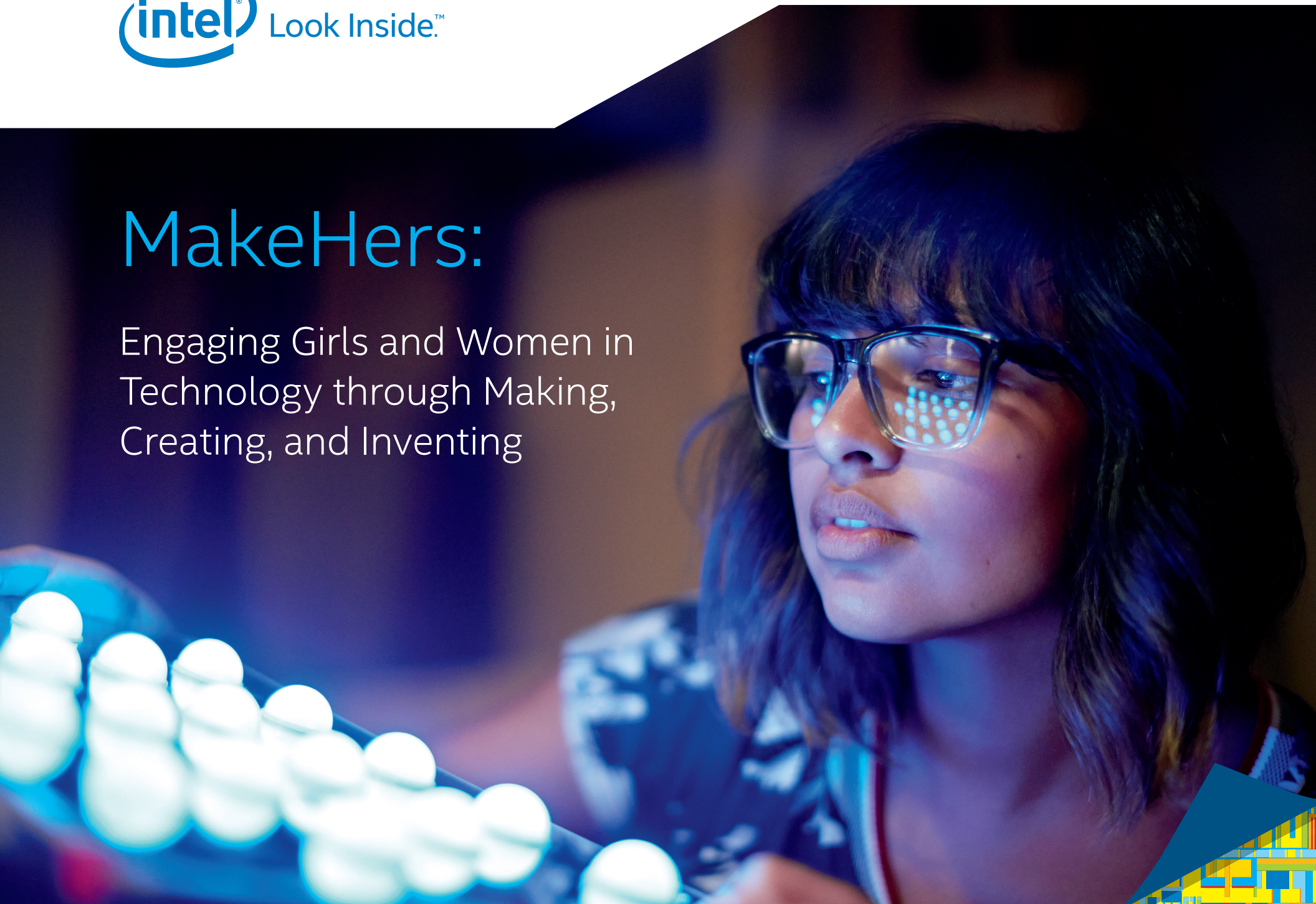




# MakeHers:

Engaging Girls and Women in  
Technology through Making,  
Creating, and Inventing





For over 40 years Intel has been creating technologies that advance the way people live, work, and learn. Through the Intel Global Girls and Women Initiative, we are working to empower millions of girls and women around the world by closing the gender gap in education access, inspiring more girls and women to become creators of technology, and connecting girls and women to opportunity through technology access. Intel supports a range of programs, competitions, and resources that seek to inspire and empower more girls and women to create and build the technology of the future. We focus on programs that feature hands-on activities such as “Maker” and coding, involve peer mentors and role models, and connect technology and engineering careers to positive social impact.

<http://www.intel.com/content/www/us/en/technology-in-education/girls-and-stem.html>

For questions or comments about this study, please contact Renee Wittemyer ([renee.wittemyer@intel.com](mailto:renee.wittemyer@intel.com))

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Over the last 5 decades, Harris Polls have become media staples. With comprehensive experience and precise technique in public opinion polling, along with a proven track record of uncovering consumers’ motivations and behaviors, The Harris Poll has gained strong brand recognition around the world. The Harris Poll offers a diverse portfolio of proprietary client solutions to transform relevant insights into actionable foresight for a wide range of industries including health care, technology, public affairs, energy, telecommunications, financial services, insurance, media, retail, restaurant, and consumer packaged goods.

# Executive Summary

The Maker Movement refers to the recent wave of tech-inspired, do-it-yourself (DIY) innovation sweeping the globe. Participants in this movement, known as makers, take advantage of cheap, powerful, easy-to-use tools, as well as easier access to knowledge, capital, and markets to create new physical objects. This revolutionary change in how hardware is innovated and manufactured has great potential to change the future of computing, particularly for girls and women, a group traditionally underrepresented in Science, Technology, Engineering, and Math (STEM) fields.

Making offers multiple entry points to engage and interest girls and women in the computer science and engineering fields.

- Girls who make, design, and create things with electronic tools develop stronger interest and skills in computer science and engineering.
- The playful and creative nature of making provides an avenue for people to engage in scientific and engineering problems that have personal meaning for them.
- Since making is based on what is personally relevant to an individual, it allows people of all backgrounds to pursue their interests and to use technological tools to develop their own projects. It can create more channels for girls to positively identify with computer science and engineering fields.
- Through making, girls and women gain valuable technology skills and a familiarity with problem-solving related to computer science and engineering. Risk-taking and

the process of becoming stuck and then “unstuck” is at the heart of making.

- Making enables those who may not be naturally tech-oriented to discover how technology and computing skills can help them achieve goals.

Enabling girls and women—who represent half of the world's population—to fully participate in the maker movement has important economic benefits. Participation in maker and STEM activities can help females develop skills and improve their earning potential. As a result, the STEM talent pool expands, fueling competition and innovation, and ultimately strengthening the global economy.

This report examines how participation in maker activities can help girls and women develop skills and provide a bridge to potential careers in computer science and engineering. It examines the nature and drivers of female involvement in the maker movement and considers how that involvement can be increased.

The study findings show:

**Girls and women makers are more likely than male makers to come to making through multiple pathways including engineering, computer science, arts, and design.**

- Female makers were more likely to have engineering or computer and information science degrees than any other credential. However, they were more likely to identify with arts and creation and describe themselves as coming to making via arts. Technology is often a means, not the end, for them.
- A 3-D printer is a key tool for women makers. Women in all countries surveyed are significantly more likely to use 3-D printers than men.
- Female makers in the survey are particularly motivated by social-service aspects of making. Among those surveyed, female makers in the US and Mexico are more likely

- than males to be motivated to make because they want “to help or to give.”
- Female makers are more likely to rely on personal connections as resources throughout the making process and say that collaboration is a key part of making. Interacting and connecting with others is important to women makers.

**Making is already popular with tweens and teens in the U.S., including both girls and boys:**

- Girls and boys in the U.S. are equally likely to be “tech makers.”
- One in four has made things with technology during the past year, and seven in 10 would like to learn to make something with electronics.
- All youth makers, both female and male, are more likely than other young people to describe themselves as independent, hardworking, solution oriented, and social.
- Nearly all parents surveyed believe that getting both girls and boys involved with making and creating things with electronic tools is a great way to build interest and skills in STEM, essential in building skills for a future career.

**Girls and women face constraints to participating in making.**

In general, female and male makers surveyed face similar challenges to making, such as lack of money, lack of information and lack of access to tools and materials. But females experience other challenges, as well.

- Lack of mentorship is the second-ranked challenge with one in three women citing it as a barrier to making.
- One in six has been excluded for being a woman.
- One in six lives in a culture where making is considered inappropriate for girls and women.
- One in 14 doesn't feel safe going to maker activities.

The maker movement is gaining excitement and momentum. Action is needed to take advantage of this momentum to increase participation and diversity in making, at large. This study's goal is to make the point that broadening a participation in making is critical, particularly for groups historically underrepresented in computer science and engineering fields.

The study outlines a set of recommendations for action for key stakeholders, with a focus on

parents, educators, policymakers, and the private sector. The goal is to:

- Interest more participation in STEM, particularly computer science and engineering fields of girls and women and underrepresented minorities.
- Increase the size of the “well” of people for the computer science and engineering pipelines, by engaging underrepresented groups in making activities.

## **A Call to Action:**

Broadening participation and diversity in the maker movement requires commitment to action across public, private, and civil society sectors. By taking action, stakeholders have the potential to activate 25,000 aspiring makers from underrepresented groups over the next two years by introducing maker activities into existing STEM programs, such as informal after-school clubs and groups focused on girls and underrepresented minorities. To support this, stakeholders must collaborate and coordinate efforts to encourage making. They must also build links between home and school and between formal and informal learning environments. The following recommendations focus on the factors that influence engagement in making. They are based on existing strategies from STEM programs that work to encourage participation, combined with the unique characteristics of maker activities. To successfully achieve the call to action requires the recommendations be tailored to particular groups being targeted and each country context in their implementation. They are also contingent on coordinated and collaborative action across the public and private sectors.

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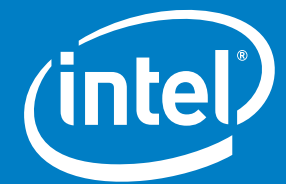
#### **Key Recommendations to Engage Girls and Women in Making**

- **Build** more girls- and women-inclusive maker environments in public places like libraries and schools.
- **Design** maker spaces that enable open-ended investigation of projects meaningful to girls and women.
- **Develop** initiatives that give girls more access to makers their own age and female mentors.
- **Encourage** parents to “embrace the mess” and engage in making with their children.
- **Align** making activities, such as coding and making hardware, with current trends and personal interests to attract girls.
- **Include** facilitators in maker spaces to create a safe, supportive, inclusive environment for girls and women.

The report’s findings were drawn from a number of secondary and primary sources:

- A survey of makers in the U.S., China, and Mexico conducted on behalf of Intel by the Harris Poll;
- Two general population surveys of youth and adults in the U.S., also conducted on behalf of Intel by Harris Poll;
- Interviews with experts in the field;
- Ethnographic research on girls and women engaged in the maker movement; and
- Literature reviews on the maker movement and the gender gap in STEM.





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