the attitudes of the kids toward their portfolios."

"The act of making a portfolio is an act of making."

CHAPTER 7

DESIGN WORKSHOPS

In our research throughout the project, we've utilized design workshops as ways to engage both youth and educators at field sites in documentation, portfolio, and facilitation practices. The purpose of the many different Design Workshops we've conducted is to inform the development of portfolio practices and principles. It is critical for the workshop to be open-ended and provide room for participants to give voice to the process. The act of making and documenting is integral to the findings of the project and informs how this work – both in research and practice – moves forward.

We elaborate upon one specific workshop that we've tested 30+ times. This experience may serve as a useful tool to use with your team of educators, whether as a fun activity or a professional development exercise. We hope that it sparks new insights, questions, and understandings.

There is no one way to facilitate this workshop, nor is there one particular goal to achieve. Rather, the workshop allows for both facilitators and participants to learn from one another, as well as uncover, explore, and reflect on design and portfolio practices, use of tools and materials for capturing the process, and the integration and interpretation of practices across all educational environments. The ways in which the workshop has been facilitated in the past have undergone multiple iterations (and will likely continue to do so)!

There are a number of different extensions or directions that the workshop can take as well. Initially framed as a two-part workshop, the below description focuses in on the first part: making and capturing that process. Originally, the second part built on the experience of using documentation stations to develop deeper practices and portfolio plans. Many different possibilities are listed below as options to explore further.

Intended audience

This workshop has been designed and facilitated as part of our field site visits and research with diverse youth-serving makerspaces, as part of national conferences, and as part of small professional development engagements. Workshop participants can be educators and administrators, youth (typically middle- or high-school age), or a mix of both.

Individuals, whether adults or youth – and with and without previous experience with portfolios, are all valuable participants and will have differing perspectives on how to capture work and process, ways in which documentation can be streamlined across a physical space or educational environment, and distinct insights into assessment, integration, and tool usage.

Preparation and setup

Materials: Provide a variety of simple materials and supplies for participants to use and experiment with. These may include basic paper, construction paper, markers, scissors, tape, paper clips, and glue. Feel free to include more unique things too, including large pieces of cardboard, foam, felt, hot glue guns, LEDs, batteries, yarn, etc.

Lay these out on a table or space that is easily accessible by all participants.

Tools and DIY documentation stations: One of the purposes of the workshop is to uncover and explore new tools or old tools in new ways. Tools for capturing work do not need to be expensive and fancy. Low-tech or no-tech approaches can be just as effective as high-tech materials.

In our work, we have also come across easily-made DIY documentation stations, which are essentially small and large contraptions or stands that may hold devices and allow for easier, consistent, and hands-free use. They may be used to passively record an activity or to as dedicated (but mobile) stations for photography. Such DIY documentation stations include egg carton stands, binder clip holders, and posterboard stands, as well as camera lenses that can be attached to smartphone and tablet devices to increase camera angles (for capturing more of a scene) or zooming in on particular aspects. They're all inexpensive, can be easily acquired and made, and can be redesigned in any way! More information on these DIY tools is available in our Open Portfolio Project Research Brief 3: DIY Documentation Tools for Makers or in the Tools & Platforms chapter in this Practical Guide.

It's also useful and interesting for workshop facilitators to see how participants use tools, tend towards certain setups more than others, utilize their own devices, collaborate on shared devices, and prefer digital, tangible, or a mix of both.

Place DIY documentation stations strategically scattered around the room. Encourage their use, and if needed, demonstrate how one might use them. Encourage redesign of them too.

Place laptops, tablets, phone, or other digital devices around the room as well. Encourage their use, and observe how they're used, which apps are preferred, and when they're actually used.

Workshop facilitation

Prompt and challenge: Depending on your audience, choose a prompt or challenge that will be most relevant to their interests, whether personally or professionally. As the facilitator, you should issue the challenge simply – no need to elaborate on details.

Past prompts and challenges have been:
- Make a paper airplane.
- Design a solution to your travel problems.
- Create a gadget that accompanies your superhero powers.
- Make a paper greeting card that lights up.

Tell participants that the challenge comes with a twist, which is in reality the purpose of the workshop. **This twist is important!**

As such, prompts and challenges are actually:
- Make a paper airplane, and capture your process.
- Design a solution to your travel problems, and document what and how you do it.
- Create a gadget that accompanies your superhero powers, and capture the process you take to get there.

Additional guidance:
Encourage participants to make something physical, utilizing the materials available.

Encourage participants to try out the DIY documentation stations. Show them off quickly, before the participants dive in!

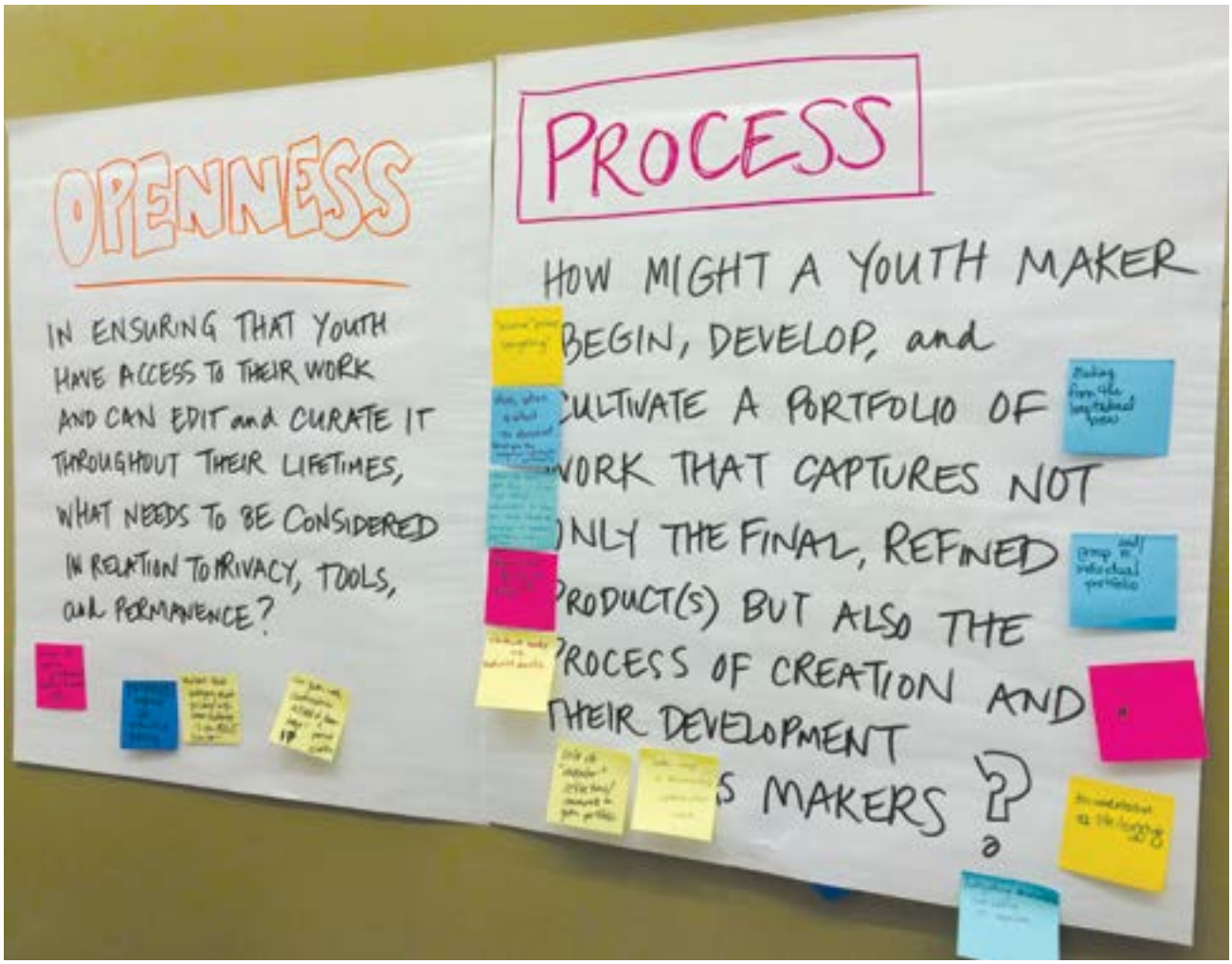
Remind participants, again and again, as appropriate, to document or capture their process.

Encourage participants to work in groups. Some will want to work on their own, but request that they engage with at least one partner. This can help with the documentation and can bring about interesting aspects of capturing making that would not arise if everyone worked on individual projects.

Timing: This workshop can be as short as 30 minutes or as long as 2 hours. Whatever the duration, be sure to include time, after the actual making+capturing, for debrief and discussion. Some of the richest findings come from this latter part.

Observations: Facilitators should take note of, in no particular order:

- Group dynamics:
  - Is one person doing all the documenting?
  - Who documents when?
- Consistency of documenting:
  - Do participants forget to capture their work? Too immersed or focused on the creation process?
  - Are there expectations set up at the beginning for what and how to document?
- Type of documentation:
  - Do participants take videos or photos, jot notes, type up thoughts, draw and sketch?
  - Do they take photos of prototypes or mistakes?
  - Do they take photos of each other?
  - Do they capture individual voice?
  - Are there "before" and "after" shots?
- Tools and materials:
  - Which tools and DIY documentation stations are used, and how often?
  - Which tools require handling or management?
  - Are tools redesigned or modified at all?



Debrief and discussion

At the conclusion of the making+capturing portion, workshop facilitators can take the session in a few different directions. Be sure to allow for time for participants to share their creations, as well as discuss their feelings and reactions.

Share: Have each individual group share their creations, as well as their feelings on the process of making+capturing.

Reflect and discuss: Some guiding questions, which are include some of the same above observation prompts, are included below. As a facilitator, you may want to build on some of the observations you noted during the workshop and bring them up as further points of discussion. Especially if there were commonly-encountered challenges or issues that arose, this is a great time to address them.

- Process and product:
  - What did you make?
  - How was it?
- Group dynamics:
  - Was one person doing all the documenting?
  - Who documented when?
  - Did they remind each other?
- Consistency of documenting:
  - Did participants forget to capture their work? Too immersed or focused on the creation process?
  - Were there expectations set up at the beginning for what and how to document?
  - Did the facilitator need to remind participants to capture their work? Why or why not?
  - What language was used? How was it received?
- Type of documentation:
  - Did participants take videos or photos, jot notes, type up thoughts, draw and sketch?
  - Did they take photos of prototypes or mistakes?
  - Did they take photos of each other?
  - Did they capture individual voice?
  - Were there “before” and “after” shots?
  - How might participants use these artifacts after the activity concludes?
- Tools and materials:
  - Which tools and DIY documentation stations were used, and how often?
  - Which tools required handling or management?
  - Were DIY documentation stations or tools redesigned or modified at all?
  - Which digital devices were used? Which non-digital tools?

Extension

There are number of ways to extend the learning and insights uncovered in the workshop and debrief. The following are options, to be conducted at a different time altogether or immediately after the initial workshop.

- **Do something with the artifacts captured.** Work with your group to design a portfolio – what would it look like? What would it include?
- **Create the actual portfolio.** What platform might you use? What affordances or limitations are there? Are groups creating individual portfolios, all with the same/similar project? Or is there one group portfolio being created? What skills, assets, and/or learning outcomes do you want to show in the portfolio? How?
- **Do the workshop again!** This time, utilize a different prompt, and designate a documenter. Choose 1-3 tools to use. Agree on the goals of the documentation, both the artifacts and the process.
- **Redesign the tools.** What tools were most useful or least useful? Can they be redesigned, modified, or combined to be more useful or effective? In an out-of-school-time environment? In the classroom?
- **Rethink language.** What prompts were most useful for reminding participants to capture their work? When should they be used? How often? What guiding questions could scaffold and prompt most effectively? How do you motivate? What the native documentation practices of youth and how might you build on them?
- **Translate to the classroom.** Which elements of the workshop can be directly applied or translate into the classroom? For which subjects, lessons, and/or activities?
- **Design your space to be conducive of documentation.** How might you set up your classroom to be most conducive to capturing work? A dedicated place for taking photos? A rotating or mounted camera? A confessional booth for recording voices and interviews? Large white paper for sketches or tablets for drawing? Laptops for written reflections?
- **Design your tools.** What do you have readily available to use? Are they adaptable, automated, mobile? Do they allow for collaboration or just for individual use?
- **Consider open-ness and inclusion.** What is stored within the portfolio? Classroom assignments, extracurricular projects? How can they be easily accessed from one year to the next, from one school to the next, from one space to the next? What characteristics of open-ness (in relation to tools) do you care about?
- **Consider assessment.** In reviewing a portfolio, what skills or learning outcomes do you want to see in a portfolio? How might you show that when creating a portfolio? Here, think carefully about the portfolio's audience. Who might makers want to show their portfolios to? And what would that particular audience would value?
- **Consider identity.** What helps to reveal the identity of the portfolio creator? In reviewing portfolios, what might you want to see about the person's personality?
- **Consider the audience of the portfolio.** Would the portfolio of work look different for different audiences? Why or why not, and how might you facilitate that?