



littleBits™ **education**

THE ROLE OF SCHOOL LIBRARIES IN THE 21ST CENTURY MAKER MOVEMENT

WHITE PAPER

BY

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TITLE

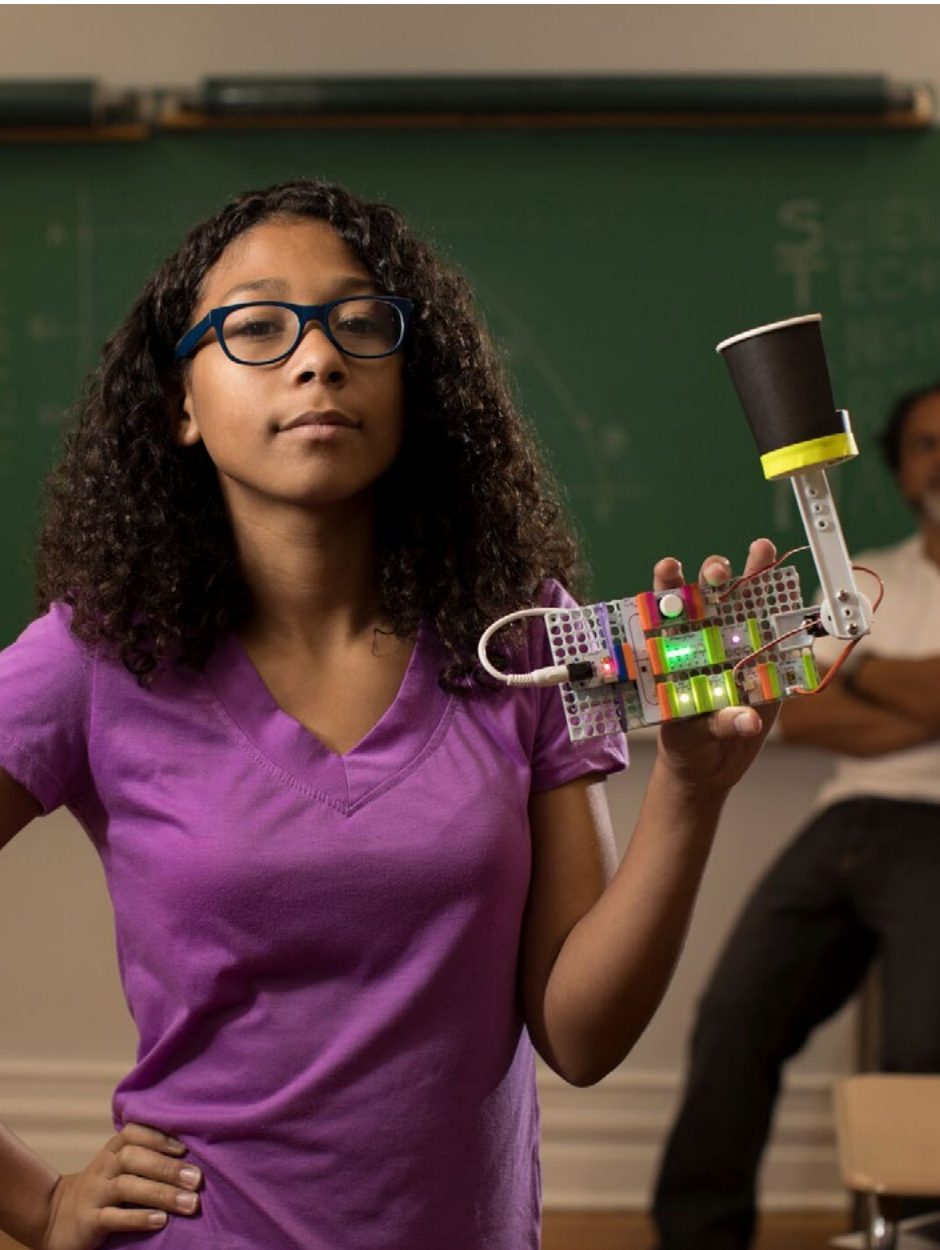
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According to [U.S. Department of Labor](#), more than 65 percent of today's students will grow up to fulfill careers that do not exist yet. Today, more than ever, it is crucial to prepare our students to become future-ready and have the confidence to invent the world they want to live in. To do this, we must equip them with [21st century skills](#) (critical thinking, creativity, collaboration, communication) and [STEAM](#) - Science, Technology, Engineering, Art, and Math - knowledge so they can be prepared for future challenges.

Although [some research](#) shows that educational institutions have not kept pace with the changing nature of work, we see an increasing number of schools now assimilating STEAM into their programs - either fully integrated as part of core academic subjects or offered as part of after school and extra curricular activities. Interestingly, [librarians in particular](#) have taken an active role in designing these programs, with an emphasis on project-based and maker education. They play an active role in piloting school programs at all levels, and in collaborating with other teachers to embed new tools into the core curriculum.

Observing these trends, littleBits collaborated with a team of researchers at School Library Journal to better understand the changing nature of school libraries - often from monolithic reading rooms to innovation hubs. As a result, we were able to delve more deeply into the types of programs that are offered as part of maker and STEAM education, the challenges librarians face as they start and scale these programs, and some of the best practices to ensure an effective and engaging implementation for all students.

Following, you'll find the results of this research, along with actionable strategies for school administrators and educators to start and scale their STEAM programs.

MAKING THE CASE FOR STEM/STEAM EDUCATION

P21's Framework for 21st Century Learning defines four unique learning and innovation skills with an emphasis on "4Cs": critical thinking and problem solving, creativity and innovation, communication, and collaboration. P21 argues that these skills help students to prepare for the increasingly complex and unknown work environments of the future.

"STUDENTS NEED THE OPPORTUNITY TO ACT ON THEIR IDEAS, TAKE RISKS, MAKE MISTAKES, LEARN FROM THEIR FAILURES, AND CONTINUOUSLY IMPROVE THEIR INVENTIONS THROUGH A CYCLICAL PROCESS OF MIXING AND REMIXING."

To think *creatively*, students must call upon a wide range of idea creation and brainstorming techniques to create new ideas, then elaborate, refine, analyze, and evaluate those ideas. And they can't do it alone; creativity is almost *never undertaken solo*. Students need to be able to work with others to develop and *communicate* new ideas effectively, be receptive to different perspectives, and integrate various ideas to create more effective and complete solutions for the problems they care about. Most importantly, creativity does not stop at idea creation. Students need the opportunity to *act on their ideas*, take risks, make mistakes, learn from their failures, and continuously improve their inventions through a cyclical process of mixing and remixing. These 21st century skills are the cornerstones of maker and STEAM education.

Dale Dougherty, who is considered by some as the Father of Maker Movement, coined the term "*maker education*" in 2013 to describe a problem - and a project-based approach to learning that involves hands-on, collaborative, and active involvement of students in finding solutions to authentic problems they care about.

"Makers" are not afraid of breaking things, taking them apart and putting them back together in new ways, making mistakes, or using mistakes as learning opportunities along the way. Maker education is closely associated with STEAM learning. In fact, Dougherty *refers* to maker activities as experimental play with new technologies in order to learn about them, and then repurpose them to create new prototypes.

In schools, maker education puts learners and their motives at the center of the learning experience and gives them the opportunity to drive such experiences. *The culture of maker education* is built around collaboration and peer-to-peer interactions; it emphasizes the process of making rather than the final project. It often involves an interdisciplinary approach to instruction and learning: *maker educators* integrate visual arts, music, language arts, humanities, and social sciences into STEAM projects, giving students a chance to have a holistic experience with technology.

Importantly, the goal of STEAM education is not to turn every student into a programmer or an engineer. The world needs diversity, after all. Instead, STEAM education is meant to give every student an opportunity to learn about the technologies they use and to help them identify themselves as innovators and changemakers that are capable of taking an active role in inventing solutions for problems they care about.

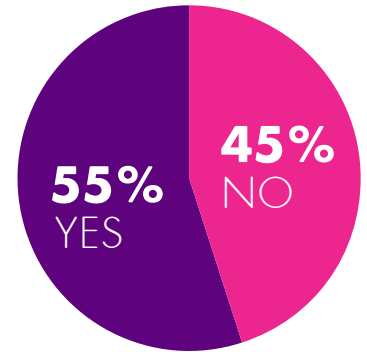
Here, we will investigate the role that school librarians play in starting and scaling maker and STEAM programs in schools.

THE STATE OF THE MAKER MOVEMENT IN SCHOOL LIBRARIES

A MAJORITY OF SCHOOL LIBRARIES OFFER MAKER PROGRAMS FOR THEIR STUDENTS.

More than half of school libraries in the U.S. and Canada (about 55%) currently offer maker programs to their students, with middle school libraries leading the pack at 61 percent. School libraries in the Northeast (60%) and the South (61%) are more likely than those in the Midwest (51%) and the West (42%) to offer maker activities. Further, suburban schools (60%) are more likely to offer maker programs than urban (51%), rural (51%), or small-town (48%) schools.

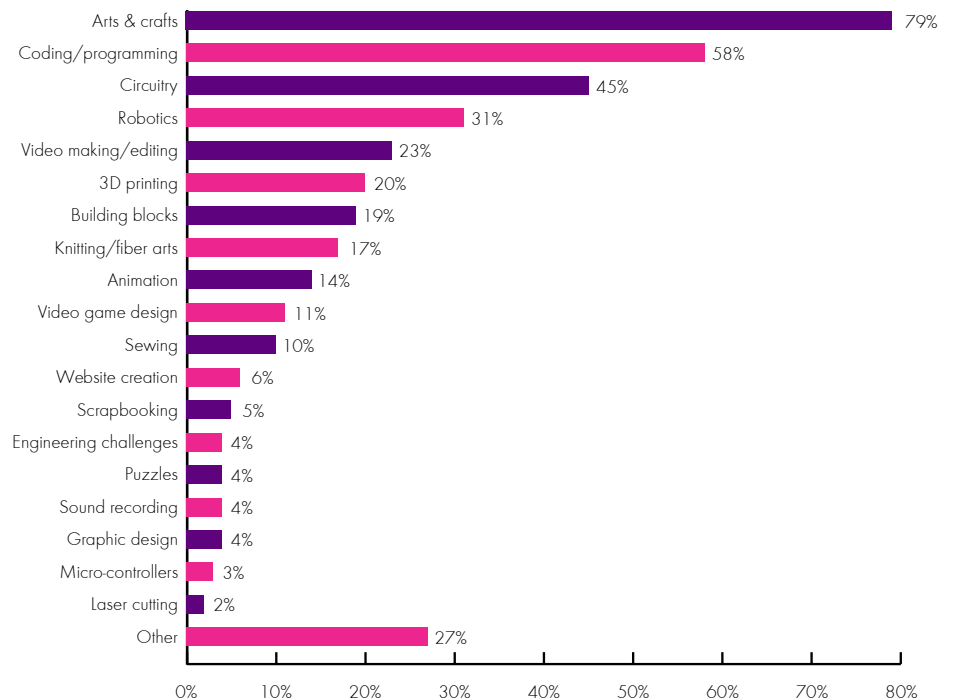
FIGURE 1
DO SCHOOL LIBRARIANS OFFER MAKER ACTIVITIES?



ARTS AND CRAFTS STILL DOMINATE THE MAKER MOVEMENT.

While arts and crafts – manipulatives like cardboard, crayons, and glue – remain the most common offering (79% of respondents) in maker spaces within elementary and middle schools, coding (58%), circuitry (45%), and robotics (31%) remain a distant second, third, and fourth. Coding is most commonly offered in suburban schools.

FIGURE 2
MAKER ACTIVITIES IN SCHOOL LIBRARIES



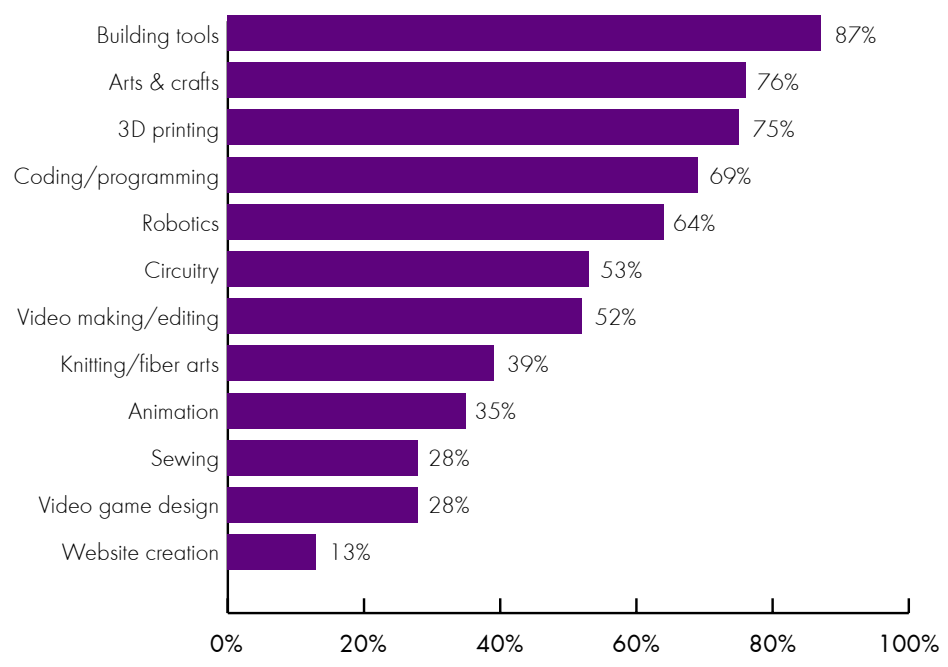
In high schools, the top four maker offerings are arts and crafts (79%), circuitry (42%), and coding, which is tied with 3-D printing at 33 percent. Coding is most commonly offered in suburban schools.

BUILDING BLOCKS AND TOOLS ARE THE MOST POPULAR MAKER OPTIONS OFFERED BY LIBRARIES.

Among all respondents, building blocks and tools (87%) – such as LEGO and K’Nex – were reported as the most popular maker options in libraries, followed by arts and crafts (76%), and 3-D printing (75%), and coding/programming (69%).

In high schools, the most popular activities within maker spaces are robotics, animation, 3-D printing, and arts and crafts. However, in comparing the most popular activities with the activities that are mostly offered, a contrasting trend appears. While robotics and animations are reported as most popular among high school students, only 17% of high school librarians are involved in robotics, and even fewer (4%) are involved in providing animation activities.

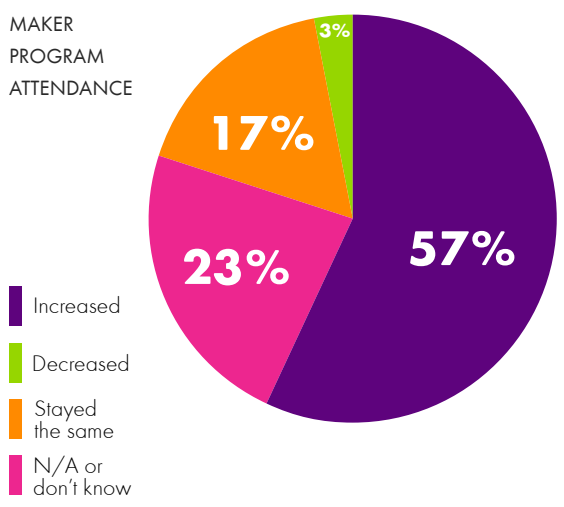
FIGURE 3
POPULAR MAKER
ACTIVITIES
IN SCHOOL
LIBRARIES



ATTENDANCE AT MAKER PROGRAMS IS INCREASING.

More than half of school librarians (57%) report that maker attendance rose from the previous year. Middle schools and schools in urban areas are most likely to experience a rise in maker attendance.

FIGURE 4
MAKER
PROGRAM
ATTENDANCE

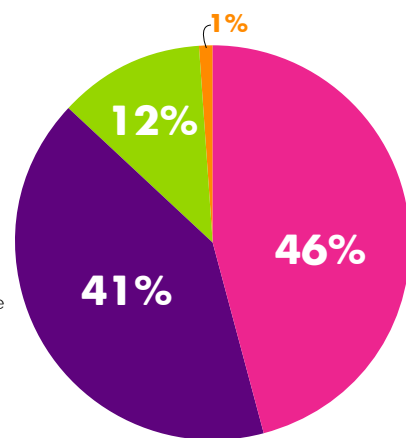


LIBRARIANS WANT TO BE INVOLVED IN SCHOOL MAKER ACTIVITIES.

All librarians who participated in our survey were either involved in their school maker activities or were interested to get involved if they were not already. In fact, 85% reported that they are either very active or somewhat active in their school's program. By type of schools, middle school librarians are the most likely to be "very active" (47%). By locality, small town (49%) and rural librarians (57%), and by region, librarians in Southern schools (51%) are most likely to be very active in maker activities.

FIGURE 5
LIBRARIANS' INVOLVEMENT IN MAKER ACTIVITIES

Very active
Somewhat active
Not very active
Not involved, but interested

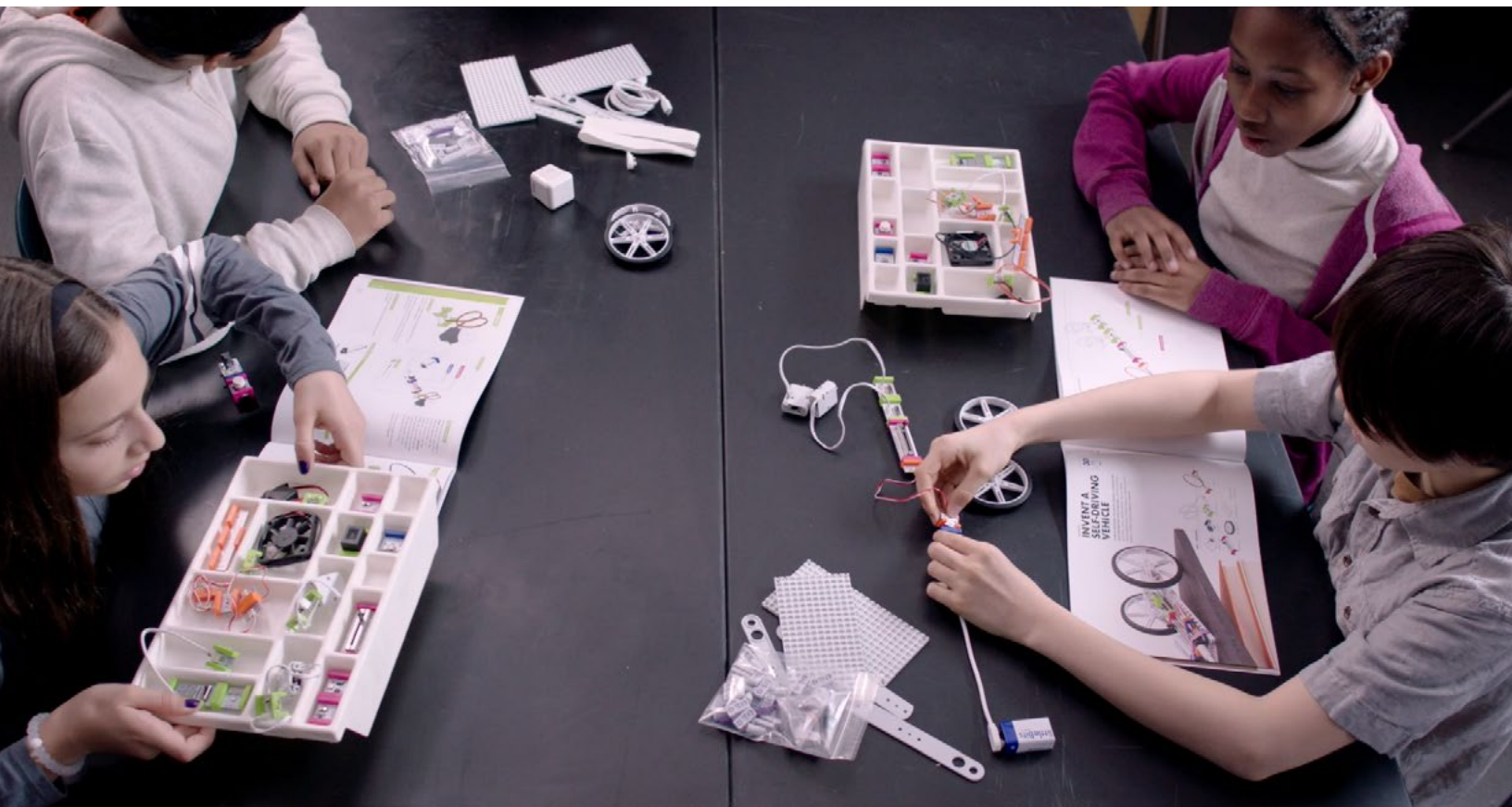


MIDDLE SCHOOLS AND URBAN SCHOOLS HAVE BEEN SUCCESSFUL IN COMBINING MAKER ACTIVITY AND COMMUNITY SERVICE PROJECTS.

Only around 8% of schools report that students combined maker activities with community service, with middle schools (12%) and urban schools (10%) being the most likely to do this. These community service projects ranged from knitting hats for the homeless, making cards for veterans and local hospitals, to creating an item to better their school.

Some of the most impactful community activities reported by survey respondents included things like:

- Making dog and cat toys for the Humane Society
- Making baby quilts for homeless expectant mothers
- Making cards for armed services members, seniors, etc.





SPACE

MOST LIBRARIES HAVE DEDICATED SPACE(S) FOR MAKER-RELATED ACTIVITIES.

Sixty-seven percent of the schools that offer maker activities do have a dedicated maker space. Most of these schools (59%) have their maker space within the school library, and only 9% of them maker spaces elsewhere in the school.



CURRICULUM

ONLY 1/3 OF MAKER ACTIVITIES ARE TIED TO CURRICULUM.

An average of about 32% of maker activities in schools are tied directly to the curriculum, while 8% of respondents report that they tie all maker activities to the curriculum and 13% tie none of their projects to the curriculum. On average, elementary and middle schools are more likely to tie their maker activities directly to curriculum.

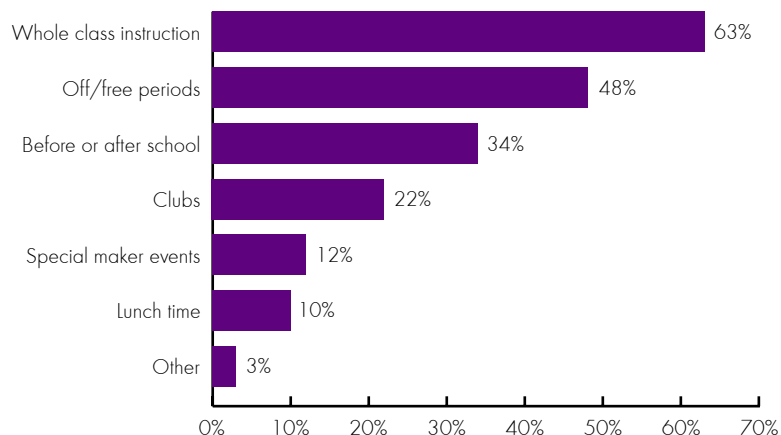


TIMING

MANY MAKER ACTIVITIES ARE OFFERED DURING WHOLE-CLASS INSTRUCTION.

When are maker activities offered? This is an important question asked by many schools, admins, and educators looking to fit maker and STEAM education in their programs in a way that does not take time away from other core subjects. Interestingly, the majority of respondents indicated that their schools offer maker activities during whole-class instruction (63%), although nearly one-half (48%) also make these activities available during free periods. One-third (34%) offer maker activities before or after school, 22% have maker clubs (e.g., coding club), and 12% hold special maker events, such as STEM nights.

FIGURE 6
WHEN ARE
MAKER
ACTIVITIES
OFFERED?



Nearly three-fourths of elementary school librarians provide maker activities during whole class instruction, while librarians in middle and high schools are more likely to provide maker activities during students' off/free periods and before or after school.

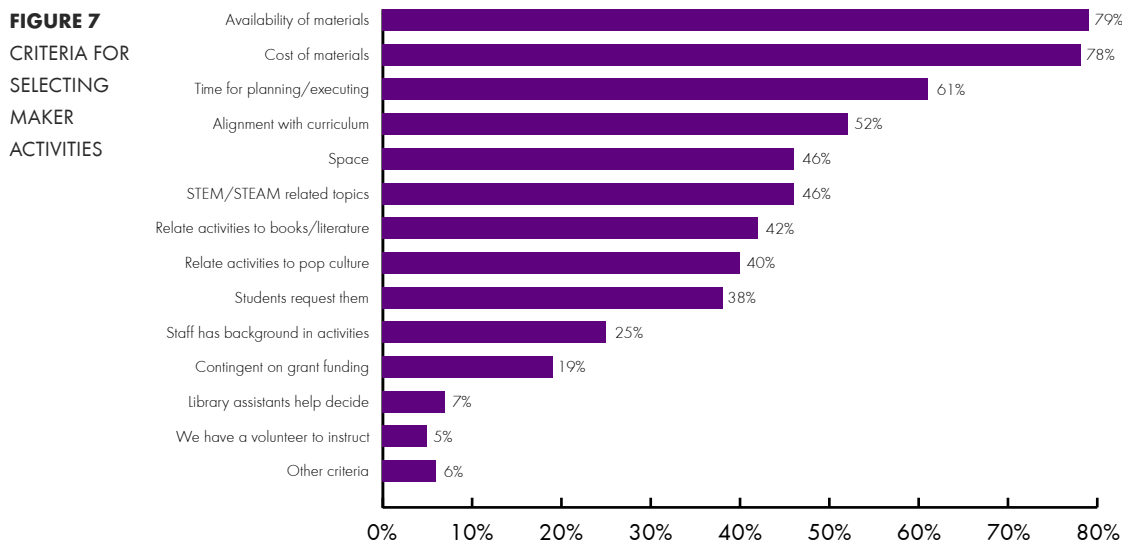
Geographically, a higher proportion of schools on the West coast (27%) hold maker events such as STEM nights. "Making clubs" such as coding clubs, Girls Who Code, and anime/manga clubs, are found most often in the Northeast and Midwest.



MATERIALS

ACCESS TO MAKER MATERIALS IS KEY FOR PLANNING.

The most influential factors that librarians use to decide which maker activities to offer is the availability of necessary materials (79%), their cost (78%), the time for planning and executing the activities (61%), and alignment with curriculum and assignments (52%).



While the availability of materials is important to all school types – elementary, middle, and high school – cost is the number-one factor for high school librarians. Respondents from elementary and middle schools report that finding time to plan and execute activities is particularly important. Ensuring that projects relate to the class curriculum or assignments is also important, especially in elementary schools, while student requests have more influence on project decisions in middle schools.



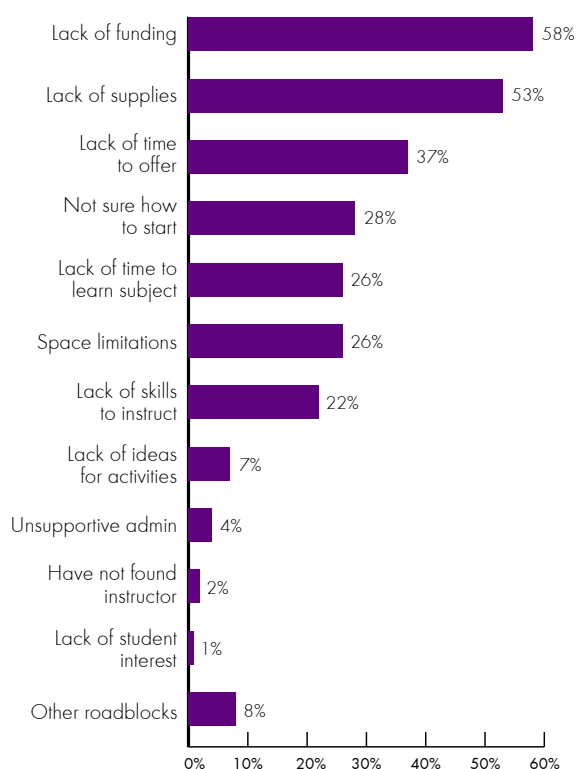
FUNDING

LACK OF FUNDING IS A MAJOR ROADBLOCK.

Not surprisingly, lack of funding (58%) and supplies (53%) were the top roadblocks preventing school libraries from trying more maker activities. Other blockers included lack of time during the day (37%), uncertainty around how to start (28%), lack of time to learn the subject (26%), space limitations (26%), and lack of training (22%). It is important to highlight that only 1% of the respondents selected students’ lack of interest as a roadblock.

For those schools that have not started a maker program yet, lack of funding (43%), lack of supplies (43%), and uncertainty around how to start (31%) are the primary reasons.

FIGURE 8 ROADBLOCKS



BOOK FAIRS COULD FUND YOUR LIBRARY'S MAKER SPACE.

Finding a source of funding for maker activities is an important piece of puzzle for starting and scaling any maker program, and results of this survey indicate that educators tap into variety of sources to fund these programs. Book fairs, library materials budgets, and grants are common sources of funding for maker supplies and equipment. In fact, 44% of libraries in elementary and middle schools receive some maker funding via book fairs. Other sources of funding include general library budget, donations, and self-funding by the librarians.



LIBRARIANS' ROLE

LIBRARIANS ORGANIZE AND CONDUCT THE MAJORITY OF MAKER ACTIVITIES IN SCHOOLS.

A majority of the respondents in our sample (92%) mentioned the librarian organized maker activities in their schools. In one-fifth of schools, it is the classroom teacher. Students themselves organize the activities in 10% of schools that offer a maker program.

LIBRARIANS WANT TO LEARN ABOUT ROBOTS AND CODING!

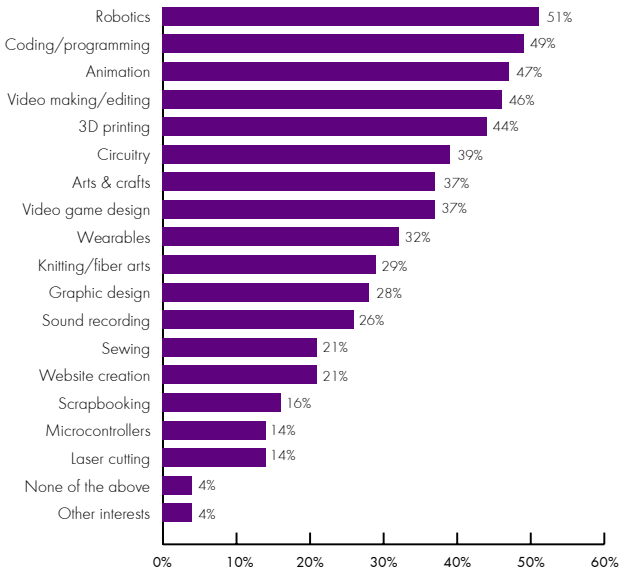
Librarians are most interested in learning robotics (51 percent), coding and programming (49%), animation (47%), video making and editing (46%), and 3-D printing (44%).

Elementary schools are especially interested in learning more about robotics (55%). Middle schools are especially interested in learning more about coding (52%). High school librarians are most interested in learning more about video making/editing (60%).

LIBRARIANS AND TEACHERS DON'T ALWAYS COORDINATE ON MAKER ACTIVITIES.

Only 1% of the respondents mentioned they coordinate maker activities with all teachers in their school. Majority though mentioned they coordinate with either some (23%) or a few (44%) teachers. Unfortunately, 26% of librarians reported no coordination.

FIGURE 9 SUBJECTS OF INTEREST



MEASURING THE SUCCESS OF A MAKER SPACE

In an open-ended question, respondents were asked about successful maker projects in their schools, as well as how they measure success. Here are some of their responses and key take-away points:



PARTICIPATION, ENGAGEMENT, and COLLABORATION are key factors in measuring success.



COMMUNITY, CHALLENGES, and COMPETITIONS are catalysts of maker movement.



Many examples of successful maker projects are the ones that **INTEGRATE MAKING INTO CORE CURRICULUM.**



Emphasis on the **PROCESS** of making is important.

WHERE DOES THIS LEAVE US?

Over the past few years, the maker movement has taken a more active role in school libraries, with more than half of the libraries in our sample currently offering maker programs and 60 percent of elementary and middle schools now dedicating space for maker activities. However, we still have a long way to go to integrate technology and STEAM tools. But, all signs point to a positive outcome. Not only has incorporation of STEAM activities increased students' **library participation**, but it has also significantly affected students' learning in sciences, technology, engineering, arts, and math subjects while giving them a strong sense of community.

For those schools not offering maker programs, student interest is not a problem. Lack of funding and supplies as well as training teachers and librarians are the main blockers. In fact, schools with successful maker programs are highly satisfied with student engagement and the impact of these programs on students' learning of core academic subjects – including 21st century and STEAM skills. These results have important implications for state, district, and school budget planning and strategy.

KEY TAKEAWAY: Policy makers and school administrators should align their budget allocations with the demands of the future of work, students' interest, and the potential for higher achievement.

Research presented in this paper also highlights an important trend in the changing role of librarians in our education system. Eighty-five percent of librarians who responded to the survey reported they are either very active or somewhat active in their school maker activities. In fact, librarians and media specialists are taking the lead in bringing new and innovative tools into their school programs. They are also playing an active role in piloting these programs and collaborating with other teachers to embed these new tools as part of the core curriculum.

KEY TAKEAWAY: This trend highlights the importance of three initiatives to further enable librarians and media specialists:

- 1. PROVIDING PROFESSIONAL DEVELOPMENT RESOURCES** to librarians and media specialists so they can more successfully be the leading force of innovation in their schools;
- 2. DESIGNING STAFF MEETINGS AND A SCHOOL CALENDAR THAT ALLOW LIBRARIANS TO INTERACT MORE FREQUENTLY WITH TEACHERS** in their school so they can better integrate maker activities with curriculum and scale these activities beyond the library space; and
- 3. RETHINKING THE DESIGN OF SCHOOL LIBRARIES** to allow integration of STEM and maker tools, collaboration between students, and opportunities to share knowledge in the community.

Many examples of successful maker programs highlight the importance of connecting student projects with a meaningful cause in the community. This underscores an important and untapped opportunity to increase the connection between school maker programs and community services.

KEY TAKEAWAY: By aligning maker activities with causes in the community, we give our students the opportunity to become more active citizens and to find meaningful connections between what they do and the needs of their community.

Results of this study also highlight a misalignment between the type of making activities that are offered in schools, the activities that are most popular among students, and the maker subjects that librarians are interested in learning more about. This data should be considered by administrators and educators at both the school and district level as they plan to scale their maker activities.

Finally, a few key questions can be answered from librarians' examples of successful maker projects:

HOW SHOULD WE MEASURE SUCCESS? Success can be measured by the level of student engagement, collaboration, and demonstration of learning.

FOR STUDENTS, WHAT IS THE MOST IMPORTANT TAKE-AWAY FROM A MAKER PROGRAM? The process by which students build a project is much more important than their final build. Students often go through many iterations, take risks, make mistakes, and learn forward from their failures.

HOW CAN WE CATALYZE THE MAKER MOVEMENT IN LIBRARIES? Creating a community and culture around making catalyzes the movement and creates synergy between different stakeholders, including librarians, teachers, students, parents, administrators, and the community at large.

HOW CAN STEAM EDUCATION WORK WITH EXISTING CURRICULUM? Maker and STEAM education provides opportunities for students to deepen their understanding of academic subjects such as arts, mathematics, sciences, language arts, and social studies. Through hands-on project-based learning, students will demonstrate what they know, reflect on their understanding and misunderstanding, and share their knowledge with the community.

The bottom line? If implemented in a meaningful and effective way, maker and STEAM activities add to students' learning of core subject areas and never take away time.



METHODOLOGY

Data for this research was collected by School Library Journal and sponsored by littleBits. Researchers from SLJ emailed a blind survey invitation to approximately 7,000 school librarians on March 10, 2017, with a follow up reminder email on March 24, 2017. A drawing for a \$200 American Express gift card was offered as an incentive to participate in this survey. The survey closed on April 3, 2017 with a total of 426 respondents. The data presented in this paper includes responses from the United States and Canada and is weighted based on type of school.

A copy of the full survey is available in Appendix A.

RESPONDENT DEMOGRAPHICS

TYPE OF SCHOOL. Respondents were asked to indicate the type of library they work in. Survey results show that 66% of respondents were from elementary schools, 11% from middle/junior high schools, 15% from high schools, and nine percent indicated “other” serving K-8, K-12, etc.

The vast majority of the respondents (95%) were from public schools, and a very small percentage represented private, charter, and “other” types of schools.

ENROLLMENT. Respondents were asked to indicate the type of school. Respondents were also asked to indicate number of students who were enrolled in their school. The average enrolment at the schools was 643 students with a median of 530. Majority of schools had between 200 to 750 students enrolled.

LOCALITY. More than two-thirds (37%) of respondents were located in suburban schools, 27% in small town schools, 21% in rural schools, and 15% in urban schools.

GEOGRAPHIC REGION. One-third of respondents (33%) were located in the South, 23% in the West, 20% in the Midwest, and 17% in the Northeast.

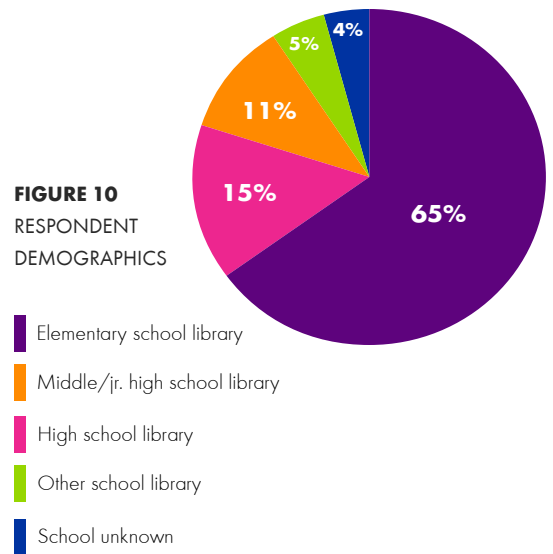


FIGURE 11
TYPES OF LIBRARIES IN OUR SAMPLE

	TYPE OF SCHOOL				Currently offer maker activities?	
	TOTAL	Elem	MS	HS	Yes	No
LESS THAN 200	6%	7%	1%	4%	6%	6%
200 - 499	35%	42%	23%	18%	37%	33%
500 - 749	32%	37%	32%	16%	32%	32%
750 - 999	14%	9%	29%	24%	13%	16%
1,000 - 1,999	10%	5%	15%	28%	10%	11%
2,000 OR MORE	2%	1%	0%	10%	2%	2%
MEAN	643	519	707	1083	621	668
MEDIAN	530	500	700	900	525	550

ABOUT SCHOOL LIBRARY JOURNAL

School Library Journal is the premiere publication for librarians and information specialists who work with children and teens. A source of quality journalism and reviews for more than 60 years, SJ produces award-winning features and news coverage on: literacy, best practices, technology, education policy and other issues of interest to the school library and greater educator community

ABOUT LITTLEBITS

littleBits is a platform of easy-to-use electronic building blocks empowering everyone to create inventions, large and small. These innovative building blocks snap together with tiny magnets, allowing anyone to build, invent, and prototype with electronics independent of age, gender and technical background – no soldering, wiring, or programming required.



APPENDIX A - SURVEY QUESTIONS

QUESTIONNAIRE

1. *What type of library do you work in?*
 - Public library [skip to public library survey]
 - School library: Elementary
 - School library: Middle/Jr. high
 - School library: High school
 - School library: Other (K-8, K-12, etc.)
 - Other library [thank & terminate survey]
 - Do not work in a library [thank & terminate survey]
2. *Does your library offer maker activities for students?*
 - Yes
 - No
3. *Do you have a dedicated makerspace?*
 - Yes, located in the library
 - Yes, located elsewhere in the school
 - None
 - Other, please specify: _____
4. *Who organizes/conducts maker activities in your library? Check all that apply.*
 - Librarian/Media Specialist/Teacher librarian
 - Library aide
 - Classroom teachers
 - Parents/volunteers
 - Students
 - Partner with outside organization(s)
 - Other, please specify: _____
5. *[if Q3 = located elsewhere in the school] Who conducts maker activities in your makerspace?*
 - Librarian/Media Specialist/Teacher librarian
 - Library aide
 - Classroom teachers
 - Parents/volunteers
 - Students
 - Partner with outside organization(s)
 - Other, please specify: _____
6. *[if Q3 = located elsewhere in the school] Do you also offer maker activities in the library?*
 - Yes
 - No
7. *What is your level of involvement in school maker activities? You are...*
 - Very active in maker activities
 - Somewhat active in maker activities
 - Not too active in maker activities
 - Not involved in maker, but interested
 - Not involved in maker, and no interest

[If not involved, but interested in maker, skip to Q21 open-end about which maker activities they'd like to offer. If not interested in maker, skip to optional comment before demographics]
8. *What types of maker activities have you personally been involved in during the 2016/2017 school year? Check all that apply.*
 - 3-D printing
 - Animation
 - Arts & crafts
 - Building with LEGO
 - Circuitry
 - Computer programming/coding
 - Graphic design
 - Knitting/crochet/fiber arts
 - Laser cutting
 - Robotics
 - Scrapbooking
 - Sewing
 - Sound recording
 - Video game design
 - Video making/editing
 - Website creation
 - Other, please specify: _____

9. Which are your three most popular maker activities? Please rank up to three choices.

- 3-D printing
- Animation
- Arts & crafts
- Building with LEGO
- Circuitry
- Computer programming/coding
- Graphic design
- Knitting/crochet/fiber arts
- Laser cutting
- Robotics
- Scrapbooking
- Sewing
- Sound recording
- Video game design
- Video making/editing
- Website creation
- Other, please specify: _____

10a. When do you offer these? Check all that apply.

- During whole class instruction
- During off/free periods
- Before or after school
- During clubs (Which clubs? _____)
- Special maker events (e.g., STEM night)
- Other, please specify _____

10b. Do your students do maker activities in conjunction with community services?

- Yes (Please tell us about it: _____)
- No
- Don't know

11. Would you say maker activity attendance has increased, decreased or stayed the same compared to 2015/2016?

- Increased
- Decreased
- Stayed the same
- N/A or Don't know

12. How do you decide which maker activities to offer? Check all that apply.

- Activities related to the curriculum/assignments
- Activities I can tie to books/literature
- Students request them
- Activities popular in the general culture
- Staff has background in the activities we offer
- STEM/STEAM related topics
- Contingent on grant funding
- Cost
- Availability of materials
- Space
- Time
- We have a volunteer to instruct
- Library assistants help decide
- Other, please specify: _____

13. In an average week, what percent of students' maker projects are tied to curriculum?

- 0%
- 1% -10%
- 11% - 20%
- 21% - 30%
- 31% - 40%
- 41% - 50%
- 51% - 60%
- 61% - 70%
- 71% - 80%
- 81% - 90%
- 91% - 99%
- 100%

14. How many teachers in your school do you coordinate with to tie maker activities to curriculum?

- All
- Most
- Some
- A few
- None

15. *When you provide maker activities through the library, is there ever the sense that you are overstepping into another teacher's or administrator's territory?*
- Yes (Please explain: _____)
 - No
16. *What sources do you use to learn about maker projects to tie into the curriculum?*
- School Library Journal
 - Other library professional journals
 - Making and DIY journals
 - Pinterest
 - Twitter
 - Facebook
 - Other social media: _____
 - Word of mouth
 - Vendors
 - Library conferences
 - Content area conferences
 - Technology conferences
 - Webinars/webcasts
 - Library organizations
 - School district
 - Websites/Online resources: _____
 - Blogs
 - Other, please specify: _____
17. *Do you partner with any of these in your community to coordinate maker projects? Check all that apply*
- Public library
 - Civic associations
 - Clubs
 - Colleges
 - Camps
 - Museums
 - Other, please specify: _____
 - None of the above
18. *[if none of the above] Are you interested in partnering with outside organizations to coordinate maker projects?*
- Yes
 - No
 - Maybe
19. *Have you used outside instructors for your maker activities in the last year? Check all that apply.*
- Yes, volunteer instructors
 - Yes, paid instructors
 - No, staff only
20. *Do you use any specific products to enhance your library's offerings? Check all that apply.*
- 3Doodler
 - Arduino
 - BeeBot
 - Bloxels
 - Chibitronics
 - Cubelets
 - Dash and Dot
 - Kano
 - K'Nex
 - Lego Mindstorms
 - LittleBits
 - Magformers
 - Makedo
 - MaKey MaKey
 - MiP
 - Osmo
 - Ozobot
 - Piper
 - Raspberry Pi
 - SAM Labs
 - Scratch
 - SnapCircuits
 - SparkFun
 - Sphero
 - Sphero/Ollie
 - Stikbot
 - Tynker
 - Other, please specify: _____

- None of the above
- Don't know
21. *Are there any maker activities that you are not currently offering that you would like to try in your library?*
- Yes (Please explain: _____)
 - No [If no, skip to Q29]
22. *If yes, what keeps you from offering the maker activities you'd like to try? Check all that apply.*
- Space limitations
- Lack of time during the day to offer
- Lack of time to learn about the subject
- Lack of funding
- Lack of supplies
- No student interest
- Have not found an instructor
- Not sure how to start
- Lack of training/sufficient skills to instruct
- Lack of activity ideas
- Unsupportive principal/administrators
- Other, please specify: _____
- 23a. *What aspect(s) of maker are you interested in learning about to help you provide activities in your library?*
- How to get started
- How to make space for it
- How to fund it
- Info about maker advocacy groups
- Specific maker programming (robotics, circuits, etc.)
- Administrator, community, teacher, student support
- STEM challenges
- Standards, assessment, mgmt., storage, mission
- Other, please specify: _____
- None of the above
- 23b. *[If "specific programming" above] Which of the following would you like to learn more about to help you enhance maker activities in your library? Check all that apply.*
- 3-D printing
- Animation
- Arts & crafts
- Circuitry
- Coding/Programming
- Graphic design
- Knitting/crocheting/fiber arts
- Laser cutting
- Microcontrollers
- Robotics
- Scrapbooking
- Sewing
- Sound recording
- Video game design
- Video making/editing
- Wearables
- Website creation
- Other, please specify: _____
24. *[If No in Q2, skip to demographics Q29] For which of the following maker materials are you involved in the recommendation or purchasing process? Please check all that apply.*
- 3-D printer
- 3-D printer supplies
- Books to support maker programming
- Camera/Video equipment
- Circuit kits
- Craft supplies
- Hardware (e.g., iPads, Chromebooks, etc.)
- Laser cutter
- Microcontrollers
- Printers/Scanners
- Robotics kits
- Software/apps
- Storage for maker products
- Video/music production equipment
- Other, please specify _____
- None of the above

25. [if involved in recommending or purchasing anything] How much would you estimate your library spent on materials and equipment for maker activities in the last year?
- \$0
 - \$1 - \$99
 - \$100 - \$499
 - \$500- \$999
 - \$1,000- 1,999
 - \$2,000 or more (Please specify: _____)
26. Where does the funding for your library's maker activities come from? Check all that apply.
- Technology budget
 - Materials budget
 - Dedicated maker budget
 - Programming budget
 - Grants
 - Fundraising/Crowdsourcing
 - Book fairs
 - PTO/PTA
 - Other, please specify _____
27. Are you expecting an increase in maker funding in the 2017/2018 school year?
- Yes
 - No
 - Don't know
28. [OPTIONAL] Please use this space to tell us about successful maker projects in your school. How do you measure success?

DEMOGRAPHICS

29. What is your job title/function?
- School library media specialist
 - Teacher librarian
 - School librarian
 - Curriculum coordinator
 - District library coordinator
 - Library aide
 - Classroom teacher
 - Other, please specify _____
30. Is your school public or private?
- Public school
 - Private school
 - Charter school
 - Other, please specify _____
31. How many students are currently enrolled in your school? _____
32. Where is your library located?
 _____ [US State or Canada]
33. How would you best describe your school's location?
- Urban
 - Suburban
 - Small town
 - Rural

APPENDIX B - DATA IN MORE DETAIL

FIGURE 1 DO SCHOOL LIBRARIES OFFER MAKER ACTIVITIES?

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
Yes	55%	55%	61%	49%	51%	60%	48%	51%	60%	61%	51%	42%
No	45%	45%	39%	51%	49%	40%	52%	49%	40%	39%	49%	58%

FIGURE 2 TYPES OF MAKER ACTIVITIES OFFERED

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
Arts & crafts	79%	78%	81%	79%	79%	78%	75%	87%	76%	78%	76%	81%
Coding/ programming	58%	62%	55%	33%	45%	64%	59%	55%	64%	63%	62%	38%
Circuitry	45%	43%	52%	42%	25%	47%	51%	50%	53%	48%	41%	37%
Robotics	31%	31%	33%	17%	21%	34%	33%	38%	27%	29%	37%	38%
Video making /editing	23%	21%	26%	21%	18%	27%	28%	17%	23%	25%	19%	14%
3-D printing	20%	16%	29%	33%	26%	13%	14%	33%	13%	28%	6%	14%
LEGOs/K'nex/Building tools (write-in)	19%	22%	22%	0%	20%	21%	24%	17%	14%	19%	21%	21%
Knitting/fiber arts	17%	14%	19%	25%	12%	24%	17%	13%	4%	14%	19%	32%
Animation	14%	13%	20%	4%	9%	11%	21%	14%	10%	17%	16%	9%
Video game design	11%	10%	17%	4%	5%	11%	14%	15%	3%	14%	13%	8%
Sewing	10%	6%	12%	21%	9%	10%	11%	7%	7%	7%	4%	21%
Website creation	6%	3%	10%	17%	1%	8%	4%	2%	7%	4%	8%	2%
Scrapbooking	5%	5%	10%	4%	3%	7%	6%	7%	2%	3%	6%	11%
Graphic design	4%	1%	10%	4%	3%	4%	3%	5%	1%	2%	9%	3%
Sound recording	4%	0%	9%	13%	1%	4%	5%	6%	3%	6%	6%	2%
Puzzles (write-in)	4%	1%	7%	13%	13%	1%	5%	3%	4%	5%	7%	0%
Engineering challenges (write-in)	4%	5%	1%	0%	13%	3%	5%	0%	0%	5%	4%	6%
Micro-controllers	3%	1%	9%	4%	0%	4%	2%	5%	3%	3%	2%	2%
Laser cutting	2%	0%	3%	8%	4%	0%	2%	1%	0%	1%	1%	5%
Other	27%	23%	36%	38%	44%	16%	30%	32%	21%	23%	41%	25%

FIGURE 3 MOST POPULAR MAKER ACTIVITIES

	Type of School			
	TOTAL	Elem	MS	HS
Building tools	87%	88%	93%	n/a
Arts & crafts	76%	84%	75%	78%
3-D printing	75%	83%	74%	88%
Coding/programming	69%	84%	67%	38%
Robotics	64%	77%	47%	100%
Circuitry	53%	53%	59%	50%
Video making/editing	52%	47%	56%	60%
Knitting/crochet/fiber arts	39%	22%	54%	50%
Animation	35%	33%	38%	100%
Video game design	28%	29%	36%	0%
Sewing	28%	25%	38%	20%
Website creation	13%	0%	17%	0%

FIGURE 4 CONJUNCTION OF MAKER ACTIVITIES AND COMMUNITY SERVICES

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
Yes	8%	7%	12%	8%	10%	4%	9%	7%	4%	9%	7%	7%
No	85%	88%	81%	75%	83%	83%	90%	88%	84%	85%	91%	89%
Don't know	7%	5%	7%	17%	6%	13%	1%	6%	12%	6%	2%	4%

FIGURE 5 DO SCHOOL LIBRARIES HAVE DEDICATED SPACE(S) FOR MAKER RELATED PROGRAMMING?

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
NET Yes	67%	69%	76%	56%	67%	70%	66%	62%	62%	74%	71%	60%
Yes, located in the library	59%	59%	71%	48%	54%	62%	61%	55%	61%	67%	53%	51%
Yes, located elsewhere in the school	9%	10%	5%	7%	13%	9%	5%	7%	1%	7%	18%	9%
Currently creating space	2%	1%	1%	4%	0%	3%	0%	0%	1%	0%	0%	0%
Other	6%	5%	5%	11%	3%	6%	8%	3%	4%	7%	7%	5%
None	28%	29%	20%	30%	31%	26%	30%	35%	34%	22%	27%	40%

FIGURE 6 TIMING FOR MAKER ACTIVITIES

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
During whole class instruction	63%	71%	49%	38%	72%	59%	75%	54%	55%	74%	72%	44%
During off/free periods	48%	39%	60%	75%	35%	54%	43%	57%	51%	44%	38%	56%
Before or after school	34%	28%	50%	54%	33%	44%	18%	32%	49%	33%	34%	27%
During clubs	22%	20%	35%	17%	29%	26%	7%	29%	31%	14%	26%	20%
Special maker events (e.g. STEM night)	12%	12%	13%	13%	1%	17%	10%	11%	11%	11%	7%	27%
Lunch time (write-in)	3%	0%	10%	13%	12%	1%	3%	4%	1%	3%	0%	4%
Other	10%	13%	6%	0%	1%	13%	9%	14%	5%	10%	17%	13%

FIGURE 7 ALIGNMENT OF MAKER ACTIVITIES WITH SCHOOL CURRICULUM

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
0%	13%	11%	13%	21%	12%	14%	22%	4%	19%	8%	13%	23%
1% - 10%	25%	25%	26%	29%	18%	25%	18%	36%	30%	28%	15%	22%
11% - 20%	12%	8%	13%	25%	12%	9%	15%	11%	9%	11%	21%	4%
21% - 30%	12%	14%	12%	4%	14%	18%	0%	12%	13%	4%	16%	30%
31% - 40%	3%	4%	4%	0%	3%	2%	9%	1%	2%	7%	0%	0%
41% - 50%	9%	11%	7%	0%	15%	9%	4%	9%	12%	8%	15%	2%
51% - 60%	7%	7%	7%	4%	1%	3%	14%	6%	0%	9%	5%	8%
61% - 70%	1%	0%	1%	4%	5%	1%	0%	1%	1%	0%	2%	0%
71% - 80%	5%	7%	0%	0%	6%	7%	1%	6%	5%	7%	2%	6%
81% - 90%	3%	3%	9%	0%	0%	1%	7%	6%	1%	5%	1%	4%
91% - 99%	2%	3%	3%	0%	6%	2%	2%	0%	0%	1%	0%	0%
100%	8%	8%	3%	13%	6%	9%	8%	9%	8%	11%	10%	1%
Mean %	31.8	34.3	29.3	23.8	35.6	31.1	32.2	32.5	25.3	37.3	30.5	23.3
Median %	19.9	25.1	18.0	10.5	26.2	22.0	17.0	19.4	11.6	28.6	21.2	21.3

FIGURE 8 COORDINATION BETWEEN LIBRARIANS AND TEACHERS

	Type of School			Locality				Region				
	TOTAL	Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
All	1%	1%	0%	4%	0%	1%	4%	0%	3%	2%	0%	0%
Most	6%	8%	4%	0%	14%	5%	0%	11%	0%	7%	5%	7%
Some	23%	24%	19%	16%	25%	22%	23%	21%	11%	24%	28%	24%
A few	44%	38%	53%	60%	36%	45%	37%	50%	53%	40%	48%	29%
None	26%	28%	24%	20%	25%	26%	36%	18%	33%	26%	19%	39%

FIGURE 9 SOURCES OF FUNDING FOR MAKER ACTIVITIES

	TOTAL	Type of School			Locality				Region			
		Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
Book fairs	44%	57%	31%	0%	36%	46%	53%	36%	9%	66%	39%	39%
Library Materials budget	36%	34%	42%	39%	23%	42%	35%	34%	56%	31%	36%	29%
Grants	29%	30%	36%	17%	25%	29%	24%	42%	28%	33%	27%	32%
PTO/PTA	19%	24%	18%	0%	15%	26%	17%	12%	11%	21%	25%	21%
Fundraising/Crowdsourcing	14%	16%	15%	4%	10%	18%	10%	12%	18%	9%	22%	15%
Technology budget	10%	9%	12%	13%	8%	12%	7%	11%	18%	6%	5%	19%
Programming budget	6%	4%	12%	9%	5%	8%	6%	2%	2%	3%	13%	7%
Dedicated maker budget	2%	0%	4%	9%	1%	0%	2%	7%	4%	0%	2%	1%
Other	27%	24%	31%	35%	26%	25%	27%	30%	14%	34%	21%	31%

FIGURE 10 CRITERIA USED BY LIBRARIANS FOR SELECTING MAKER ACTIVITIES

	TOTAL	Type of School			Locality				Region			
		Elem	MS	HS	Urban	Sub-urban	Small Town	Rural	North east	South	Mid west	West
Availability of materials	79%	80%	78%	72%	61%	84%	89%	79%	74%	82%	85%	79%
Cost	78%	79%	75%	84%	62%	87%	88%	69%	75%	81%	67%	81%
Time	61%	64%	65%	40%	60%	60%	61%	59%	62%	56%	56%	79%
Activities related to the curriculum/assignments	52%	59%	34%	36%	55%	52%	47%	50%	44%	61%	39%	49%
STEM/STEAM related topics	46%	49%	34%	36%	30%	51%	50%	46%	42%	57%	36%	44%
Space	46%	49%	34%	40%	40%	51%	60%	30%	42%	48%	53%	44%
Activities I can tie to books/literature	42%	48%	24%	32%	34%	43%	45%	47%	28%	52%	38%	42%
Activities popular in the general culture	40%	36%	46%	52%	48%	41%	38%	38%	30%	42%	35%	44%
Students request them	38%	35%	51%	36%	34%	37%	31%	52%	42%	38%	34%	38%
Staff has background/skills in the activities we offer	25%	20%	28%	44%	36%	25%	21%	24%	28%	25%	11%	29%
Contingent on grant funding	19%	20%	18%	16%	9%	21%	18%	19%	25%	21%	15%	20%
Library assistants help decide	7%	5%	6%	8%	1%	9%	6%	10%	1%	8%	6%	14%
We have a volunteer to instruct	5%	7%	0%	4%	0%	7%	9%	1%	5%	4%	5%	13%
Other	6%	4%	4%	16%	5%	6%	0%	10%	3%	3%	9%	7%

FIGURE 11 ROADBLOCKS FOR OFFERING MAKER ACTIVITIES

	TOTAL	Type of School			Currently offer maker activities?	
		Elem	MS	HS	Yes	No
Lack of funding	58%	58%	56%	64%	78%	43%
Lack of supplies	53%	56%	46%	55%	67%	43%
Lack of time during the day to offer	37%	40%	32%	30%	51%	26%
Not sure how to start	28%	29%	26%	27%	24%	31%
Space limitations	26%	28%	16%	30%	24%	28%
Lack of time to learn the subject	26%	26%	26%	27%	35%	19%
Lack of training/sufficient skills to instruct	22%	22%	16%	23%	26%	18%
Lack of activity ideas	7%	4%	10%	11%	5%	8%
Unsupportive principal/ administrators	4%	3%	5%	7%	2%	5%
Have not found an instructor	2%	1%	3%	5%	1%	3%
No student interest	1%	1%	1%	2%	2%	1%
Other	8%	6%	9%	16%	8%	8%

FIGURE 12 MAKER SUBJECTS OF INTEREST TO LIBRARIANS

	Type of School			Currently offer maker activities?		
	TOTAL	Elem	MS	HS	Yes	No
Robotics	51%	55%	44%	38%	48%	56%
Coding/Programming	49%	48%	52%	45%	44%	57%
Animation	47%	47%	39%	45%	41%	56%
Video making/editing	46%	45%	39%	60%	44%	50%
3D printing	44%	43%	44%	48%	43%	46%
Circuitry	39%	41%	32%	33%	37%	42%
Video game design	37%	36%	47%	30%	31%	49%
Arts & crafts	37%	36%	26%	48%	29%	49%
Wearables	32%	31%	32%	35%	33%	30%
Knitting/crocheting/fiber arts	29%	26%	24%	40%	32%	24%
Graphic design	28%	24%	36%	30%	24%	33%
Sound recording	26%	24%	24%	33%	22%	34%
Website creation	21%	20%	24%	20%	15%	31%
Sewing	21%	21%	21%	23%	21%	21%
Scrapbooking	16%	17%	10%	13%	14%	19%
Laser cutting	14%	11%	18%	25%	15%	12%
Micro-controllers	14%	11%	18%	15%	10%	20%
Other	4%	4%	6%	3%	0%	10%
None of the above	4%	5%	7%	0%	4%	3%



THANK YOU.