International Society for Technology in Education

ISTE SEAL OF ALIGNMENT REVIEW FINDINGS REPORT

Photon

December 2022

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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 nourish 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 *Photon*?

Photon is an educational company centered around three curriculum pillars: social-emotional learning, STEM, and connectivity with a global community. A *Photon* (*home or school*) educational robot helps children learn problem-solving skills, STEM, and programming. Photon aims to increase student achievement through coding, computer science, and computational thinking.

Different teaching kits are included, with a *Photon* robot emphasizing play at all grade levels. The available teaching kits available: Artificial Intelligence, Early Education, Physics, Robotics & Coding, Social Emotional Learning, Special Education, and Sustainable Energy. Digital textbooks are available to assist with setup and lesson ideas for educators. An educator portal allows educators to search for grade-level-specific resources such as lesson plans, teaching scenarios, activities, videos, and projects. An online course for beginners is also available on YouTube.

The *Photon* robot also integrates easily with other technologies. An application known as *Photon* EDU allows students and teachers access to Photon Joystick, Photon Draw, Photon Badge, Photon Blocks, Photon Code, and Scratch. Each of these programs connects directly with the Photon robot to execute different commands and sequences designed by students. Students can work individually, in pairs, or in small groups with each task, scenario, or project.

HOW IS *Photon* IMPLEMENTED?

The *Photon* teaching kits can be implemented at different grade levels based on educator goals and curriculum teaching standards. The different teaching kits are *Artificial Intelligence, Early Education, Physics, Robotics & Coding, Social Emotional Learning, Special Education, and Sustainable Energy*. Within each teaching kit, educators are provided with a robust array of teaching scenarios, student-led collaborative projects, and various activities for classroom instruction. The instructional approach allows for student creativity, problem-solving, and a team-building experience amongst students.

In addition to the many resources available within the *Photon* website and Photon Magic Bridge Application, ISTE reviewers also focused on two teaching kits: Photon Social & Emotional Learning Kit and Photon Artificial Intelligence Teaching Kit. The SEL Teaching kit involves teaching and development strategies focusing on students' emotions and their ability to recognize

and process emotions. The Photon Artificial Intelligence Kit offers a choice of two development paths based on student grade levels, each consisting of ten lessons and projects. Students solve problems using real-world artificial intelligence technologies by transforming the robot into a smart cash register, a refrigerator, an autonomous vehicle, a police detective, or a chatbot. Students further explore the uses of artificial intelligence technology in everyday life.

ISTE SEAL OF ALIGNMENT REVIEW

Product: Photon Robot & Teaching Kits
Organization: Photon
Date of Award: December 2022

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 the 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.

SCOPE OF REVIEW

Photon was reviewed for alignment against the ISTE Standards for Students. ISTE reviewers examined all lessons that appeared to have content aligned to the Standards. Photon was reviewed for alignment against the ISTE Standards for Students within the following categories.

- Photon Robot & Photon Teaching Kit: Artificial Intelligence
- Photon Robot & Photon Teaching Kit: Social & Emotional Learning
- Photon Textbook
- Photon Introduction to Programming Textbook
- Help Center, Lesson Scenarios, Videos on Photon EDU website
- Photon App: Photon Joystick, Photon Draw, Photon Badge, Photon Blocks & Photon Scratch
- Photon Magic Bridge Application (Coding & Robotics Kit)

REVIEW FINDINGS

The ISTE Standards can be aligned at the following levels:

- Foundational - Resources and activities aligned at the *foundational* level primarily focus on skills and knowledge that facilitate skill acquisition to eventually meet ISTE Standard indicators.
- Applied – Resources and activities aligned at the *applied* level primarily focus on practical, real-world, and/or relevant opportunities to practice the skills and knowledge learned in the curriculum.

Photon was found to align with the ISTE Standards for Students in the following areas:

ISTE STANDARDS FOR STUDENTS

	Standard 1 Empowered Learner	Standard 2 Digital Citizen	Standard 3 Knowledge Constructor	Standard 4 Innovative Designer	Standard 5 Computational Thinker	Standard 6 Creative Communicator	Standard 7 Global Collaborator
Indicator A							
Indicator B							
Indicator C							
Indicator D							

Foundational resources and activities focus primarily on knowledge that facilitates skills acquisition to eventually meet ISTE Standards indicators.

Applied resources and activities focus primarily on practical, real-world and/or relevant opportunities to practice the skills and knowledge learned in the curriculum.

Photon was found to address the ISTE Standards for Students in the following ways:

ISTE STANDARD	FOUNDATIONAL FINDING STATEMENT
1. Empowered Learner. Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.	
1.a. Articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.	Students are encouraged to set personal and collective goals for each of the tasked activities or scenarios inside Photon's curriculum. Students reflect on their progress through error detection and algorithm repair and analyze the robot's intended performance.
1.b. Build networks and customize their learning environments in ways that support the learning process.	Students build customized sequences and programs for the Photon robot to follow based on different scenarios. They are advised to use the support provided through the digital textbook and student-friendly app.
1.c. Use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.	Students demonstrate their knowledge of coding and programming in all aspects and lessons within Photon teaching kits. They learn there are multiple paths to reach an intended outcome. Students receive immediate feedback based on the robot's movements and can brainstorm changes.
1.d. Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.	Students are introduced to the concept of programming, learning how a robot moves, creating a sequence of moves for the robot, using sensors in robots, and using conditional statements in each teaching kit. Students make connections made to current technologies such as magnets, security systems, and setting timers.

2. Digital Citizen. Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.	
2.a. Cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.	
2.b. Engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.	
2.c. Demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.	
2.d. Manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.	
3. Knowledge Constructor. Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.	
3.a. Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.	
3.b. Evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.	

3.c. Curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.	
3.d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.	Students explore different real-world scenarios, which promotes solution-orientated brainstorming in designing a sequence for the robot to follow. Students are led to problem-solve with both error detection and algorithm repair to propose solutions based on what has been tested.
4. Innovative Designer. Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.	
4.a. Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.	Students gain computer programming skills such as designing functions, learning how to use loops or conditional instructions within the Blocks and Badge interfaces, building parameters, and using conditional statements. Thorough explanations of programming terminology are provided within the introduction to the programming textbook.
4.b. Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.	
4.c. Develop, test and refine prototypes as part of a cyclical design process.	Students create sequences for the robot to follow, design functions, program with parameters, repeat sequences with loops, using sensors, and construct conditional statement(s) as part of their design process.
4.d. Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.	Students work together to creatively propose different solutions based on a real-world problem or scenario. They work together to design paths, navigate obstacle courses, and build a ramp for the robot to drive on.
5. Computational Thinker. Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.	

5.a. Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.	The teaching kits promote student algorithmic thinking through all of the different coding tasks and projects. Students also learn about the importance of chatbots and how they are used in everyday life.
5.b. Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	Each of the programming applications allows students to problem-solve using a series of codes or boxes to command the robot's movements, sounds, and colors. Students wirelessly communicate & send data to the robot and work collaboratively to analyze the outcome.
5.c. Break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	The Photon EDU application helps students break down computer programming into simplistic steps and how to design automated solutions.
5.d. Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.	Students design automated solutions through lesson scenarios, in which they can immediately test their sequences and make changes in real time. All of the lessons encourage students to focus on error detection and algorithm repair.
6. Creative Communicator. Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.	
6.a. Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.	
6.b. Create original works or responsibly repurpose or remix digital resources into new creations.	
6.c. Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.	

6.d. Publish or present content that customizes the message and medium for their intended audiences.	
7. Global Collaborator. Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.	
7.a. Use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.	
7.b. Use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.	
7.c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.	In each teaching kit, student collaboration is promoted, and students work together towards a common goal to develop a solution as a team using computer programming.
7.d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions.	

CONCLUSION

To summarize, ISTE Reviewers examined the website, teaching kits, available resources and application which allow students to creatively explore solutions through the world of coding and computer programming. There are a variety of teaching kits available to utilize with the Photon robot such as: Artificial Intelligence, Early Education, Physics, Robotics & Coding, Social Emotional Learning, Special Education and Sustainable Energy. Students work to brainstorm solutions independently, in pairs or small groups to real-world scenarios and project-based tasks.

The resources offer students different learning scenarios which work towards formulating solutions using computer programming. They develop their knowledge of coding by demonstrating their understanding of how to create sequences for the robot to follow, design functions, program with parameters, repeat sequences with loops, using sensors and construct conditional statement(s) as part of their overall design process.