



ISTE SEAL OF ALIGNMENT REVIEW FINDINGS REPORT

MakerBot Certification Program

SEPT 2018

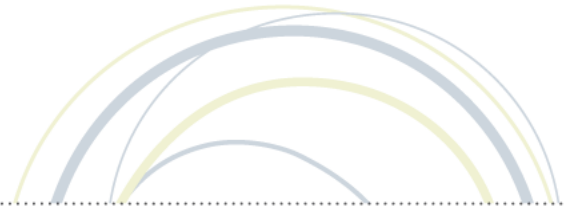
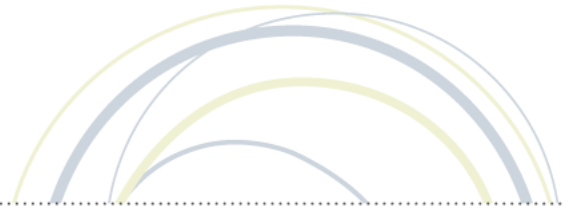


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ABOUT

ABOUT ISTE

The International Society for Technology in Education (ISTE) is the premier nonprofit membership organization serving educators and education leaders. ISTE is committed to empowering connected learners in a connected world and serves more than 100,000 education stakeholders throughout the world.

As the creator and steward of the definitive education technology standards, our mission is to empower learners to flourish in a connected world by cultivating a passionate professional learning community, linking educators and partners, leveraging knowledge and expertise, advocating for strategic policies, and continually improving learning and teaching.

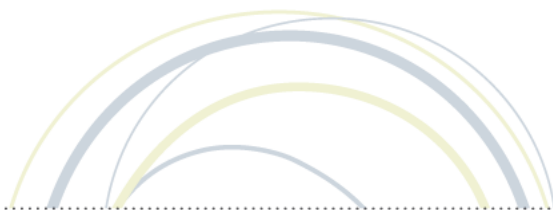
ISTE SEAL OF ALIGNMENT

Resources and products designed with the ISTE Standards in mind are choosing to demonstrate their commitment to support critical digital age learning skills and knowledge. Regardless of a solution's intended grade level, purpose or content area, by addressing the ISTE Standards and earning a Seal of Alignment, a solution is shown to consciously, purposefully and meaningfully support best practices for digital age teaching and learning.

ISTE considers a solution aligned to the ISTE Standards only after an extensive review conducted by trained ISTE Seal of Alignment reviewers, and it has been determined to meet all critical elements of a particular standard indicator in accordance with specific review criteria.

By earning a Seal of Alignment, ISTE verifies that this product:

- Promotes critical technology skills
- Supports the use of technology in appropriate ways □
- Contributes to the pedagogically robust use of technology for teaching and learning
- Aligns to the ISTE Standards in specific ways as described in the review finding report



RESOURCE DESCRIPTION

WHAT IS THE MAKERBOT CERTIFICATION PROGRAM?

The MakerBot Certification Program offers participants two learning plans to successfully deploy MakerBot 3D printers in the classroom. The MakerBot Certification program is hosted on an LMS at the MakerBot University website, along with accompanying curriculum resources.

The two learning plans, or workshops, are designed to introduce participants to the use of 3D printing as a learning resource for the classroom and makerspaces. In the *MakerBot Operator* learning plan, participants first learn how to setup and operate a 3D printer and then how to develop lesson plans or projects that enable students to use this technology for their own learning. The second *Curriculum Creator* learning plan, is designed to help educators learn how to use MakerBot 3D printing in the classroom. Sample lesson plans in the MakerBot Educators Guidebook include guidance on alignment to a variety of learning standards.

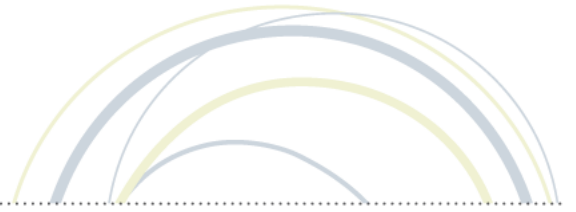
HOW IS THE MAKERBOT CERTIFICATION PROGRAM IMPLEMENTED?

The two workshops are sequenced, step-by-step learning experiences that employ text, graphics, voice-over and videos to introduce the ideas and concepts.

Both workshops are available online as fully self-paced lessons, however, they are offered in a blended format to some school districts

MakerBot Operator is divided into seven parts, or courses, typically including a quiz at the end of each. Once all the parts/courses are completed, candidates qualify to take a 30-minute exam which is required for certification.

The MakerBot Curriculum Creator is divided into five parts with quizzes at the end of the first four and an exam at the end estimated to take around four and half hours. The exam includes 30-minute online test and also requires the creation of a Thingiverse Education Project using the MakerBot printer for use with students. The project is uploaded to the Thingiverse online community for students and other educators to use. Upon completion of the project and exam, educators are awarded a MakerBot Curriculum Creator badge and certification.



ISTE SEAL OF ALIGNMENT REVIEW

Product: MakerBot Certification Program

Company: MakerBot

Date of Award: September 2018

REVIEW METHODOLOGY

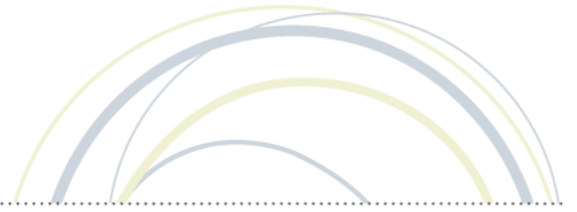
ISTE Seal of Alignment reviews are conducted by a panel of education and instructional experts. Reviewers use data collected both separately and collectively to determine how a solution addresses specific elements described in each of the indicators of the ISTE Standards. Special instruments are used by reviewers to collect data on potential alignment across all resource materials. Alignment is determined based on the extent to which all or some of specific elements are addressed within the materials. Reviewers conduct regular calibrations to assure the validity and reliability of the results and final review findings are combined for an overall score for alignment on each individual indicator.

The MakerBot Certification Program was reviewed for alignment against the ISTE Standards for Educators, at the Proficiency level. A Seal of Alignment at the Proficiency level recognizes high quality resources designed to develop skills needed to meet the ISTE Standards indicators. The evidence found in the MakerBot Certification Program supports a strong alignment to the ISTE Standards for Educators.

SCOPE OF REVIEW

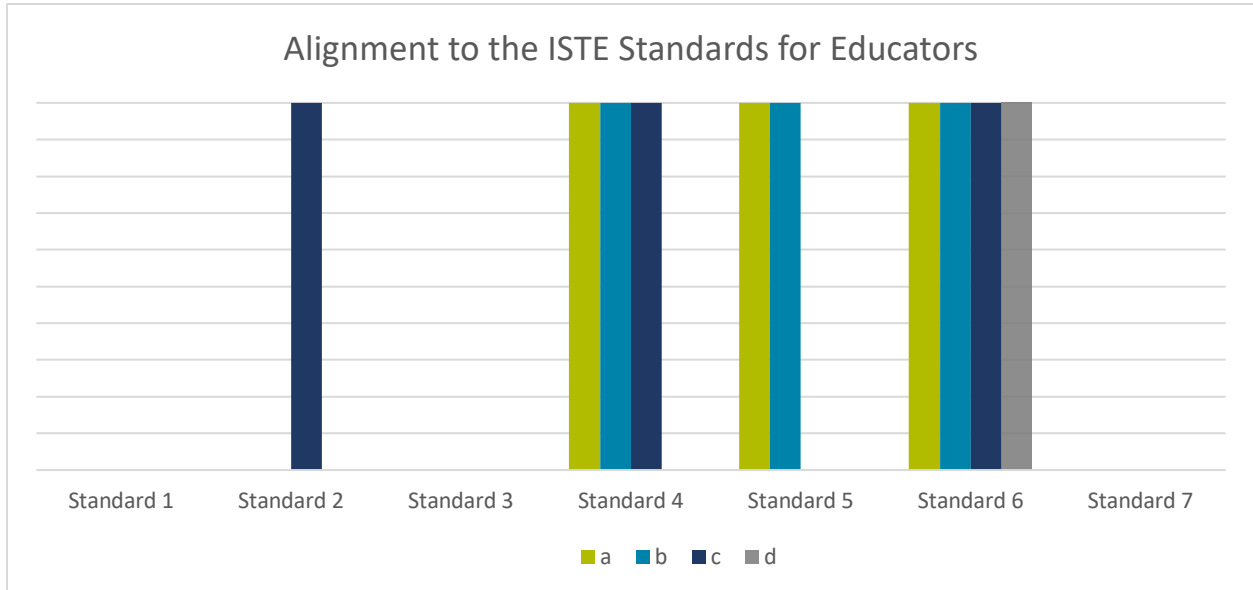
During the review process for the MakerBot Certification Program, reviewers:

- collected data on when and how each activity addressed specific skills and knowledge described in the ISTE Standards for Educators.
- compiled findings to determine overall alignment across all ISTE Educator standards and indicators.
- used aggregate findings to form the basis of the overall alignment results.



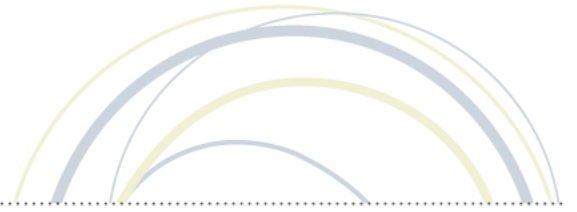
REVIEW FINDINGS

The MakerBot Certification Program resource aligns to the following indicators of the ISTE Standards for Educators:

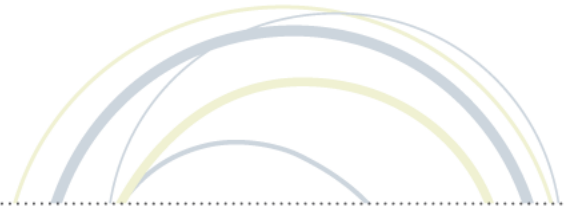


The MakerBot Certification Program was found to align to the ISTE Standards for Educators at in the following ways:

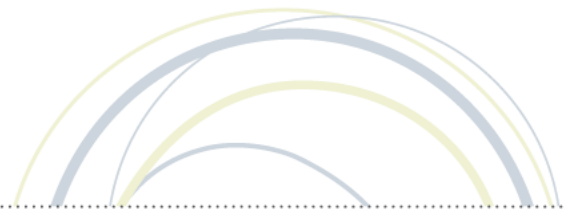
ISTE Standard	Finding Statement
1. Learner	
1.a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.	
1.b. Pursue professional interests by creating and actively participating in local and global learning networks.	
1.c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.	
2. Leader	



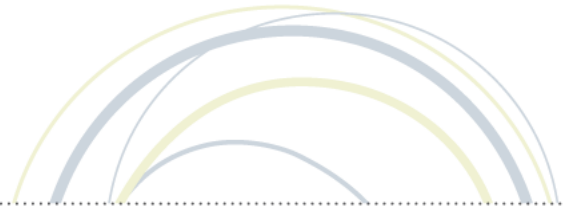
2.a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.	
2.b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.	
2.c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.	Participants gain hands on experience using 3D printers, evaluating potential uses in classrooms and makerspaces, and creating resources for other teachers that show how 3D printing can enhance student learning. Lesson plans and templates for 3D objects are uploaded to Thingiverse for both teachers and students to use.
3. Citizen	
3.a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.	
3.b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.	
3.c. Mentor students in safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.	
3.d. Model and promote management of personal data and digital identity and protect student data privacy.	
4. Collaborator	
4.a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.	Teachers gain experience collaborating with other teachers by learning from and sharing lesson plans and other digital resources archived on the Thingiverse site that are focused on hand-on, real-world problem-solving with students.
4.b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.	Learning to operate 3D printers, troubleshooting potential problems with their use, and developing lesson plans to involve students in constructivist learning experiences prepare teachers to collaborate and co-learn with students.



<p>4.c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.</p>	<p>Teachers collaborate with both students and other teachers, locally and globally, by developing lesson plans that involve students in solving problems and creating 3D objects with real-world uses, and then sharing their solutions and other resources with others.</p>
<p>4.d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.</p>	
<p>5. Designer</p>	
<p>5.a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.</p>	<p>The lessons and projects demonstrated in the workshops and illustrated in the MakerBot Educator Guidebook are constructivist in nature providing many opportunities for independent learning and personalization. Many of the lessons also include a description of the difficulty levels and provide suggestions for extended activities that support accommodations of learner differences.</p>
<p>5.b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.</p>	<p>The lessons and projects demonstrated in the workshops and illustrated in the MakerBot Educators Guidebook are focused on hands-on, real-world problems that engage students in complex learning situations. The lesson plan demonstrations and the template used by teachers in creating their own lesson plans includes references to standards alignment.</p>
<p>5.c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.</p>	
<p>6. Facilitator</p>	
<p>6.a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings</p>	<p>The Educators Guidebook lessons provide a range of both independent and group 3D printing projects that encourage students to set goals and challenge their levels of creativity through the design & creation process.</p>
<p>6.b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.</p>	<p>The courses and supplemental materials provide extensive, detailed instructions to help both teachers and students successfully use 3D printers. The materials include strategies for placement, access management, and project selection to help teachers optimize the</p>



	integration of this technology into the classroom.
6.c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.	Some aspect of the design process and computational thinking strategies are at the heart of almost every activity in the courses. Students learn to define and deconstruct problems to solve, design visual/CAD solutions and turn them into 3D objects.
6.d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.	Projects in the courses and the Educators Guidebook consistently demonstrate how students can create 3D objects that illustrate and communicate their knowledge of a wide range of subject areas including math, science, technology and art.
7. Analyst	
7.a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.	
7.b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.	
7.c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self- direction.	



CONCLUSION

The MakerBot Operator course does an outstanding job of introducing an innovative new educational technology to the field in a way that makes it easy to understand and un-intimidating to use so teachers can focus their attention on “using technology to learn” rather than “learning to use the technology.” In addition, teachers are also provided with detailed setup, classroom management and trouble-shooting tips.

The Curriculum Creator course prepares teachers through engaging hands-on experiences to create and implement lesson plans focused on problem-solving and creative design activities across a variety of disciplines. The lessons in the MakerBot Educators Guidebook provide examples and entry points for teachers and students across a range of grade and experience levels as well. Collaborative activities for teachers and students are encouraged and diversified by links to the Thingiverse platform and to a number of software design applications.

The materials for both courses are clear, easy to navigate and professional in presentation. Although both courses can be completed in around 12 hours, including final project creation, these materials are packed with helpful information and manage to convey the excitement, innovation and creativity that 3D printing can bring to the classroom and makerspaces.