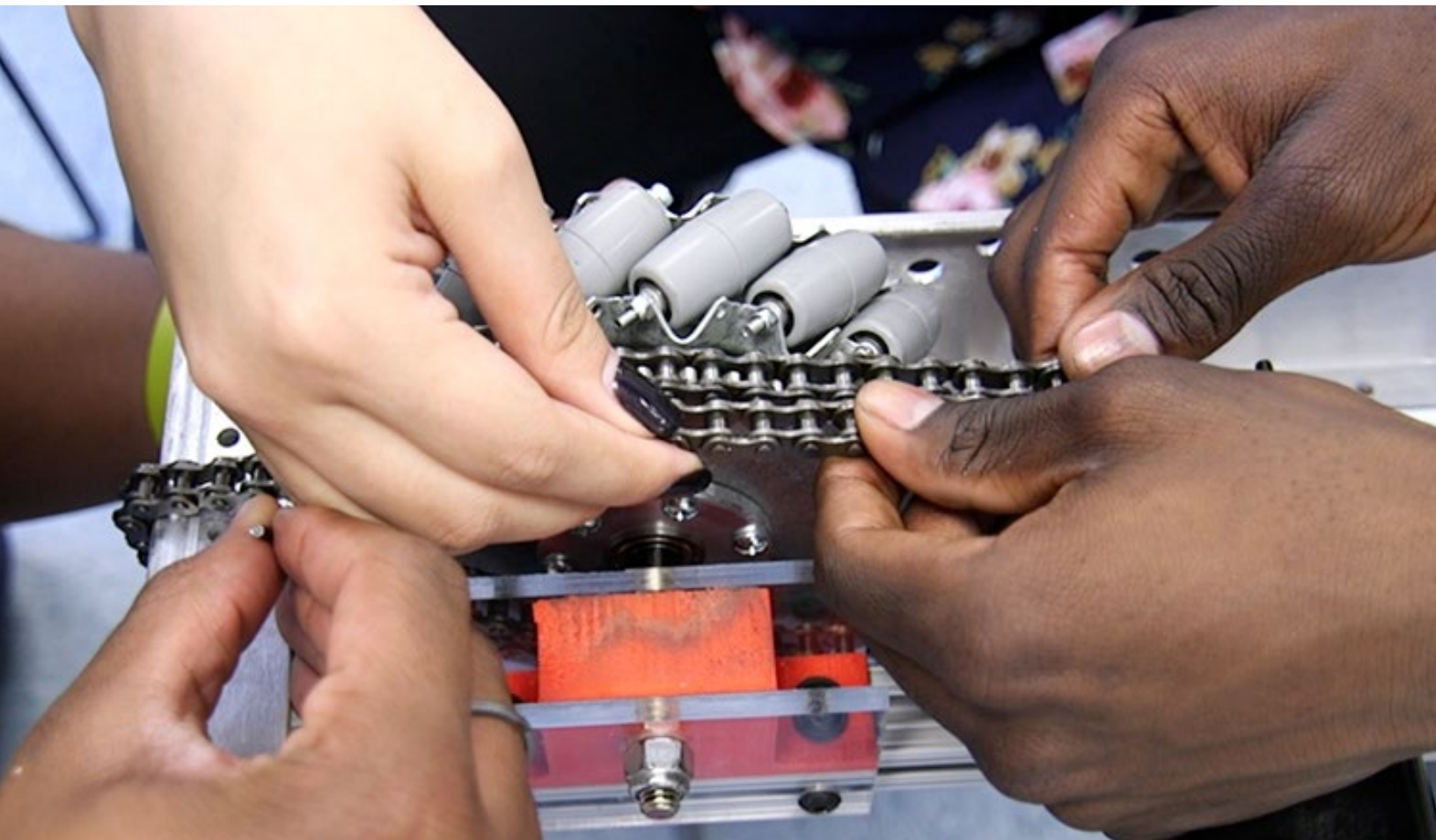# Maker**Promise**

Fulfilling the Maker Promise:
Year One

June 21, 2017

A COLLABORATION BETWEEN

Maker Ed   AND   Digital Promise

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Launching the Maker Promise

On March 9, 2016, Digital Promise, a nonprofit organization dedicated to accelerating innovation in education, and the Maker Education Initiative (Maker Ed), a nonprofit organization dedicated to empowering educators to facilitate meaningful learning experiences with youth, launched the Maker Promise. Announced by the White House as part of President Obama's Nation of Makers initiative, the Maker Promise is a collaborative campaign to give more students the opportunity to make.

Making in schools has been buoyed by the rise of the Maker Movement and enhanced by the falling costs and increase in access to digital design tools (like software for 3D modeling, programming electronics components, or producing media) and production devices (like 3D printers, laser cutters, or Arduino and other physical computing devices). Maker education — learning activities that incorporate the creativity of student-centered design and result in novel digital or physical creations — has the potential to better engage students of all ages and better prepare them for successful careers after graduation.

As part of the effort to cultivate opportunities for students to make, Digital Promise and Maker Ed issued a call to action for school and district leaders around the country to sign the Maker Promise, a concrete commitment by schools to dedicate a space for making, designate a champion for making, and display what students make. In turn, Digital Promise and Maker Ed will help connect schools to free resources and opportunities to develop their maker learning programs.

On June 17, 2016, during the National Week of Making, Digital Promise and Maker Ed announced that school and district leaders representing more than 1,400 schools from all 50 states had signed the Maker Promise, formalizing their commitment to bring access to quality maker education experiences to their students.

In the subsequent year, Digital Promise and Maker Ed have shared resources and opportunities with these schools through regular email newsletters, developed a stack of "Getting Started with Making" educator micro-credentials, and continued to grow the network through face-to-face events and informal gatherings.

A significant focus has also been on finding out more about how school leaders and educators envision maker learning in their schools, as well as their areas of greatest need. School transformation is not an overnight process; to effectively and sustainably integrate maker-centered curricula, spaces, and tools, and the teacher and leader capacities to implement them takes research, iteration, assessment, and time.

In this report we will share what we have learned over the last 12 months about the state of maker education in U.S. schools and how these discoveries are shaping the future of the Maker Promise initiative. We hope this knowledge can help maker educators and the other individuals and organizations that support them as we continue to bring making into our schools and build our nation of makers.

How is making being integrated into K-12 schools?

Throughout the summer of 2016 we talked to twenty-six of the superintendents, district administrators, and principals who signed the Maker Promise to find out more about what maker learning looked like in their schools and districts and how they were meeting the commitments of signing the Promise. A key takeaway from these interviews is that in many cases, signing the Maker Promise was an indication of commitment and aspiration, not a reflection of current school practice. While these leaders could identify at least one champion for making in their schools, spaces where making is already happening, and some ways that student work was being displayed, few could articulate a unified implementation model or development plan for maker learning in their institution. There was, however, a nearly universal desire to develop these implementation models to ensure sustainability and quality in bringing making to their schools.

In reporting on the challenges faced in developing more robust maker learning programs, school leaders repeatedly cited the following challenges:

- **Lack of unity around goals and outcomes.** Leaders and educators are interested in maker learning for a number of reasons that may include some combination of "hands-on learning opportunities," "developing creative confidence," "letting students design their own learning journey," "building metacognition and reflection skill and practice," or "integrating authentic and relevant projects." Without a clear narrative about learning objectives and potential benefits, districts have difficulty making large investments of funding, staffing, time, and other resources.

- **Small and inaccessible research base.** There is only a small and fairly recent body of research directly addressing "maker" practices in schools. While there is a much larger body of research that connects related practice and may inform maker learning implementations and advocacy, educators need guidance to leverage appropriate research in areas like constructivism, engagement, science learning, and other more prominent topics to inform their program goals and activities.

- **Lack of models for academic integration.** Schools are getting started with making in a number of ways: mobile maker carts, dedicated spaces, projects in libraries, with clubs, or in technology classes. Many leaders expressed excitement at the idea of integrating making into core academic subjects as a goal, but few had seen or carried out these integrations. One concern shared by many of the leaders we interviewed is that schools are buying tools and materials and setting up makerspaces, but the utilization of these

spaces does not always match the initial investment of resources put into them.

- **No frameworks for planning and designing programs.** Schools and districts that support maker learning are willing to nurture and encourage it in the places where it is occurring. This is often under the supervision of the maker champion who began making activities on their own and spread them through grassroots outreach in the school community. School an district leaders recognize that to scale these activities and avoid positioning making as a short-lived fad will require more direction and programmatic support at the district level, but they lack tools to design and plan for these programs.

These trends likely represent the biggest dangers to sustaining the maker movement in education; if schools over-invest in materials without clear plans and objectives, using implementation models supported by research, initiatives may be scrapped without being given a true opportunity to flourish. Highlighting these challenges was an important first step towards ensuring all students in the United States have access to quality maker learning experiences. To help schools meet this challenge, we sought to discover more about the practices and progress of districts leading in maker education, those developing programs, and those just beginning or considering getting started.

To do so, we developed a survey ([Appendix A](#)) to gather information on how maker learning is being brought into school programs and who the educators are that are implementing it.

The survey, completed in October 2016, aimed to answer three main questions:

1. Who are the maker champions?

2. What is the status of making in schools?

3. What resources do schools need most?

In most cases, the person who completed the survey was not the principal or superintendent who participated in our initial interviews. While every leader, educator, and community advocate who signs the Maker Promise is a champion for making in their school community, for the purposes of this survey we specifically solicited responses from the "person most responsible for implementing maker learning in your school or district."

Who are the maker champions?

The survey was completed by 201 "maker champions," the educator most responsible for implementing maker learning in their school or district. Many of these maker champions responded on behalf of an entire school district, so these submissions accounted for a large majority of the 1522 Maker Promise signer schools at the time the survey was administered.

Maker champions were asked to share their job titles (Table 2), department (Table 3), and how much of their work time was spent on maker learning. While job titles do not always fully make clear the extent of a person's role, both responses were indicative of how these programs are placed within a district's organizational structure.

Table 1:
Number of schools, teachers, and students reached by the Maker Promise.

How many SCHOOLS in your district engage in maker learning?	1,323
Approximately how many TEACHERS in your district engage in maker learning?	5,854
Approximately how many STUDENTS in your district engage in maker learning?	293,593

Table 2:
Job titles of maker champions who completed the survey.

Organizational Role	# of Respondents	% of Respondents
Superintendent/Asst. Superintendent	20	10%
Principal/Asst. Principal	17	8%
Director/Coordinator (school or district level)	35	17%
Teacher	52	26%
Librarian/Media Specialist	47	23%
Instructional Coach	15	8%
Other / Did Not Respond	15	8%

Table 3:

Department or program maker champions indicated they are a part of in their school.

Organizational Role	# of Respondents	% of Respondents
General administration	37	18%
General instruction or subject teacher	35	17%
Library	47	23%
Technology	40	20%
Maker/STE[A]M	25	12%
Career and Technical Education (CTE)	5	2%
Other / Did Not Respond	9	4%

A few conclusions can be drawn from the demographic data of the maker champions and the amount of their time allotted to maker learning:

- *Making in schools is typically initiated and developed at the grassroots level.* Teachers, librarians, and coaches account for 57 percent of maker champions, while administrators account for only 35 percent.

- *Few maker champions spend the majority of their time at work dedicated to that role.* For 56 percent of the respondents, maker learning accounted for less than one-third of their job responsibilities, while only 12 percent reported that their job was entirely dedicated to maker learning.

- *Maker learning activities are more likely to be found in libraries or technology programs and spaces than in core subject area classes*. Just like their counterparts at local, public libraries (Resnick, 2014; Fallows, 2016), school libraries and librarians are leading the charge to bring making into their schools. Librarians and media specialists account for 23 percent of maker champions.

- *Few schools have created job titles that explicitly identify the role as pertaining to "Maker," "STEM," or "STEAM".* Remold, Fusco, Anderson, and Leones' (2016) research on maker educator communities found that maker educators held a variety of unique titles and roles in K-12 settings. Based on the maker champions data, only 12 percent of respondents had a title that included "maker," "STEM," or "STEAM" as an area of focus. Future growth in the number of job titles containing these monikers could be seen as a measure of program sustainability in these areas.

- *There are few CTE teachers who identify with maker learning.* Only five maker champions have a role that explicitly includes CTE, although many CTE program areas involve student creative work. Reaching out to more CTE teachers and having them share their expertise with the maker educator community could aid teachers new to this type of learning, and also has the potential to help increase the sustainability of maker learning programs.

Which students are making and where?

Next, we wanted to know more about the maker education programs themselves. Maker champions reported the ages of students participating in maker learning activities in their schools (Figure 1), revealing upper elementary and middle grades have much more access to this type of learning than younger students (early elementary) and older students (high school). This finding echoes that of Remold et al. (2016), which found that maker educators were particularly focused on learners aged 5-13 (grades K-8).

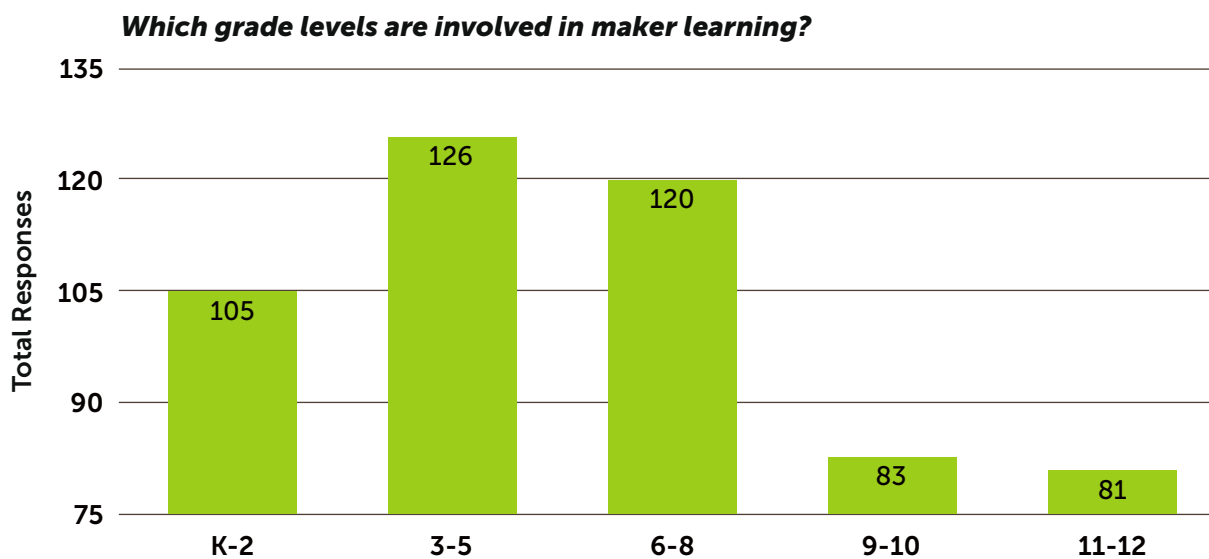**Which grade levels are involved in maker learning?**

Figure 1:
Grade levels involved in maker learning.

To find out more about these implementations, we asked maker champions to "briefly describe how maker learning is implemented in your school or district." Open-ended responses were grouped into the following maker learning program implementation areas:

- Space: School/District has a dedicated space where students can engage in maker learning.

- In class: School/District engages students in maker learning in the classroom.

- Extracurricular: School/District has extracurricular activities available for students to engage in maker learning.

- PD: School/District has a professional development opportunity for educators to learn about making.

- Beginning: School/District is currently working towards implementing maker learning but has few or no offerings in place.

Briefly describe how your maker learning is implemented in your school or district
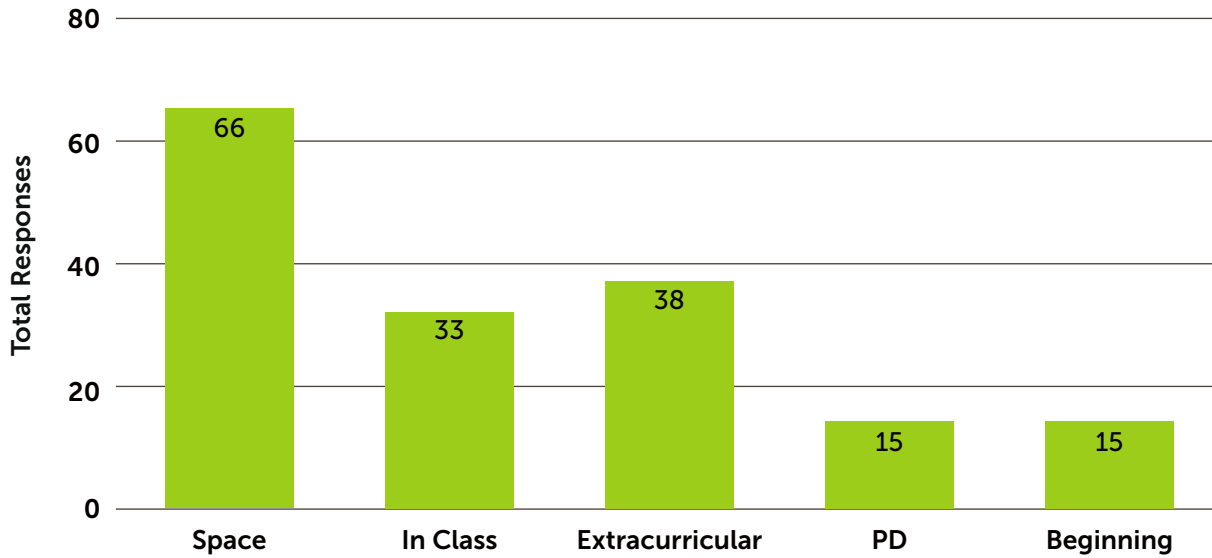

Figure 2:

Maker learning program implementation areas as reported by maker champion

While a few schools see themselves as just "beginning," more have begun to implement making in their schools in the context of a makerspace. Whether part of a library, a computer lab, or a separate dedicated space, this may support both curricular and extracurricular programming. Fewer schools are implementing formal professional development for teachers in the area of making.

How are maker learning programs developing?

Respondents were asked to assess their maker learning program in six categories using a common rubric (Appendix B). The rubric was designed based on the goals articulated in leadership interviews, with integration of maker learning into regular academic subjects and programming as the guiding principle. The six categories included Faculty and Staff Support; Administration Support; Resources and Budget; Tools, Materials, and Spaces; Assessment and Documentation; and Curricular Integration. In each category, respondents could rate their district as "beginning," "exploring," "integrating," or "embedded." At the fourth level, or "embedded," making is no longer seen as something separate or different, it is a regular part of the day-to-day learning for all students in the school. As expected, very few schools rate themselves at this level in many categories (Figure 3). This aligned with previous leadership interviews, which suggested that most schools are currently targeting the "integrating" level in most areas and will explore what comes next when they are more comfortable with making within the curriculum.
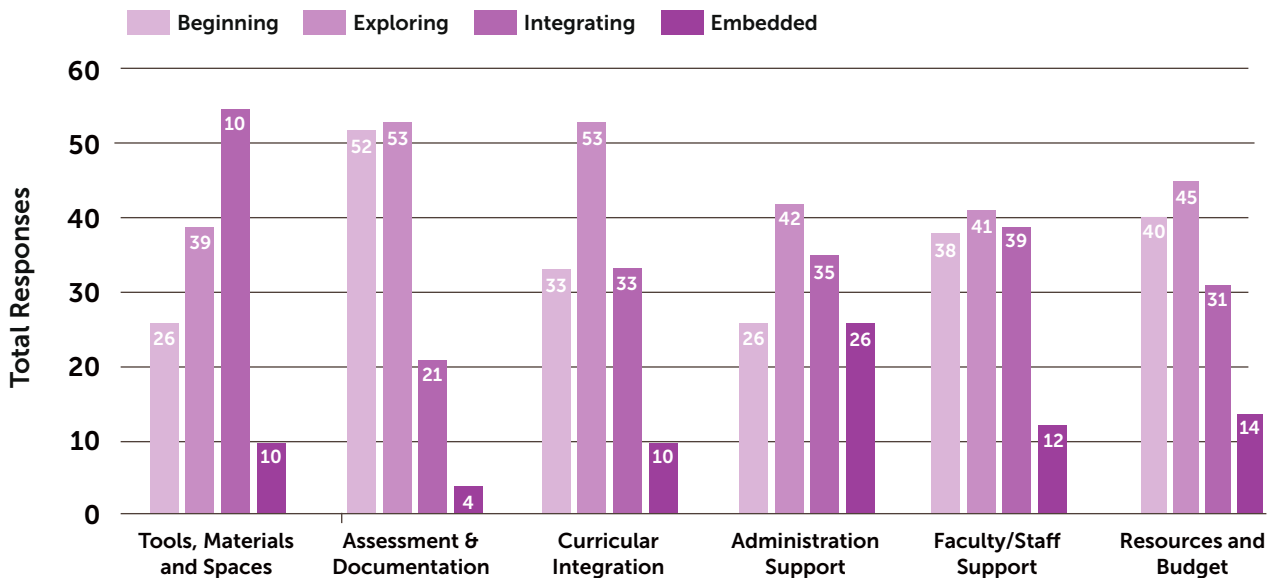
Self-Evaluation of Maker Learning

Figure 3:

Maker champions assessment of their district's maker learning program across six categories using a common rubric.

In designing this rubric, based on the feedback from leadership interviews, we attempted to replicate a model development trajectory for maker learning integration in a K-12 setting. One assumption we make is that schools would generally progress in all six areas relatively evenly in successful programs. As that has not been shown to be the case in these self-assessments, we will seek to determine in future research whether the rubric should be re-balanced to reflect the more common integration pathways, or if the lack of balance across categories signifies that the integration pathway many schools are following needs adjustment.

If this data, in fact, reflects an imbalance in the progress of integration in schools, it is concerning but not unexpected that champions rate their schools highest in the Tools, Materials, and Spaces category. This appears to support one of the trends that school leaders shared in their interviews: curricular integration lags behind the implementation of independent spaces,

and with that the development of assessment tools. *One could view this as a chicken and egg concern - there is a need to see learning through making happen to allow it into the formal curriculum, but without vetted curriculum and assessments it is very difficult to implement into the academic program.* This could also suggest a reason why faculty support is rarely reported at the highest level: without curricular integration that fully involves all core subject areas (or general education in lower grades), not all faculty members have opportunities to engage.

Maker champions report administrative support towards the higher levels of this self-assessment, which is not surprising given that the Maker Promise commitment could only be signed by senior administrators at a school or district. It seems likely there are many potential maker champions we have not heard from who are working in schools that have not yet generated a level of buy-in from the administration and have not joined the Maker Promise network.

What resources do schools need most?

The explicit mission of Digital Promise and Maker Ed in partnering to build the Maker Promise network was to aid schools in developing their programs by sharing with them the resources they need most. The final survey question asked respondents specifically about those needs. Maker champions were asked to rank, in order of importance, their need for the following types of resources: online professional development, in-person professional development, student project ideas and guides, student project documentation resources and guides, assessment resources and guides, cross-curricular integration resources and guides, and resources for advocating for maker learning in schools.

The high ranked need expressed is for student project ideas and guides (Figure 4). Reinforcing a key finding from the maker educator research conducted by Remold et al. (2016) is the desire from maker champions for more student project ideas and guides. Also, in-person professional development opportunities, resources for curricular integration, and project documentation resources are in high demand. Online professional development is less desirable, presumably because teachers understand making to be both hands-on and social, and not captured as well in a mediated format.
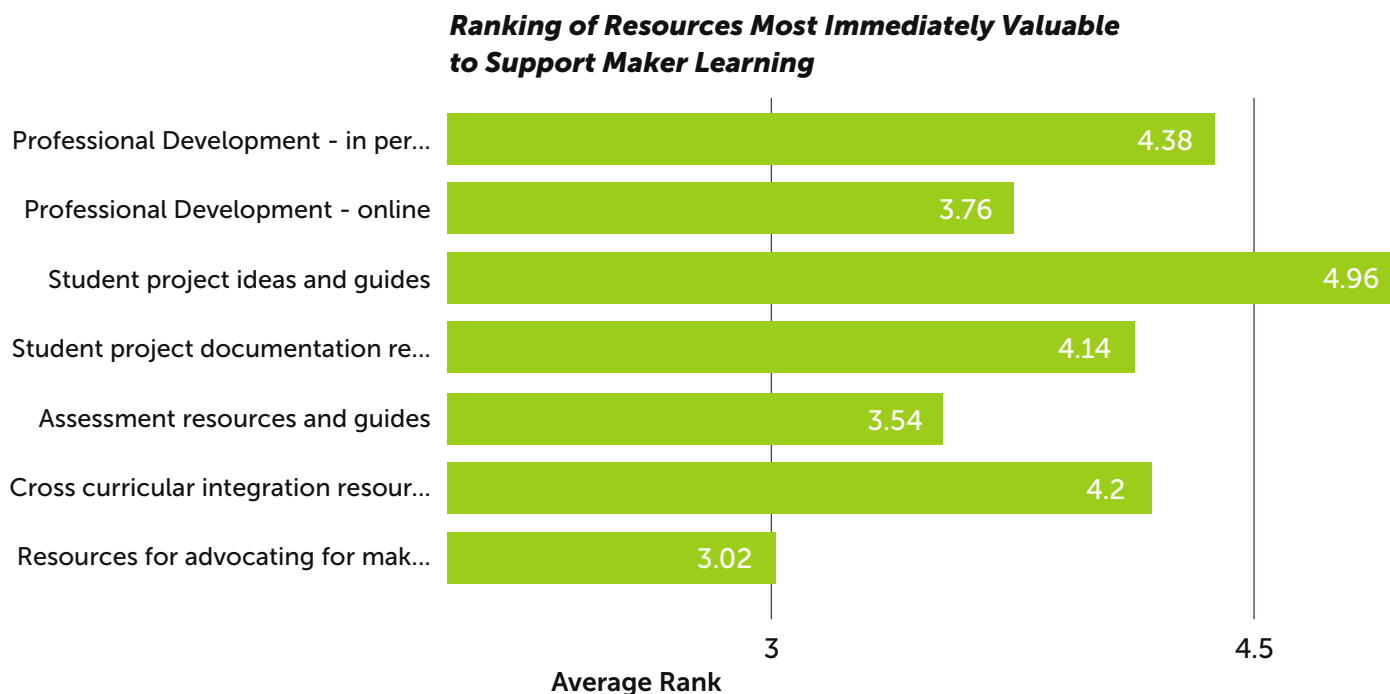
Ranking of Resources Most Immediately Valuable to Support Maker Learning

Resource	Average Rank
Professional Development - in per...	4.38
Professional Development - online	3.76
Student project ideas and guides	4.96
Student project documentation re...	4.14
Assessment resources and guides	3.54
Cross curricular integration resour...	4.2
Resources for advocating for mak...	3.02

Average Rank

Figure 4:
Needs identified by maker champions.

Maker champions expressed a need for student project documentation resources, and Chang, Regalla, Keune, and Peppler's (2015) research into portfolios in schools highlights the various ways digital tools and curation systems are used by students to capture their learning through making. Assessment resources also rank lower when decoupled from documentation resources; however, as mentioned previously, *it may prove difficult to integrate making into subject areas without assessment protocols, so as we meet the need for curriculum integration resources, we expect to see the need for assessment tools rise.*

Resources for advocacy rank as the lowest need, which is in line with relatively high levels of buy-in from school administrators and faculty in these districts.

When we analyzed needs by specific job categories listed previously, project guides ranked as highest need for almost all categories of maker champion and never fell below second highest for any. Technology directors identified professional development as the area of greatest need, while instructional coaches identified curricular integration resources higher. Both of these results are in line with the typical duties of those roles.

Year Two: Expanding, Connecting, and Sharing

Since entering the second year of the Maker Promise in March 2017, Digital Promise and Maker Ed have continued to engage and expand the maker educator community through a bi-weekly newsletter with a refreshed format that shares timely resources and opportunities while featuring thematic content and spotlights on additional partner organizations and Maker Promise signers.

We have worked to further connect the network by launching a series of Maker Educator Meetups at major national conferences, with the first attended to capacity at the Tinkering School in Austin, Texas, during the SXSWedu conference. Upcoming meetups will be held at major education conferences throughout the year - both to connect members of the network to each other, and to invite new members into the Maker Promise network.

In May 2017, we sought to extend both the depth and breadth of the Maker Promise network by launching an updated and expanded MakerPromise.org website.

The call to action now extends beyond just school leaders to include modified pledges for in-school and out-of-school educators, and community advocates. We have also begun to recognize, in the website and newsletter, partner organizations who aid maker educators by sharing free resources to Maker Promise signers. The website also now contains a calendar of events and a blog, so that Maker Promise signers can continue to browse and access information and resources shared in the newsletter.

As part of this year's National Week of Making, in response to the loudly voiced need for more and better access to guides and resources for student projects, Digital Promise and Maker Ed are committing to launching an effort to curate and connect available open education resources for making, and to make these resources easier to implement by re-formatting, combining, linking to standards or content goals, and publishing. While we are still in the planning stages of this effort, we expect to share more details soon.

The Maker Promise team, from Digital Promise and Maker Ed, are excited to continue building this network, sharing opportunities, and continuing to learn and grow with this amazing network of maker educators and school advocates into the next school year and beyond.

Acknowledgements

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Appendix A Maker Promise Champions Survey

MakerPromise

A collaboration between MakerEd and Digital Promise

Maker Champions
Survey

This survey is designed to be completed by a school or district's "Maker Champion" -- That is, the person most responsible for integrating making into the school program. You might be a curriculum and/or technology coordinator, a librarian, a teacher, or even a principal or superintendent. You might have any role in the school, but if you don't feel that you are the person *most* responsible for maker learning in your organization, this survey isn't for you (we'll have other surveys for you soon). If your maker learning implementation is a collaborative effort, complete the survey as a group and choose one person for the identification information on the first page.

By completing this survey you will be helping Maker Ed and Digital Promise to determine the most useful resources we can share with you to support your programs, and to help us design new resources for you. We rely on your feedback to provide you the best support you can.

Thanks,
The Maker Promise Team

Maker Promise

A collaboration between Maker Ed *and* Digital Promise

Tell us about yourself

* 1. Your name.

* 2. Your email address.

* 3. May we contact you directly if we want to find out more about your work or your answers to this survey?

○ Yes, please email me if you want to discuss further.

○ No, I'd rather not be contacted.

* 4. Your job title or role.

* 5. Your School or District name.

6. What percent of your work is with your school or district's maker learning program?

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Tell us about your school(s)

* 7. I work with:

○ One school

○ More than one school (but not an entire school district)

○ Every school in my school district

8. How many SCHOOLS in your district engage in maker learning?

[   ]

9. Approximately how many TEACHERS in your district engage in maker learning?

[   ]

10. Approximately how many STUDENTS in your district engage in maker learning?

[   ]

11. Which grade levels are involved in maker learning?

☐ K-2

☐ 3-5

☐ 6-8

☐ 9-10

☐ 11-12

Maker **Promise**   A collaboration between Maker Ed and   Digital Promise

Tell us about your program

12. Briefly describe how your maker learning is implemented in your school or district.

* 13. Please use this linked rubric to self-evaluate integration of maker learning in your school(s).

	Beginning	Exploring	Integrating	Embedded
Tools, Materials and Spaces	○	○	○	○
Assessment & Documentation	○	○	○	○
Curricular Integration	○	○	○	○
Administration Support	○	○	○	○
Faculty/Staff Support	○	○	○	○
Resources and Budget	○	○	○	○

14. Please provide any information that may help to inform us about your selections from the previous question.

* 15. Please rank in order of need which of the following resources would be most immediately valuable to supporting maker learning in your school or district?

⠿	⬍	Professional Development - in person
⠿	⬍	Professional Development - online
⠿	⬍	Student project ideas and guides
⠿	⬍	Student project documentation resources and guides
⠿	⬍	Assessment resources and guides
⠿	⬍	Cross curricular integration resources and guides
⠿	⬍	Resources for advocating for maker learning in your school

* 16. I give permission for Digital Promise to share my response to this survey with its Maker Promise partner Maker Ed.

○ Yes

	Beginning	Exploring	Integrating	Embedded
Faculty and Staff	There is one (or a small group of) teacher-champion interested in making. The champion is aware of he national conversation around making and maker education and is beginning to find ways to do maker work with students.	The teacher-champion offers a making or STEAM class or club for interested students - often by volunteering free-time or taking on an extra duty.	More teachers become excited about how they can integrate making into their own teaching practice and subject areas. The teacher-champion becomes a facilitator for these activities.	Making is ingrained in the culture of the school. Teachers use making in all aspects of their curriculum as a way to open up new possibilities for student agency and to facilitate authentic collaborations between disciplines.
Administration	There is no admin support, but the administration is not blocking.	The administration is curious and pleased with the stories being generated in the class and levels of student engagement.	Administration supports interested teachers integrating maker learning by providing collaborative planning opportunities, material resources, and professional development. Teaching or coordinting maker learning activities and materials becomes and official part of the teacher-champion's role.	Administration becomes champions of maker learning, dedicating significant resources to it and designing school structures and systems to accommodate open-ended projects, assessments, and collaborations. Teachers are expected to integrate maker learning into their programs and the teacher-champion is tasked entirely with supporting this work.
Tools and Space	The teacher-champion may seek funding for or receive a new tool like a 3D printer but does not know fully how it will be used, or the teacher-champion may not have a clear sense of what tools are needed and is seeking to evaluate some options.	There is a space or some access to tools such as a cart. Frequently there is a focus on 3-D printers or other high-tech tools. The tools are typically in a space used only by one teacher or class.	School has a space or mobile solution that can be used by more teachers. This space features a combination of low and high tech tools and materials. The teacher-champion likely still oversees the space, but it is used by other teachers as well.	The space becomes a central and shared resource for the school. There may still be an owner of the space, but he or she becomes a facilitator for others' usage, not the sole provider of services.
Curricular Integration	None.	There is a separate class or club for maker learning activities - often focused on one tool or skill like robots or 3D printing.	The champion has started outreach to other teachers, who jointly develop projects supporting their subject areas. Several classes across the curriculum are engaging in at least one student-centered hands on project each school year.	Projects are deeply integrated into every aspect of the school. Classwork consists of projects that are co-created and coowned by teachers and students across disciplines.
Assessments	None.	Making is typically situated in a class or club that has limited or no assessment requirements. What assessments there are are unstructured and informal.	Teachers struggle to find ways to assess the making they are integrating into their curriculum - workaround systems are created or maker projects go unassessed within formally assessed classes.	Schoolwide practice and systems change to create assessment structures that accommodate maker learning by allowing for more formative assessment, student reflection, and collaborative evaluation of learning between teacher and student.
Funding/ Budgets	Making activities use already available or donated materials.	School contributes a small amount of the technology budget to acquire some tools and/or teacher crowdfunds for supplies.	School or district dedicates a meaningful level of funding to provide necessary tools and consumables for projects as well as to support faculty time spent planning and integrating maker learning into practice.	School or district dedicates a significant level of funding to ensure that tools, materials, and supports are in place to allow all teachers to incorporate maker learning into their practice.